

NEJAC Public Comments

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U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Docket ID No. EPA-HQ-OA-2022-0859

RE: Comments on EPA’s Civil Rights Obligations in Designing and Implementing the Greenhouse Gas Reduction Fund

As members of the Title VI Alliance¹ - a coalition of attorneys, advocates, and community members seeking strengthened civil rights protections in federal environmental decision making - we appreciate the opportunity to provide comments on the design and implementation of the Greenhouse Gas Reduction Fund (GHGRF).

In particular, we write to provide comments on essential safeguards and principles EPA should consider to ensure that (1) funds spent and leveraged under the GHGRF directly benefit disadvantaged and low-income communities, and (2) recipients of GHGRF resources comply with their civil rights obligations under Title VI of the Civil Rights Act of 1964 (Title VI) and other laws.

Absent meaningful consultation and adequate civil rights safeguards, investments of this scale may not fully and fairly benefit People of Color, Indigenous Peoples and Tribal Nations, and low-income communities. These communities have for too long felt the adverse health and other effects of racial segregation and inadequate environmental protection.² Government-sanctioned discriminatory housing and land use practices have had devastating impacts on generations of residents, whose injuries include disproportionate levels of lead poisoning, asthma, diabetes, heart disease, respiratory illness, cancer, and now COVID-19.³ Severe and long-standing

¹ Organizational signatories include Taproot Earth, Earthjustice, Alternatives for Community and Environment, the UC Berkeley School of Public Health, National Housing Law Project, IDARE LLC, the Institute for Policy Integrity, BIG! Blacks in Green, Center for Environmental Health, and Concerned Citizens for Nuclear Safety. Individual signatories include Richard Grow (U.S. EPA, retired), Hannah Perls (Harvard Environmental & Energy Law Program), and Leslie Fields (Sierra Club). Please find a complete list of signatures at the end of this letter.

² See e.g. Dorceta E. Taylor, Toxic Exposure: Landmark Cases in the South and the Rise of Environmental Justice Activism, in TOXIC COMMUNITIES: ENVIRONMENTAL-RACISM, INDUSTRIAL POLLUTION, AND RESIDENTIAL MOBILITY 6 (New York University Press 2014) (highlighting major environmental racism cases in the South). See also Christopher W. Tessum, et al., PM2.5 polluters disproportionately and systemically affect people of color in the United States, *Sci. Advances*, vol. 27, no. 18 (Apr. 28, 2021).

³ See, e.g., Jyotsna S. Jagai et al., The Association Between Environmental Quality and Diabetes in the U.S., *Journal of Diabetes Investigation* (Oct. 2019) <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7078099/>, Olga Khazan, A Frightening New Reason to Worry About Air Pollution, *The Atlantic* (July 5, 2018) [https://www.theatlantic.com/health/archive/2018/07/a-frightening-new-reason-to-worry-about-air-pollution/564428](https://www.theatlantic.com/health/archive/2018/07/a-frightening-new-reason-to-worry-about-air-pollution/564428;);

deficiencies in federal external civil rights enforcement and oversight play a key role in enabling such environmental racism and injustice.⁴ The climate crisis has proven to be a threat multiplier for People of Color, Indigenous Peoples and Tribal Nations, and low-income communities even as these same communities receive disproportionately fewer resources to prepare for and recover from extreme weather and other climate-related disasters.

In our comments below, we identify several areas where EPA should ensure that civil rights obligations inform the allocation and implementation of the GHGRF, including the design of grant selection criteria, and mechanisms for ongoing monitoring and accountability. Zealous enforcement of Title VI and Executive Orders 12898, 13985, and 14008 in the expenditure of federal funds is necessary to correct the longstanding trend of concentrating industry and emitting facilities in EJ communities already disinvested and overburdened by pollution, and now contending with increasing risks due to climate change. This includes compliance with the administration's Justice40 Initiative established under EO 14008, in which at least forty percent of the "benefits" under federal climate, energy, and environmental programs should be directed to "disadvantaged communities."

In addition to our responses below, we urge EPA to adopt the following principles for the design and implementation of both the \$7 billion for zero-emission distributed generation technologies to benefit disadvantaged and low-income communities, and the \$20 billion in financing and technical assistance to be allocated by nonprofit entities.

- **EPA should maximize benefits for low-income and disadvantaged communities across the entire \$27 billion portfolio.** Prioritizing direct investments in and benefits to low-income and disadvantaged communities and households is the best way to accomplish multiple goals of the GHGRF, including facilitating additionality, creating new markets for clean energy technologies, and ensuring compliance with the administration's Justice40 Initiative.
- **EPA should clarify that GHGRF resources must directly benefit disadvantaged communities.** Examples of such direct benefits include investments in energy efficiency, resilience, or electrification in affordable housing, small businesses, nonprofits, community facilities, and small educational and religious institutions that address existing inequities and contribute to measurable improvements to social determinants of

Anthony Nardone et al., Associations between historical residential redlining and current age-adjusted rates of emergency department visits due to asthma across eight cities in California: an ecological study, *Lancet Planet Health* (Jan. 4, 2020); New Research Links Air Pollution to Higher Coronavirus Death Rates, *N.Y. Times* (Apr. 7, 2020) <https://www.nytimes.com/2020/04/07/climate/air-pollution-coronavirus-covid.html>; Claudia Persico & Kathryn Johnson, The effects of increased pollution on COVID-19 cases and deaths, *J. Env'tl. Econ. Mgmt.* (Feb. 2021), <https://www.sciencedirect.com/science/article/pii/S0095069621000140>.

⁴ See, e.g., Marianne Engelman-Lado, No More Excuses: Building A New Vision of Civil Rights Enforcement in the Context of Environmental Justice, 22.4 *Univ. of Pennsylvania J. of L. and Soc. Change* 281, 290–93 (2019) (documenting EPA's failure to adequately enforce Title VI of the Civil Rights Act).

health in disadvantaged communities. Achieving general reductions in greenhouse gas emissions, absent demonstrations of direct benefits to disadvantaged communities, is an unacceptable use of the GHGRF.⁵

- **EPA should clarify that GHGRF funds can be used for retrofits and other investments necessary to make properties eligible for clean energy and other improvements, including zero-emission technologies.** Many projects with the potential to deliver significant benefits to disadvantaged communities require upfront investments that aren't covered by other federal clean energy funding. For example, aging infrastructure in communities with a history of disinvestment often require significant remediation or upgrades prior to installing zero-emission technology, weatherizing the property, or other climate-friendly projects. Individual properties, including homes and rental properties, may likewise need significant remediation or upgrades before GHG reduction strategies can be deployed. EPA should therefore clarify that GHGRF grants can be used to invest in necessary infrastructure or home upgrades and remediation to facilitate future clean energy project financing in communities that the private market does not currently serve.
- **EPA must pair financing with technical assistance and grants to ensure disadvantaged communities are able to access clean energy solutions.** In order to ensure GHGRF benefits reach disadvantaged communities, EPA must invest in the capacity of community-based organizations and local residents to leverage and implement clean energy financing. This gap in resources exists in both public infrastructure, such as transit, and at the household level, where homeowners require resources to come into compliance with relevant codes before accessing energy efficiency resources.

We also urge EPA to adopt specific principles with regards to the \$20 billion in financing and technical assistance available under Sections 134(a)(2) and (3). The IRA's legislative history clearly demonstrates that the \$7 billion available under Section 134(a)(1) to facilitate the adoption of zero-emission technologies is distinct in form and nature from the rest of the GHGRF, and should preference distributed generation and closely-related technologies directly benefiting residents of disadvantaged and low-income communities.⁶ We therefore offer the following principles as separate recommendations with regards to the other \$20 billion in financing under Sections 134(a)(2) and (3):

⁵ See, e.g., Juan Declet-Baretto & Andrew A. Rosenberg, *Environmental justice and power plant emissions in the Regional Greenhouse Gas Initiative states*, PLoS ONE 17(7): eo271026 (July 20, 2022), <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0271026> (finding that power sector carbon mitigation policies focusing on aggregate emissions reductions have largely benefitted non-environmental justice communities and have not redressed the fundamental problem of disparities in pollutant burdens between EJ and non-EJ communities).

⁶ For more, see comments from the Coalition for Community Solar Access (CCSA).

- When evaluating a proposed project’s benefits under Sections 134(a)(2) and (3), **entities should consider reductions in GHGs, criteria pollutants, and hazardous air pollutants (HAPs)**. Under Section 134(c)(3), a “qualified project” is one that “reduces or avoids greenhouse gas emissions and *other forms of air pollution*.” EPA’s RFI therefore unnecessarily restricts the scope of the GHGRF to GHGs and criteria pollutants, excluding potential benefits from reductions in HAPs, such as mercury and other air toxics, which are suspected to cause serious health problems including immunological, neurological, reproductive, and respiratory harm.
- Whenever possible, **EPA should consider how proposed projects will reduce upstream emissions of GHGs and other pollutants**. Many clean energy sources rely on upstream processes that disproportionately impact disadvantaged and low-income communities, including nuclear energy and natural gas-reliant technologies. By accounting for upstream emissions, EPA can ensure that selected projects do not result in net disproportionate burdens or impacts to the very communities the GHGRF is designed to benefit most.
- When selecting ‘eligible recipients’, EPA should prioritize **multiple entities with strong relationships and an established track record of accountability to disadvantaged and low-income communities**. The GHGRF represents an unprecedented opportunity to reverse the legacy of disinvestment in disadvantaged and low-income communities and facilitate a just transition to an inclusive and regenerative economy that relies on justly sourced renewable energy. This requires partnership with local community based-organizations and community members to identify existing needs and actionable solutions to meet those needs. To deliver on that promise, EPA must select recipients with a proven track record of engaging with, investing in, and being accountable to target communities. Now is not the time to rely on intermediary entities without knowledge of on-the-ground conditions, much less gamble on untested institutions.

We thank EPA for their consideration of our comments. If we can be of further assistance, please contact Sofia Owen at sofia@ace-ej.org.

Section 1: Low-Income and Disadvantaged Communities

1. *What should EPA consider when defining “low income” and “disadvantaged” communities for purposes of this program? What elements from existing definitions, criteria, screening tools, etc., - in federal programs or otherwise - should EPA consider when prioritizing low-income and disadvantaged communities for greenhouse gas and other air pollution reducing projects?*

EPA should **use the White House Council on Environmental Quality’s (CEQ) Climate & Economic Justice Screening Tool (CEJST) Version 1.0** as a first step to define disadvantaged communities for purposes of allocating funds designated to benefit those communities under the IRA, and disbursing funds under both the IIJA and IRA consistent with the Justice40 Initiative. Agencies should supplement the CEJST with other spatial mapping tools that integrate key EJ indicators, including cumulative pollution and health burdens and other social vulnerability indicators, such as the Agency for Toxic Substances and Disease Registry’s Environmental Justice Index.⁷ EPA should include consideration of race and ethnicity as a non-exclusive criterion, similar to how many states define "disadvantaged" or analogous terms for purposes of allocating state resources (e.g., New York State’s criteria for identification of disadvantaged communities under the Climate Leadership and Community Protection Act).⁸ Finally, **EPA should consider establishing a process for communities to petition to be identified as disadvantaged** for purposes of grant allocation. This process is essential to the extent that mapping tools rely on incomplete, outdated, or coarse datasets, or exclude key characteristics such as race or ethnicity.

EPA should **also clarify that GHGRF resources must *directly* benefit residents of disadvantaged and low-income communities**. Examples of such direct benefits include investments in energy efficiency, resilience, or electrification in affordable housing, small businesses, nonprofits, community facilities, and small educational and religious institutions that address existing inequities and contribute to measurable improvements to social determinants of health in disadvantaged communities. Examples of unacceptable indirect benefits include relying solely on census tracts to quantify qualifying benefits. This approach does not guarantee additionality as high-capacity institutions may reside within disadvantaged census tracts. Furthermore, projects geared toward aggregate reductions in GHG emissions are an unacceptable use of GHGRF resources. Absent demonstrations of direct benefits to disadvantaged communities, such projects do not fulfill either the spirit or letter of the text of the IRA or the Justice40 Initiative, and risk exacerbating existing disparities if not structured explicitly to mitigate the impacts of concentrated fossil fuel infrastructure in disadvantaged and low income communities.⁹

2. *What kinds of technical and/or financial assistance should the Greenhouse Gas Reduction Fund grants facilitate to ensure that low-income and disadvantaged communities can participate in and benefit from the program?*

⁷ *Environmental Justice Index*, Agency for Toxic Substances and Disease Registry (last updated Aug. 10, 2022), <https://atsdr.cdc.gov/placeandhealth/eji/index.html>.

⁸ *Disadvantaged Community Criteria*, New York State (last visited Dec. 2, 2022), <https://climate.ny.gov/Our-Climate-Act/Disadvantaged-Communities-Criteria>.

⁹ See Delect-Barreto J, Rosenberg AA (2022) Environmental justice and power plant emissions in the Regional Greenhouse Gas Initiative states. PLoS ONE 17(7): e0271026. <https://doi.org/10.1371/journal.pone.0271026>; Cushing, Lara et al., Carbon trading, co-pollutants, and environmental equity: Evidence from California’s cap-and-trade program (2011–2015), PLOS Medicine (2018), <https://doi.org/10.1371/journal.pmed.1002604>.

EPA should provide guidance directing eligible recipients of the \$20 billion in financing under Sections 134(a)(2) and (3) to prioritize financial assistance to the minority-owned businesses already engaged in facilitating transitions to clean energy sources in their own communities. Examples of such businesses include minority-owned wind and solar energy companies, companies developing environmentally-friendly product solutions in disadvantaged communities, and businesses developing project management solutions for issues that disproportionately impact disadvantaged communities, such as solid waste disposal. EPA should also prioritize technical assistance to workers in such businesses, paying special attention to the historic inequities in the development of construction workforces and steep challenges workers may face from historic disinvestments in infrastructure. Where possible, EPA should partner with the Minority Owned Business Development Agency, Historically Black Colleges and Universities, the Native American Business Development Institute, and other eligible institutions to ensure technical assistance opportunities are accessible to community members and minority owned businesses thrive through robust access to needed capital.

Section 2: Program Design

1. *What should EPA consider in the design of the program to ensure Greenhouse Gas Reduction Fund grants facilitate high private-sector leverage (i.e., each dollar of federal funding mobilizes additional private funding)?*

EPA should adopt clear guidance stating that **first and foremost, selected projects must demonstrate clear, specific benefits delivered directly to disadvantaged and low-income communities**. There is a risk that prioritizing “high private-sector leverage,” without contextualizing this priority within the broader equity-driven goals of the GHGRF, will result in selected projects that fail to provide additionality or community-level benefits. Furthermore, when assessing to what extent grants facilitate private-sector leverage, **EPA should give more weight to private-sector financing with the potential to drive new market creation and/or market transformation**, as opposed to financing that will deliver benefits primarily to existing markets. This includes prioritizing financing streams with the potential to ultimately invest or transfer wealth (as profits or surpluses) or assets to community member-owned entities. This could include prioritizing profit-sharing arrangements with partner community-based organizations.

2. *What should EPA consider in the design of the program to ensure Greenhouse Gas Reduction Fund grants facilitate additionality (i.e., federal funding invests in projects that would have otherwise lacked access to financing)?*

EPA can guarantee GHGRF grants facilitate additionality by **prioritizing direct benefits to disadvantaged and low-income communities and households across the entire \$27 billion fund**. Specifically, EPA should structure and award the \$11.97 billion under Section 134(a)(2) with a priority toward disadvantaged and low-income household access, as well as small businesses and institutions, including schools and religious organizations, that may be physically located outside of those communities but still serve them.

Consistent with this focus, investment criteria should **screen out projects that cannot convincingly demonstrate a need for GHGRF capital** to drive project benefits directly and overwhelmingly to low-income and disadvantaged communities. Projects that may fail this “but for” test could include mature technologies such as utility-scale renewables; market segments well-served by current financing such as transmission; and areas that are well funded via other federal provisions in IRA and IIJA. Many non-low-income focused entities – such as corporate, investment-grade rated institutions with no demonstrated mission focus, affluent customers, and commercial real estate developers – do not require public financing assistance to adopt GHG-reducing and decarbonization technologies. Instead, GHGRF investment criteria should screen for projects that reduce barriers to larger-scale implementation of GHG-reducing and decarbonization projects for historically disinvested communities at both community-wide and household levels.

6. *What, if any, common federal grant program design features should EPA consider or avoid in order to maximize the ability of eligible recipients and/or indirect recipients to leverage and recycle Greenhouse Gas Reduction Fund grants?*

EPA should **integrate best practices identified by the Office of Management and Budget** in its July 2021 Study to Identify Methods to Assess Equity¹⁰ to make federal funding opportunities as accessible as possible. This includes minimizing unnecessary administrative burdens whenever possible, and co-designing programs and services with the very communities those programs are intended to benefit. EPA should also ensure that all relevant grant program design and application materials are provided consistent with the agency’s Language Access Plan.¹¹

8. *What should EPA consider when developing program guidance and policies, such as the appropriate collection of data, to ensure that greenhouse gas and air pollution reduction projects funded by grantees and subrecipients comply with the requirements of Title VI of the Civil Rights Act, which prohibits discrimination on the basis of race, color, and national origin in programs and activities receiving federal financial assistance?*

¹⁰ *Study to Identify Methods to Assess Equity: Report to the President*, Office of Management and Budget (July 2021), https://www.whitehouse.gov/wp-content/uploads/2021/08/OMB-Report-on-E013985-Implementation_508-Compliant-Secure-v1.1.pdf.

¹¹ *Assisting People with Limited English Proficiency*, EPA (last updated Oct. 24, 2022), <https://www.epa.gov/external-civil-rights/assisting-people-limited-english-proficiency>.

The Biden administration has dedicated significant funding, personnel, and policy resources to strengthening enforcement of Title VI among federal funding recipients. EPA in particular has made strides in expanding the agency’s capacity and dedication to enforcing Title VI, most notably with the recent establishment of the Office of Environmental Justice and External Civil Rights (OEJEER). However, the GHGRF will likely bring many new funding recipients under the purview of Title VI, including but not limited to nonprofit entities receiving funds as part of the \$20 billion allocated under Sections 134(a)(2) and (3). We provide these recommendations to ensure these recipients are cognizant of and prepared to comply with EPA’s regulations implementing Title VI.

In considering these recommendations, we encourage EPA to **strike an appropriate balance to ensure that requirements do not prevent smaller and community-based entities and disadvantaged and low income communities from accessing GHGRF resources**, while providing the information needed to ensure that disadvantaged and low income communities directly benefit from and are not disproportionately burdened by large-scale projects.

First, EPA should clarify both for its own staff and eligible state, municipal, and Tribal grantees under Section 134(a)(1) that **receipt of federal financial assistance triggers the application of Title VI to the entire department or agency, and not just the program within that agency for which funding was sought.**¹² Similarly, for private and public institutions serving a public purpose, such as nonprofit grantees under Sections 134(a)(2) and (3), the “program or activity” covered by Title VI “encompasses the entire institution and not just the part of the institution that receives federal financial assistance.”¹³ EPA should also clarify that an entire state government may be liable for Title VI violations if it is found to be “partially responsible” for the discriminatory conduct, is contractually obligated to comply with Title VI, or otherwise has a “responsibility to monitor subrecipients.”¹⁴

Second, **data collection and use requirements must be designed to facilitate recipients’ demonstration that their programs do not result in discriminatory effects.** EPA has committed to “clarifying that recipients must not only collect and maintain data about the communities they serve but must also analyze it and use it in their decision-making process *to promote equity and ensure program decisions, including permitting decisions, are consistent with civil rights laws.*”¹⁵ To limit the burden that data collection and use requirements might impose on smaller grant recipients and ensure that data collection reflects on-the-ground

¹² <https://www.justice.gov/crt/fcs/T6manual>, at sec. V(E).

¹³ 42 U.S.C. § 2000d-4a.

¹⁴ <https://www.justice.gov/crt/fcs/T6manual>, at sec. V(E)(2).

¹⁵ Environmental Protection Agency, OGC Revised Responses to OIG Recommendations, 7 (September 13, 2021), https://www.epa.gov/system/files/documents/2021-10/_epaog_20-e-0333_agency_response2.pdf. (emphasis added).

conditions, EPA should incorporate community science and qualitative data, including community narratives, as part of its prioritization and selection process. These data should be given equal consideration compared to statistical and quantitative data collection and use.

Third, EPA should provide **guidance that goes beyond procedural checklists and data collection requirements to include mechanisms for determining and preventing substantive Title VI violations**. That guidance should include clear and transparent mechanisms for civil rights compliance reviews that include opportunities for public input and transparency regarding selection and evaluation criteria.

Fourth, given that funds under the GHGRF must be disbursed relatively quickly, EPA should explore **mechanisms for issuing funds in conditional disbursements over an extended period of time** such that the grantee is only able to receive additional rounds of funding if they demonstrate compliance with Title VI. In the absence of such measures, disbursing all funds within a short amount of time severely limits grantees' accountability to those impacted by the program, and removes the threat of EPA pausing or rescinding federal funding if it finds that the grantee did in fact violate Title VI.

Fifth, EPA must be prepared to expediently investigate and resolve Title VI complaints regarding discrimination by recipients of this unprecedented disbursement of funds. EPA must further provide **clear guidance to ensure consistency in the inclusion of complainants in the investigation and resolutions of complaints**. Not only will this lead to effective resolution of those complaints, but also make the complaint administration process more transparent to members of the public and other complainants.

Sixth, EPA should **clarify the consequences for violations of Title VI, including the authority of agencies to withdraw or defer funding**. This would urge federal funding recipients to be proactive and consistent in demonstrating compliance with Title VI requirements, while informing potential complainants of the types of recourse available when filing complaints.

Finally, EPA's selection criteria should **require direct recipients of GHGRF resources to demonstrate best practices necessary to achieve compliance with Title VI** in order to ensure that IRA and IIJA-funded projects do not result in discriminatory effects. That criteria may include requiring applicants to report a detailed spending plan to the awarding agency, including an analysis of the plan's impact on EJ communities; consider alternatives to reduce or eliminate potential discriminatory impacts; collect and report additional data to the awarding agency to demonstrate compliance; meaningfully consult with disadvantaged communities; and submit a timeline for providing compliance data to the awarding agency.

- For example, the Department of Housing and Urban Development (HUD) issued a Consolidated Notice on Feb. 1, 2022 requiring grantees under the Community

Development Block Grant for Disaster Recovery (CDBG-DR) program to “assess whether the planned use of CDBG-DR funds will have an unjustified discriminatory effect on OR failure to benefit racial and ethnic minorities in proportion to their communities’ needs, particularly in concentrated areas of poverty. Grantees must also assess how they will address the recovery needs of impacted individuals with disabilities. Grantees must consider the impact of their planned use of CDBG-DR funds on all protected class groups under fair housing and civil rights laws; vulnerable populations; and other historically underserved communities.”¹⁶

10. What federal, state and/or local programs, including other programs included in the Inflation Reduction Act and the Infrastructure Investment and Jobs Act or “Bipartisan Infrastructure Law,” could EPA consider when designing the Greenhouse Gas Reduction Fund? How could such programs complement the funding available through the Greenhouse Gas Reduction Fund?

EPA should **ensure that the recently established Environmental Finance Centers (EFCs) are equipped to provide GHGRF-specific technical assistance** to their target communities.¹⁷ These Centers will receive up to \$150 million in grants over the next five years under the Bipartisan Infrastructure Law and other funding sources to “provide states, Tribes, and local governments or water systems with technical assistance services to advance equitable health and environmental protections”, including supporting greenhouse gas reduction projects in overburdened and underserved communities. The EFCs can therefore provide essential capacity to help communities access GHGRF resources.

Section 3: Eligible Projects

It is essential that EPA **prioritize GHGRF projects that address legacy issues of disinvestment and disproportionate environmental burdens, and avoid projects that will have discriminatory effects on communities of color and low-income communities.**

As the Biden administration has noted, “... policies to tackle climate change also must clean up the legacy pollution that low-income communities and communities of color have suffered with for far too long.”¹⁸ Consistent with this policy goal, experts with the Indigenous Environmental

¹⁶ *Advancing Equity in Disaster Recovery*, Dep’t of Housing & Urban Dev’t (Feb. 1, 2022), https://www.hud.gov/sites/dfiles/CPD/documents/Advancing_Equity_in_CDBG-DR.pdf.

¹⁷ *Biden-Harris Administration Announces Selection of 29 EPA Environmental Finance Centers to Help Communities Access Funds for Infrastructure Projects*, EPA (Nov. 4, 2022), <https://www.epa.gov/newsreleases/biden-harris-administration-announces-selection-29-epa-environmental-finance-centers>.

¹⁸ Biden Administration FY 2022 US EPA Budget Justification, March, 2021, p1.

Network (IEN), among others, have advocated that “all efforts to reduce greenhouse gas emissions must be coupled with strategies to reduce toxic co-pollutants, waste and biodiversity destruction, as well as disproportionate pollution and poverty burdens borne by Black, Brown, Indigenous, migrant and poor communities around the world.”¹⁹

Any approach to GHG reductions must recognize that the most significant contributors to GHG emissions are also most often located in proximity to and impacting EJ populations. For example, in February of this year, a State of California evaluation of sources covered by the State’s cap and trade program found that “covered facilities are disproportionately located near disadvantaged communities, and that covered facilities near communities with high proportions of people of color tend to emit more air pollution.”²⁰

In this context, we provide the following responses.

1. *What types of projects should EPA prioritize under sections 134(a)(1)-(3), consistent with the statutory definition of “qualified projects” and “zero emissions technology” as well as the statute’s direct and indirect investment provisions? Please describe how prioritizing such projects would:*
 - a. *maximize greenhouse gas emission and air pollution reductions;*
 - b. *deliver benefits to low-income and disadvantaged communities;*
 - c. *enable investment in projects that would otherwise lack access to capital or financing;*
 - d. *recycle repayments and other revenue received from financial assistance provided using the grant funds to ensure continued operability; and*
 - e. *facilitate increased private sector investment.*

Section 134(a)(1) requires the \$7 billion in funding for State, municipalities, Tribal governments and “eligible” recipients to “enable low-income and disadvantaged communities to deploy or benefit from zero-emission technologies . . . and carry out other greenhouse gas reduction activities.” A plain reading of this section suggests that the *primary* purpose of such funds is to enable “low-income and disadvantaged” communities to *directly* benefit from or deploy such

<https://www.epa.gov/sites/production/files/2021-05/documents/fy-2022-congressional-justification-all-tabs.pdf>.

¹⁹ Indigenous Environmental Network, *Hoodwinked in the Hothouse* (2021) p. 21, <https://climatefalsesolutions.org/>. See also Cushing, Lara et al., Carbon trading, co-pollutants, and environmental equity: Evidence from California’s cap-and-trade program (2011–2015), PLOS Medicine (2018), <https://doi.org/10.1371/journal.pmed.1002604>.

²⁰ *Impacts of Greenhouse Gas Emission Limits Within Disadvantaged Communities: Progress Towards Reducing Inequities*, California Office of Environmental Health Hazard Assessment, (Feb. 2022) 16; <https://oehha.ca.gov/media/downloads/environmental-justice/impactsfghgpoliciesreport020322.pdf>. The report also found that “Black Californians in particular experience twice the PM2.5 exposure from facilities covered by the Cap-and-Trade Program than White Californians do. Furthermore, we found that Black Californians experience three times greater exposure from refinery emissions than all other stationary source sectors covered by the Cap-and-Trade Program combined.” *Id.* at 7.

projects. Consistent with that reading, EPA should **prioritize projects that deliver *direct* benefits to disadvantaged and low-income communities.**

With regards to guidance for selecting projects under Sections 134(a)(2) and (3), EPA should clarify that it will also consider reductions in non-criteria pollutants that have harmful public health effects, e.g., hazardous air pollutants (HAPs), when assessing projects. While benefit considerations for purposes of the \$7 billion zero-emission technologies program is restricted to GHGs, criteria pollutants and their precursors, the \$20 billion financing available under Sections 134(a)(2) and (3) is for projects that will “reduce[] or avoid[] greenhouse gas emissions and *other forms of air pollution.*” EPA’s RFI therefore unnecessarily restricts the scope of the \$20 billion in financing and technical assistance to GHGs and criteria pollutants, excluding potential benefits from reductions in HAPs, such as mercury and other air toxics, which are suspected to cause serious health problems including immunological, neurological, reproductive, and respiratory harm. **We therefore recommend EPA expand the scope of its interpretation of “other forms of air pollution” under Section 134(c)(3)(A) to include HAPs as well as criteria pollutants, therefore maximizing the “benefits” of selected projects under the GHGRF.**

Whenever possible, **EPA should consider how proposed projects will reduce *upstream emissions* of GHGs and other pollutants.** Many clean energy sources rely on upstream processes that disproportionately impact disadvantaged and low-income communities, including nuclear energy and natural gas-reliant technologies. By accounting for upstream emissions, EPA can ensure that selected projects do not result in net disproportionate burdens or impacts to the very communities the GHGRF is designed to benefit most. This is particularly true for purposes of the \$7 billion designated to facilitate adoption of zero-emission technologies, which should be utilized for community and rooftop solar and closely related technologies, consistent with Congress’s intent.²¹

For pollution-reduction projects financed via the \$20 billion allocated under Sections 134(a)(2) and (3), **EPA should prioritize projects that reduce harmful emissions** (i.e., both GHGs and other air pollutants) **at the source.** EPA should be extremely skeptical of projects that promise to “substitute” or “offset” emissions, as these programs fail to accomplish the primary purpose of GHGRF resources under Sections 134(a)(1) and (a)(3) to benefit “low-income and disadvantaged” communities. Projects promising to “indirectly” benefit these communities through general reductions in emissions or through offset projects will, at best, fail to comply with the statute. More likely, such projects will exacerbate disproportionate pollution burdens on these communities by allowing sources of harmful emissions to continue in operation.

²¹ For more, see comments submitted by the Coalition for Community Solar Access.

EPA has long recognized that market-based programs, offsets or other credit-based approaches may have disproportionate effects, and has previously issued guidance to protect against such effects. For example, in considering economic incentive programs (EIPs) intended to “trade” non-toxic pollutants such as volatile organic compounds (VOCs), EPA has stated:

“...[these] EIPs will inevitably involve HAPs. The public - including members of communities of concern - and EPA are concerned that EIPs could actually result in **increases in local HAP emissions or foregone reductions of HAP emissions** that could lead to localized increases in air toxics hazard - possibly in areas already subject to disproportionate impacts of air toxics hazards.”²² (emphasis added).

EPA goes on to say that such EIPs:

“should include safeguards to avoid localized impacts from air toxic emissions and any unacceptable health consequences for nearby areas, including low-income and minority communities . . . program design must consider options for **prevention and/or mitigation** of unacceptable impacts from potential or actual trades or other types of transactions involving HAPs.”²³

EPA’s guidance goes on to describe in detail the assessments and potential safeguards needed in order to avoid disproportionate effects of market-based programs.

In light of these concerns, **EPA should compare and prioritize proposed projects’ emission reductions by first considering direct reductions at source(s)** with the greatest impacts on communities’ health. EPA should give equal weight to reductions in greenhouse gas emissions and other harmful co-pollutants in order to select projects that maximize both climate and public health benefits to the surrounding communities. **Any alternatives to this direct reduction approach must provide equivalent benefits and protections**, consistent with with the Title VI principle requiring the consideration of “less discriminatory alternatives” when there is potential for discriminatory effects. Unless and until the GHGRF incorporates requirements for such assessments and safeguards, environmental justice and civil rights concerns should require an emphasis on direct reductions at the source of GHGs, while maximizing reductions of other harmful pollutants that may affect public health.

EPA should also consider that many projects with the potential to deliver significant benefits to disadvantaged communities are not shovel-ready and that a policy preference for shovel-ready projects will be an impediment to directing funds to benefit disadvantaged communities. Aging infrastructure in communities with a history of disinvestment often require significant

²² US EPA, “Improving Air Quality with Economic Incentive Programs”, Section 16.2, 2001, p183; <https://www.epa.gov/sites/default/files/2015-07/documents/eipfin.pdf>.

²³ *Id.* at 183-84.

remediation or infrastructure upgrades prior to installing zero-emission technology or other climate-friendly upgrades. Individual properties themselves may likewise need significant remediation or upgrades before greenhouse gas reduction strategies can be deployed. EPA should therefore clarify that GHGRF grants can be used to overcome historic disinvestment and invest in necessary infrastructure upgrades and remediation/upgrades of homes, EPA can accelerate GHG-reducing investments in communities that the private market does not broadly serve. These investments include energy efficiency, weatherization, electrification, and resiliency investments in affordable housing, small businesses, nonprofits, community facilities, and educational and religious institutions. **EPA should therefore cover and prioritize projects that address deep energy retrofits in disadvantaged communities**, thus enabling communities to benefit from future GHG reduction activities.

Consistent with the language of the IRA, **EPA should give priority to projects that are deployed by disadvantaged and low-income communities**, i.e., projects that are community-owned or community-controlled. This criterion is consistent with the fundamental environmental justice principle of **self-determination**, and helps safeguard against capital extraction or tokenism, in which applicants partner with communities to secure GHGRF grants, with no guarantee that those resources will in fact reach the community after project implementation begins. By focusing on community ownership, EPA can help ensure that disadvantaged communities benefit both from *receiving* clean energy as well as *supplying* it.

Finally, **EPA should clarify that the definition of “zero-emission technology” does not include “net-zero” strategies**. Section 134(c)(4) states that “zero-emission technology” means a “technology that produces zero emissions” of criteria pollutants (or precursors to such pollutants) and GHGs. Projects claiming to be “net-zero” sacrifice real pollution reductions at the source for promised or unsound reductions elsewhere. Again, this definition is required by the plain language of the statute, and the provision’s legislative history.²⁴

2. *Please describe what forms of financial assistance (e.g. subgrants, loans, or other forms of financial assistance) are necessary to fill financing gaps, enable investment, and accelerate deployment of such projects.*

EPA should take an ecosystem development approach to GHGRF design and implementation. This includes recoverable and non-recoverable grants and flexible, low-cost impact investing structures that don't excessively rely on cash flow from low-income residents. Building community trust, project development, workforce development, small business support, and flexible early-stage financing represent just some of the challenges in finding “investable” projects in low-income and disadvantaged communities.

²⁴ For more, see comments submitted by the Coalition for Community Solar Access (CCSA).

3. *Beyond financial assistance for project financing what other supports – such as technical assistance -- are necessary to accelerate deployment of such projects?*

To maximize the benefit of GHGRF grants to disadvantaged communities, **EPA should clarify that the provision of “technical assistance” under Sections 134(a)(1), (a)(2), and (a)(3) includes workforce training and development** prioritizing disadvantaged and low-income community members. The provision of technical assistance, workforce development, community planning, and other activities essential to the expanded utilization of clean energy technologies in disadvantaged and low-income communities should also be considered “qualified projects” in their own right. This interpretation is consistent with Section 134(c), as such activities fulfill the goal of the GHGRF to “enable” such communities to “deploy or benefit from zero-emission technologies.” Furthermore, **EPA should prioritize these activities in the first round of funding to maximize their impact over the lifetime of the GHGRF.**

Section 4: Eligible Recipients

1. *Who could be eligible entities and/or indirect recipients under the Greenhouse Gas Reduction Fund consistent with statutory requirements specified in section 134 of the Clean Air Act? Please provide a description of these types of entities and references regarding the total capital deployed by such entities into greenhouse gas and air pollution reducing projects.*

For governmental entities applying under section 134(a), EPA **should explicitly consider applicants’ Title VI compliance history** as part of the application process. If candidates seeking federal funding (whether as a grantee or subgrantee) have been subject or are currently subject to a federal agency finding of a civil rights violation or Department of Justice civil rights lawsuit, the candidate should be required to speak to the status of that investigation or complaint, detail plans to remedy the circumstances that resulted in the discriminatory action or effect at issue, and specify measures taken to ensure such effects do not reoccur if the candidate is awarded additional federal funds.

- For example, the Department of Housing and Urban Development (HUD) maintains an internal Civil Rights Threshold List to evaluate a federal funding recipient’s eligibility to apply for HUD discretionary funding. EPA should create a similar list to be referenced as part of both the GHGRF grantee and subgrantee selection to the extent possible.
2. *What types of entities (as eligible recipients and/or indirect recipients) could enable Greenhouse Gas Reduction Fund grants to support investment and deployment of greenhouse gas and air pollution reducing projects in low-income and disadvantaged communities?*

To deploy capital quickly and equitably as part of the \$20 billion in financing, **EPA should prioritize existing, mission-driven institutions and platforms with proven grantmaking or financial relationships to Black, Brown, Indigenous, People of Color-led organizations, including a history of co-governance with these organizations.** These entities should have demonstrated track records of successfully deploying capital in low-income and disadvantaged communities either directly or through their networks. EPA should prioritize applicants that have: (1) clear client/borrower networks in low-income and disadvantaged communities; (2) an established lending and/or grantmaking infrastructure, including prudent lending/grantmaking standards and existing products that can be modified to include GHG reduction technologies; (3) a specific and credible commitment to modify existing products to drive GHG reductions; (4) existing reporting frameworks that can be used to track performance; and (5) demonstrated organizational accountability mechanisms to the communities they serve.

These institutions and platforms, such as Community Development Financial Institutions (CDFIs), established Green Banks, Housing Finance Agencies (HFAs), Public Housing Authorities (PHAs), as well as associations of community-based lenders like Credit Unions and Minority Depository Institutions (MDIs), can all deploy GHG-reducing capital quickly to projects in areas that have thus far been overlooked in our country's clean energy transition. With access to GHGRF capital and technical assistance, lenders can adjust and complement existing loan products – such as predevelopment, rehab, equipment, construction, and refinance loans – to finance GHG reducing technologies.

Consistent with these principles, **EPA should create a competitive, transparent process for selecting recipients of financing under Sections 134(a)(2) and (3)** to ensure a diverse set of entities are included in the pipeline to access the Fund.

- 3. What types of entities (as eligible recipients and/or indirect recipients) could be created to enable Greenhouse Gas Reduction Fund grants to support investment in and deployment of greenhouse gas and air pollution reducing projects in communities where capacity to finance and deploy such projects does not currently exist?*

EPA could use a smaller tranche of the \$20 billion fund to invest in and spur new institutions and innovative approaches that address persistent gaps in the marketplace, **provided the majority of GHGRF resources are channeled through existing mission-driven institutions with established track records of serving disadvantaged and low-income communities.** These new institutions could be new local, state, or regional Green Banks, CDFIs, or nonprofit loan funds. In places where there are limited or insufficient intermediaries to adequately serve low-income and disadvantaged people and communities, EPA should look to invest in new entities that have a business model that explicitly seeks to complement (not compete with) existing

institutions, consistent with the GHGRF's additionality requirement. In addition to accountable and inclusive governance and performance standards, such entities should have a credible model to either (1) help bring together commercial, public, and mission-driven capital to drive GHG reduction in low-income and disadvantaged communities not currently met by existing institutions; (2) seek to fill funding gaps (e.g. pre-development, bridge loans, taking on specific risks that established lenders may avoid due to policy restrictions); and/or (3) address specific barriers in local, state, or regional markets inhibiting the existing deployment infrastructure.

4. *How could EPA ensure the responsible implementation of the Greenhouse Gas Reduction Fund grants by new entities without a track record?*

EPA should be extremely skeptical of entities seeking funding under Sections 134(a)(2) and (3) resources with no experience, connections or infrastructure in disadvantaged communities. The GHGRF represents an unprecedented investment in communities that have experienced rampant disinvestment, discrimination, or borne a disproportionate burden of environmental pollution. It also represents an opportunity for those seeking to leverage federal funding for personal or institutional gain. EPA must therefore apply strict criteria to ensure project applicants have the relevant capacities, mission, and expertise to fulfill the statutory purposes of the GHGRF.

Significant attention has been paid to the possibility of establishing a national non-profit green bank to implement some or all of the GHGRF. There is no national green bank that currently exists that could implement the program in its entirety. Establishing such an entity would require significant time, including engaging in significant stakeholder outreach and establishing that entity's credibility as a prerequisite to receiving GHGRF resources. **EPA should immediately clarify that it will award multiple smaller grants to subnational entities** consistent with the IRA's 180 day deadline, and invite public comment on considerations for the number and diversity of grants in subsequent rounds. EPA should also make clear that it will disqualify any applicant who discourages competing applicants or interferes with EPA's public request for information.

Section 5: Oversight and Reporting

1. *What types of governance structures, reporting requirements and audit requirements (consistent with applicable federal regulations) should EPA consider requiring of direct and indirect recipients of Greenhouse Gas Reduction Fund grants to ensure the responsible implementation and oversight of grantee/subrecipient operations and financial assistance activities?*

For the GHGRF to successfully meet Justice40 goals, impacts will need to be focused on people-centered benefits. EPA should require selected applicants to show clear, measurable equity-based outcomes in addition to pollution-related ones. Awardees should **prioritize meaningful improvements to the lived experience of marginalized and disadvantaged communities** through investments in GHG and other pollutant-reducing projects (e.g. percent reductions in energy burden and utility shut offs; percent reduction in exposure to criteria pollutants; employment outcomes; projects with clear ties to community ownership etc.). One potential resource for EPA to consult is the University of Michigan’s newly released Energy Equity Project report,²⁵ which provides a framework to measure and further energy equity outcomes.

- 2. Are there any compliance requirements in addition to those provided for in Federal statutes or regulations (e.g., requirements related to administering federal grant funds) that EPA should consider when designing the program?*

EPA should award applicants that can credibly demonstrate both (1) inclusive governance practices with responsiveness and accountability to low-income and disadvantaged communities and (2) best practices of nonprofit and financial governance. Other Federal programs, such as those run by US Department of Treasury’s CDFI Fund or the US Department of Health and Human Services Federally Qualified Health Centers, may serve as good examples for EPA to consider when deciding on GHGRF governance parameters. At minimum, consideration should be given to board and leadership representation, board charters, investment/credit policies, as well as organizational policies such as conflicts of interest standards, procurement policies, and document retention. In addition, applicants with a demonstrated track record of effectively stewarding federal and/or state funds through other programs (e.g., Paycheck Protection Program, CDFI Fund, utility ratepayer funds, etc.) should be scored highly. Similarly, indirect regulated recipients of funding, such as credit unions and minority depository institutions should fare well in scoring if they can demonstrate a record of best-in-class regulatory compliance.

Thank you for your time and consideration of these comments. We would be glad to discuss further and assist however possible as you move forward. For more information, please contact Sofia Owen at sofia@ace-ej.org, and any of the undersigned groups.

Signatories (* organization for affiliation purposes only)

Amy Laura Cahn
Legal Director
Taproot Earth

²⁵ *Energy Equity Project Framework Report*, Energy Equity Project (2022), https://energyequityproject.com/wp-content/uploads/2022/08/220174_EEP_Report_8302022.pdf.

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Naomi Davis
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BIG! Blacks in Green

Leslie G. Fields
National Director, Policy Advocacy and Legal, Sierra Club*

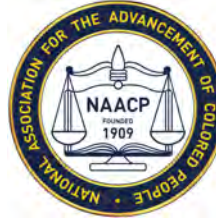
Joni Arends
Executive Director
Concerned Citizens for Nuclear Safety (CCNS)

Dear NEJAC,

Enclosed is a copy of the complaint submitted by 18 organizations to the EPA on 12/1/2022 regarding the issue of the WIIN Grant and testing for lead in drinking water in public schools. As you can see from this letter, EPA has failed to ensure that the sampling program operated within the required parameters. As a result, numerous children, teachers, and other school staff were exposed to lead in the drinking water while our state had full knowledge of the risks. There has not yet been any recommendations for blood lead testing.

1. We hope that NEJAC will investigate the EPA's water programs and support the measures requested in our complaint. Specifically:
2. Investigate the failures of the DOE and DHSS in the execution of this grant and to provide a path forward to correct instances of negligence. The people of Delaware, including students and parents, teachers, school employees, and members of the public who utilize these buildings should be assured that the implementation of federal funds into school drinking water safety produces positive outcomes that reduce the incidence of lead poisoning in our state.
3. Provide specific guidance to DOE and DHSS on their responsibilities for communicating the health risks of lead exposure through consumption in drinking water, and best practices to avoid misrepresentations and false assurances of safety. This communication should include the importance of blood lead testing in a timely manner following exposure.
4. Require DOE/DHSS to take actionable steps to eliminate lead exposure from school drinking water, instead of attempting to outsmart water tests with strategic flushing.
5. Initiate an update to the MCL/TT from .015 mg/L established in 1991 to a new level based on the current science about the health risks of lead poisoning from drinking water and clarify the language used about health-based risks of water at or above the MCL/TT.
6. Develop a specific health-based standard for lead in the drinking water of schools and child cares that aligns with the MCLG of zero.

Thank you, Amy Roe



December 1, 2022

To: Michael S. Regan, Administrator
Environmental Protection Agency
michael.regan@epa.gov

Adam Ortiz, Regional Administrator for Region 3
Environmental Protection Agency
ortiz.adam@epa.gov

Karrie Crumlish, Chief, Drinking Water & Source Water Protection Branch (3WD20)
Environmental Protection Agency, Region 3
crumlish.karen@epa.gov

RE: Complaint, Delaware WIIN Grant

Dear Mr. Regan, Mr. Ortiz and Ms. Crumlish,

We are writing to submit a formal complaint to the EPA about the State of Delaware Department of Education and Department of Health and Social Services for their failure to execute the terms and conditions of their 2020 \$209,000 Water Infrastructure Improvements for the Nation Act (WIIN) grant to test for lead in drinking water at schools.

DOE/DHSS failed to utilize EPA 3Ts. In [EPA's announcement for the grant award on April 1, 2020](#), EPA stated: "[EPA's 3Ts \(Training, Testing, and Taking Action\) for Reducing Lead in](#)

[Drinking Water in Schools](#) will be used by the grantee to assist schools in implementing lead in drinking water testing including identifying sources of lead such as fountains.”

In their Quality Assurance Plan submitted to EPA, DOE claimed: “The DOE and HSP are using EPA’s 3Ts guidance as a model to (1) **Communicate** the results and important lead information to the public, parents, and teachers throughout the program; (2) **Train Facility** staff on the risks of lead in drinking water and testing for lead, as well as developing key partnerships to support the program; (3) **Test** using appropriate testing protocols and a certified laboratory; and (4) **Take Action**, including the development of a plan for responding to results of testing conducted and addressing potential elevated lead where necessary” (page 9).

Yet, in their FOIA Response on October 24, 2022, May Allison from the Delaware DOE maintained that the 3Ts were “not a requirement”. On October 17, 2022, the following information was provided via Senate Health Committee Chair Senator Sarah McBride: “In response to my questions, they are saying very explicitly that there was no requirement for a communications plan and that the results did not trigger a communications requirement from them. I have followed up to ask the timeline of all of this. Here is what I was sent from DOE:

The grant did not require a communications plan. Although the results also did not trigger any federal or state communication requirements, DOE and DPH provided communications materials to districts/charters to support their local communications efforts. How each district/charter handled its local communications differed and was a local decision. As the initiative moves forward, DOE and DPH will continue to support districts with technical guidance, information on available funding and other resources.”

DOE/DHSS failed to perform the following tasks described in the 3Ts:

1. Develop a communications plan, establish a communications team, and maintain a contact list.

When requested via FOIA, the DOE and DHSS both explained that no such communications plan, communications team, or contact list exist.

2. Develop a sampling plan, including a walkthrough of the facility, determine sampling locations, identify individuals who are adequately trained to collect lead samples to help avoid sampling errors, differentiate and collect 250 ml first draw and 250 ml 30-second flush samples at fixtures.

After requests, a sampling plan has not been made available, and it is unclear if one was ever created. We are also doubtful that any training occurred. We have learned through testimony at the Red Clay School Board on October 19, 2022 that boxes of sampling materials were simply sent to schools with little information about what to do or how to collect the samples. One indication of the seriousness of this lack of sampling

information is the prevalence of water sampling from maintenance area sinks, boiler rooms, hose bibs, and other sources not commonly used for drinking water.

3. Establish a plan before sampling to assist facilities in how they will respond to their sample results to protect the school and child care facility population from lead in drinking water, including providing filters at problem taps, flushing taps prior to use, providing bottled water, or plumbing upgrades.

Some water fixtures continued to be used for drinking and food preparation for more than a year after their sampling. There does not appear to be any effort to anticipate next steps following sampling, prioritize problem water fixtures, or to put measures in place to prevent consumption from problem taps.

4. Shut off problem outlets and/or post “Not for Drinking/Cooking” at problem outlets.

DOE/DHSS in some cases failed to notify facilities for more than a year after initial sampling, and failed to provide instruction about posting information and shutting off outlets. For example, DOE/DHSS waited a year before shutting off the water and switching to bottled water at the Wallace Wallin School in New Castle, even though lead levels in the nurse’s office and kitchen exceeded 0.015 mg/L. Problem fixtures in other schools continued to be used without any posted signs or other measures.

5. Notify individuals how and where individuals may seek blood-lead level testing if they are concerned.

DOE/DHSS has not provided any guidance on blood lead testing. Because lead is cleared from the blood after a [half-life of 1 to 2 months](#), the timing window of detecting an exposure in blood is narrow. The failure of DOE/DHSS to provide direction about blood lead testing constitutes negligence to such a degree that a lead-poisoned person may never be able to receive a diagnostic determination from a laboratory.

Because lead is stored in bone and released back into blood during [pregnancy](#), the children of individuals who are exposed before becoming pregnant or during pregnancy can be poisoned *in utero* or during lactation. Knowledge of lead exposure is therefore critical when managing pregnancy and the decision to breastfeed. It is for this reason that the [FDA separately considers its Interim Reference Limits for “females of childbearing age”](#).

DOE/DHSS failed to meet the following conditions specified in the grant:

1. Notification of results, specified in the WIIN Act statute and summarized in section C-2 of the grant, including notification to school administration offices, parents, teachers, and employee organizations, no more than 90 days from the completion of the initial lead testing conducted at each facility.

There has been a lack of notification and outreach to students, parents, teachers, and administration offices within the timeframes required, and in some cases delays of more than a year following initial lead testing transpired before any posting online was performed. Lack of direct communication between DOE/DHSS and school administration officials about results or the need for follow-up steps has been an enduring problem.

2. Quality Management Plan and Quality Assurance Project Plan, described in section F of the grant, to establish policies and practices that are sufficient to produce data of adequate quality to meet program objectives.

Instead, little if any instruction was provided to those collecting samples, some samples were collected when school buildings were closed during the COVID-19 closures, and it has been claimed by DHSS staff that extensive flushing was strategically utilized following elevated test results, in a seeming effort to invalidate initial tests and demonstrate that the water is below the the threshold they described as the MCL level for Lead.

DOE and DHSS have known about problem taps in public schools used for drinking water for extended periods of time and have kept that information secret. Locations include cafeteria kitchens, nurse's offices, staff lounges, water fountains, water bottle fill stations, food lab sinks, classrooms, locker rooms, and bathrooms. As a result of this negligence, more adults and children may have become lead-poisoned.

DOE and DHSS staff also have used what they referred to as the "EPA's Maximum Contaminant Level (MCL)" to communicate safety since making the results available in September 2022, even though the EPA maintains that 0.015 mg/L is not a health-based standard is instead a [Treatment Technique](#) (TT). The EPA instead utilizes a Maximum Contaminant Level Goal (MCLG) for considerations of health. EPA has set the [MCLG for lead in drinking water at zero](#) "because lead is a toxic metal that can be harmful to human health even at low exposure levels. Lead is persistent, and it can bioaccumulate in the body over time."

Since 1994 with Executive Order 12898, EPA has been required to integrate environmental justice into all EPA programs, policies and activities. On Earth Day 2022, President Biden said "We've put environmental justice at the center of what we do, addressing the disproportionate health, environmental, and economic impacts that have been borne primarily by communities of color — places too often left behind."

The locations of some of the most impacted schools are in environmental justice communities that are affected by the cumulative impacts of lead exposure in their homes and environments, environmental toxins, ongoing industrial emissions, and legacy pollution in air, water and soil. This includes The Wallace Wallin School, located on the Rt. 9 Corridor, which had water samples greater than ten times what DHSS is claiming the EPA's Maximum Contaminant Level

(MCL) of .015 mg/L for lead in drinking water. Environmental justice demands that public policy be based on mutual respect and justice for all peoples, free from any form of discrimination or bias.

It is the responsibility of the EPA to oversee the use of federal funds and to provide assurances that the public's resources are spent wisely and in accordance with environmental justice principles. In reference to the State of Delaware DOE and DHSS WIIN Grant to test for lead in the drinking water in schools, we ask EPA to:

1. Investigate the failures of the DOE and DHSS in the execution of this grant and to provide a path forward to correct instances of negligence. The people of Delaware, including students and parents, teachers, school employees, and members of the public who utilize these buildings should be assured that the implementation of federal funds into school drinking water safety produces positive outcomes that reduce the incidence of lead poisoning in our state.
2. Provide specific guidance to DOE and DHSS on their responsibilities for communicating the health risks of lead exposure through consumption in drinking water, and best practices to avoid misrepresentations and false assurances of safety. This communication should include the importance of blood lead testing in a timely manner following exposure.
3. Require DOE/DHSS to take actionable steps to eliminate lead exposure from school drinking water, instead of attempting to outsmart water tests with strategic flushing.

The best science available has consistently pointed to the harm of lower levels of lead to neurological development and health. For example, in 2021 [CDC lowered the Blood Lead Reference Value](#) from 5 µg/dL to 3.5 µg/dL. In 2022, [FDA, in turn, lowered the Interim Reference Level for lead consumption](#) from 3 µg/day to 2.2 µg/day for children and from 12.5 µg/day to 8.8 µg/day for females of childbearing age.

The following drinking water standards are also utilized, slated to be utilized, or recommended for drinking water, all of which are considerably lower than the EPA's MCL/TT of 0.015 mg/L:

- [American Academy of Pediatrics Council on Environmental Health \(2016\)](#) recommended that "state and local governments should take steps to ensure that water fountains in schools do not exceed water lead concentrations of 1 ppb" (.001 mg/L).
- [World Health Organization](#) provisional guideline value for lead in drinking water is 10 µg/L (.01 mg/L)
- [FDA Current Good Manufacturing Practices \(CGMPs\)](#) for bottled water of 5 ppb (.005 mg/L).
- [European Union Drinking Water Directive](#) for lead was lowered in 2021 to 5 µg/L (.005 mg/L) which becomes effective in 2036.

As a result of the critical importance of preventing lead exposure in drinking water, we additionally ask the EPA to:

1. Initiate an update to the MCL/TT from .015 mg/L established in 1991 to a new level based on the current science about the health risks of lead poisoning from drinking water and clarify the language used about health-based risks of water at or above the MCL/TT.
2. Develop a specific health-based standard for lead in the drinking water of schools and child cares that aligns with the MCLG of zero.

We look forward to continuing our dialogue with the EPA to correct these oversights and to ensure that such negligence never happens again.

ACLU of Delaware

Mike Brickner, Executive Director

Black Mothers in Power

Shané Darby, Founder

Central Delaware NAACP

Fleur McKendell, Branch President

Delaware Coalition for Open Government

Board of Directors

Delaware Concerned Residents for Environmental Justice

Dora Williams, Co-leader

Linda Whitehead, Co-leader

Delaware Nurses Association

Christopher E. Otto, MSN, RN, PCCN, CCRN, Executive Director

Delaware Poor People's Campaign Coordinating Committee

Carl Lathon, Coordinating Committee Member

Delaware Press Association

Katherine Ward, Executive Director

Delaware School Nurse Association

Denise Bradley Buffin, RN, MEd, MSN, NCSN, President-Elect

Michelle Bridge, MSN, NCSN, RN, NREMT-B, FNP-BC, President

Environmental Training Program, West End Neighborhood House

Chantae' Vinson, Employment Specialist/EPA Coordinator

Health Committee, Delaware State Conference of NAACP Branches

La Vaida Owens-White, MSN, RN, Health Committee Chair

Latin American Community Center

Maria Matos, President & CEO

Latino Initiative on Restorative Justice

Charito Calvachi-Mateyko, Executive Director

Lead-Free Delaware

Sarah Bucic MSN, co-chair

Amy Roe Ph.D., co-chair

Network Delaware

Drew Serres, Network Coordinator

New Castle Prevention Coalition

Sandra Smithers, Executive Director

Sierra Club Delaware Chapter

Dustyn Thompson, Chapter Director

Sussex Health and Environmental Network

Maria Payan, Authorized Representative

Cc: David B. McGuigan, Ph.D. McGuigan.David@epa.gov
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Lisa M. Donahue donahue.lisa@epa.gov
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Drinking Water Section Chief, EPA Region III

Full Name (First and Last): Antonio Testa

Name of Organization or Community: colectividad hispana

City and State: argentina

Brief description about the concern: for-Elon Musk - MULTINATIONAL- POLITICIANS-journalis- government- foundation. - company-etc thank you Transformation-WE HAVE IT "Discovery of the century"scoperta-WE HAVE IT Asunto: LEGAL HELP USA/UE not moneyLEGAL HELP USA/UE not money WE HAVE IT Steve Hanke, the prestigious economist at Johns Hopkins University projects a "great recession" in 2023 LIE 2 DECADES OF WORK IN THE WORLD CHANGING THE WAY OF GENERATING ENERGY FROM TODAY WE HAVE IT--Antonio surpasses what was done by the roman empire and the silk road Groenlandia-Energía Cambio Climático--FOR POLITICIANS WHO CARE ABOUT THE PLANET foundations-governments-opposition-capital markets-families-inhabitants of the planet-etc. ARGENTINA-intellectual property is private//THEY WATCH YOU IF YOU HAVE IDEAS-independent ideas bother here -//THE WEST IS NOT LISTENING -LEGAL HELP NOT MONEY THANK YOU----Hispanic Argentines- "Discovery of the century" WE SUBSTITUTE RUSSIAN GAS -our discovery SURPASSES THE SILK ROAD WITHOUT GAS PIPELINE, WE HAVE IT NEITHER WITH WATER, NOR SUN, NOR WIND, NOR WITH CEREAL FERTILIZERS OF ANY KIND, NOR WITH OIL DERIVATIVES, NOR COAL, NOR NUCLEAR-NOR DAM-NOR-uranium--no dams--hydrogen WE ARE-children grandchildren European Union European Union, WILL HAVE ITS OWN GAS-energia -- WILL//NOT FROM RUSSIA "discovery of the century"COP26-G20+DAVOS does not have the solution-we YES in my country the intellectual property is private MILLIONS of jobs on the planet changing the way we generate energy-- no NUCLEAR sin agua ni Represas Sin viento sin sol no SOLAR ----- NI CON AGUA, NO SOL, NO CON VIENTO, NO CON ABONO DE CEREALES DE NINGÚN TIPO, NO CON DERIVADOS DE PETRÓLEO, NI CARBÓN, NO NUCLEAR-SIN REPRESAS-SIN HIDROGENO--AFTER THE WORK OF THE ROMAN EMPIRE WILL BE our discovery THE CHANGE IN THE WAY OF GENERATING ENERGY We have it we change history--"discovery of the century"surpasses what was done by the roman empire and the silk road Antonio testa-- HAVE IT :: for Elon Musk-a journalist-a politician a government-a foundation. a company-etc thank you THE GOVERNMENT OF THE RIGHT AND THE LEFT NEVER RESPOND TO US, THEY OWN THE ENERGY

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This is the age of technology, why would you not offer a virtual opportunity to hear speakers? I imagine it will be recorded. So, some of us can see it after the fact? Every conference of which I have been interested in, that decided to revisit the antiquated in-person meetings have resulted in several participants returning with COVID. Not only catching it at the event, but through their travels, spreading it. Many did not know they had it until returning home. It is limiting, dangerous and purposely set up to deny opportunity to attend. Going back to where we were will never happen. You see, you have to bring back the dead children who left their parents' horrified, or the lost parents of children who are now orphans, or the toll in the aftermath it took on those of us who were left behind. The reason why we have not advanced as much as we could in true environmental repair is because we are trying to do things the way we used to. Was limiting then and limiting now. I am aware this has little to no meaning to you or you would not have kept me from coming. We talk to talk and meet to meet.

Arnita Gadson

To All Concerned,

Yonkers, New York is the third largest city in New York State with a population of over 200,000 people. It shares its border with New York City and has the dubious distinction of being the only City in America with a double desegregation order, housing and busing. The median income is \$35,000 and the city is majority minority, Hispanic and African American. It is also a melting pot with approximately 6.5 % Asian and many newly arrived immigrants from all over the world. The Municipal Housing Authority for the City of Yonkers (MHACY) own and or manages over 1700 units and administers over 5000 section 8 vouchers making it the fourth largest housing authority in New York State. MHACY properties spread across approximately 60 acres throughout Yonkers, ranging from high rise to townhomes.

Groundwork Hudson Valley is working with the Municipal Housing Authority for the City of Yonkers to address Climate change/climate resiliency at the City's municipal housing sites. Groundwork Hudson Valley and the MHACY received funds from New York State environmental facilities corporation which was leveraged to get more grant funds from the Bezos Earth Fund and Bank of America for the purpose of addressing climate resiliency at 10 of the MHACY's 17 sites.

Flooding, although not in flood zones, heat island effect and other issues have been documented and studied by Groundworks through grants from NOAA. The heat differential from the east side of Yonkers to the west side is two degrees. Southwest Yonkers has traditionally been the area where indigent families reside and the neighborhoods that are generally hotter. Groundwork was able to lay a heat map over the traditionally redlined areas and document the correlation between heat island effect and redlining. Together Groundwork and MHACY have spoken nationally at housing conferences and parks conferences on the connection between heat, health, and standardized test scores. They have also spoken about white roofs, bioswales, rain gardens and tree canopies to mitigate heat island effect and address Environmental Justice (EJ).

We have been asking anyone who is interested to reach out to us so that we may provide them with a model of what teamwork among community partners can achieve in areas with climate resiliency and EJ. As of now, we have partnered with Mayor Mike Spano, Iona University, workforce development (the green team, comprised of MHACY residents), the business council of Westchester community college and others. We urge any and everyone to please reach out to us.

Brendan McGrath

Good afternoon, our company is a consulting firm to housing authorities throughout NY and CT. The below Yonkers' summary is typical of the issues and opportunities related to environmental justice and affordable housing. In addition, however, many areas of low-income housing have been underserved by improvements in municipal infrastructure such as storm drainage, electrical system upgrades and stability (below ground distribution), internet connectivity and modernization of water supplies. Many municipalities make their investments in their economic corridors or to support non affordable housing development (waterfront developments) neglecting low-income areas already at maximum density and without prospects of redevelopment due to lack of investment returns.

Westchester County New York is typical of this lack of investment, Greenburgh New York's state affordable housing lacks consistent hot water and is serious disrepair. White Plains New York is dealing with the displacement of generations of African American families due to urban renewal in the 70's and a lack on similar investment in housing and infrastructure for minority housing.

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Brian Sweeney

Re: Comments for the Public Meeting of the National Environmental Justice Advisory Council, Docket ID EPA-HQ-OA-2022-0053

I write in response to the National Environmental Justice Advisory Council’s request for public comments on addressing harmful air, soil, and water pollution in the United States. I urge the Council to advise the Environmental Protection Agency (“EPA”) to address pollution from concentrated animal feeding operations (“CAFOs”) by granting a rulemaking petition aimed at increasing oversight of the largest and most-polluting CAFOs, submitted to EPA in October 2022.

In my experience, EPA and the state environmental agency are not doing enough to prevent pollution from CAFOs. Accordingly, I support the rulemaking petition asking EPA to adopt a rebuttable presumption that Large CAFOs using wet manure management systems—which are a particularly significant source of water pollution—actually discharge water pollution and, thus, must apply for Clean Water Act permits. If granted, the petition would strengthen protections for water quality, increase opportunities for public participation in CAFO permitting, and improve transparency around CAFOs.

For these reasons, I urge the Council to advise EPA to grant the rulemaking petition.

Sincerely,

Caleb Merendino

The City of Yonkers, New York, is the third largest City in New York State, with over 200,000 people. It shares its border with New York City. It has the dubious distinction of being the only City in America with a double desegregation order in housing and busing. The median income is \$35,000, and the City is majority-minority, Hispanic and African American. It is also a melting pot with approximately 6.5 % Asian and many newly arrived immigrants worldwide.

The Municipal Housing Authority for the City of Yonkers (MHACY or YHA) owns and or manages over 1700 units and administers over 5000 section 8 vouchers making it the fourth largest housing authority in New York State. MHACY properties spread across approximately 60 acres throughout Yonkers, ranging from high rise to townhomes.

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We have been asking anyone who is interested in reaching out to us so that we may provide them with a model of what teamwork among community partners can achieve in areas with climate resiliency and EJ. We have partnered with Mayor Mike Spano, Iona University, workforce development (the green team, comprised of MHACY residents), the Business Council of Westchester, Westchester Community College, and others. We urge any and everyone to please reach out to us.

Carlos G. Laboy-Diaz

Hello,

As a risk practitioner, I am very interested in the process built around informing and implement on decisions. While I agree with a community centered approach, I also think industry has an important contributory role here, especially with respect to helping identify workable opportunities and solutions. I did not hear too much about it during the panel discussions but believe an engagement process that includes community, regulatory agencies, and industry as part of problem formulation will be an important dimension to include.

Charles Menzie

I am David Dow a retired scientist & grassroots EJ Activist. I reside within the Waquoit Bay Watershed on Cape Cod, Ma. US EPA Region 1; Massa. Executive Office of Energy & Environmental Affairs and the Cape Cod Commission have been engaged in nutrient pollution of local water bodies from septic systems under Comprehensive Wastewater Management Plans; toxic chemical contamination of our drinking water from the Joint Base Cape Cod Superfund site; trying to address the climate change crisis on land/ in the surrounding ocean and funding local municipal solid waste challenges.

These environmental stressors have disproportionate effects on our less affluent residents; seniors with pre-existing medical conditions; Mashpee Wampanoag Tribal members who hunt and fish on traditional lands where prey may contain toxic chemicals; and folks who work in the local service industries who can no longer afford to live here. Despite the high costs of addressing these multiple environmental challenges overseen by EPA/State/County/Town regulatory authorities, The Ma. EOEAA doesn't identify us as an Environmental Justice Community based on Federal Census Block data on income, minority status, and English language proficiency.

I would recommend that NEJAC and its Regional Offices develop a common definition of EJ-affected communities and help them address human induced environmental challenges regulated by EPA which will lead to large expenditures at the grassroots level (which alters the balance between income and the cost of living). The Climate Crisis will require significant investments in housing and electric transportation. The JBCC Superfund/Safe Drinking Water Act cleanup has led to Granular Activated Carbon Filters on Public Drinking Water Wells in Falmouth and Mashpee and closure of Public Drinking Water Wells in Falmouth & Sandwich (with replacement by the 3 wells on the Upper Cape Water Supply Reserve). EPA Region 1 is conducting a study of toxic chemical threats to the UCWSR. The finfish and shellfish in some local kettle hole ponds contain dangerous levels of cyanobacterial toxins; methyl mercury and the PFAS6 which constrain putting food on the table. Addressing the CWMPs is estimated to cost \$ 4-7 billion over the next 20-30 years.

Environmental Justice Communities need to be expanded to include Environmental Justice Populations exposed to these man-made environmental stressors which effect the members of the public who have less political influence in the EPA regulatory process. I have submitted written comments with more specific recommendations and additional background information

I plan to make a verbal comment on November 29 on the implications of EJ Communities versus EJ Populations exposed to environmental stressors overseen by US EPA; state agencies (Massa. Executive Office of Energy & Environmental Affairs and Massa. Environmental Management

Commission) and the Cape Cod Commission for those of us living in the Waquoit Bay Watershed. Sensitive populations (women of childbearing age and children; oldsters with pre-existing health problems; Mashpee Wampanoag tribal members & saltwater anglers who fish in Ashumett and Johns Ponds to put food on the table; members of the public whose drinking water has been contaminated by toxic chemicals; etc.) live in the Waquoit Bay Watershed and should qualify as EJ populations from my perspective as a retired scientist/grassroots environmental activist. Currently the Ma. EOEAA Environmental Justice Council designation is based on Federal Census Block Data on income & cost of living; Minority Status and English language proficiency, so that the Waquoit Bay watershed residents are not included as those exposed to EJ concerns from manmade environmental stressors.

I have been engaged in the Superfund/Safe Drinking Water Act cleanup at Joint Base Cape Cod (JBCC), since the 1990's. Toxic chemical plumes forced closure of the Town of Falmouth's Ashumet Valley Public Drinking Water Well in the mid-1980's & replacement of some of this drinking water by a well on the Upper Cape Water Supply Reserve (UCWSR) which lies on the northern 15,000 acres at JBCC. The Massa. Environmental Management Commission (EMC) oversees the UCWSR and Massa. Army National Guard Training (ANG) on the northern 15,000 acres. Different branches of EPA Region 1 oversee the. Air Force Civil Engineer Center (AFCEC) SDWA/CERCLA cleanup of past toxic pollution of our drinking water and the current toxic chemical threats to the UCWSR (a PFAS6 plume from a former Ma. ANG Training Range poses a threat to Well # 2 on the UCWSR). Both Ma. DEP and EPA region 1 oversee the CERCLA/SDWA cleanup.

Granular activated carbon (GAC) or Ion Exchange (IX) filters have been placed on public drinking water wells in Falmouth and Mashpee. The finfish and shellfish in Johns Pond are contaminated by unsafe levels of the PFAS6 (sum of 6 PFAS chemicals can't exceed 20 ng/l or parts per trillion); cyanobacterial toxins and methyl mercury according to a recent survey by the Massa. Department of Public Health. The water and sediments of Ashumet and Johns Ponds are source areas for the Fire Training Area 1 (FTA-1) Plume which underlies the Yearling Meadows development where I live in East Falmouth, Ma. The PFAS6 is the cleanup standard utilized by AFCEC. EPA's current level of concern for PFOS and PFOA is 70 ng/l or parts per trillion. Recently EPA has mentioned toxic hazard elves for PFAS chemicals in the range of 0.007 ng/l or parts per trillion which are below the presumable maximum contaminant level for PFOS/PFOA in drinking water. Between 1995-2006 I participated in EPA Headquarters Waquoit Bay Watershed Ecological Risk Assessment project which identified nutrients ("N" in Waquoit Bay and "P" in Ashumet Pond) as the major human stressor. I actually wrote the section of the final report on "P" challenges in Ashumet Pond which were partly addressed by an iron oxide filter in sand along the shoreline and alum treatment in deep-water sediments. Excess "P" loading created hypoxia in the bottom waters which killed finfish; lead to cyanobacterial bloom toxins accumulating in shellfish and disrupted benthic habitats for a variety of biota/diminished

biodiversity. The Association to Preserve Cape Cod (APCC) has been issuing Cape Cod Freshwater Water Quality Reports on our kettle hole ponds, while the Cape Cod Commission has initiated a “P” water quality program for over 500 freshwater kettle hole ponds. Thus eutrophication (nutrient pollution) effects both the natural environment and socioeconomic system on Cape Cod for both residents and visitors. Gentrification and lack of affordable housing/apartments poses challenges to service industry workers and less affluent seniors who reside in rent-controlled facilities (which often lack emergency generators to run their medical equipment during power outages).

Climate change has caused warming of the ocean waters surrounding Cape Cod and towns exploring Resilience Directors to cover the regulatory gap between 0-0.3 miles from shore (Massa. Ocean Management Program or MOMP covers 0.3—3 miles from shore). The offshore wind farm construction is regulated by a variety of Federal agencies (Bureau of Ocean Energy Management; NOAA Fisheries; US Coast Guard; Dept. of Energy; etc.) in waters 3-200 miles from shore. For my Biodiversity 6 course on “Systems Thinking and Scenario Analysis”, my class project was on the “Effects of Nitrogen Pollution from Septic Systems” and “Inshore Climate Crisis Regulations” for the Pleasant Bay Watershed Area of Critical Environmental Concern (ACEC) which is occupied by four towns on the Outer Cape which have different plans to address nearshore eutrophication and climate change effects (Summer hypoxia in Cape Cod Bay kills lobsters in their pots). As I mentioned earlier the Massa. Army National Guard “Climate Resilience Plan” leaves a lot to be desired for addressing effects on land (including pine beetle effects on pine trees and disease expansions for wildlife).

In 2021 I developed a series of 5 articles on: “The Challenges Facing the Cape Cod Aquifer” for the Social & Ecojustice Action Committee (SEAC) at a local church in Falmouth (see uuffm.org under “Challenges”). This series described the consequences of climate change, nutrient pollution and toxic chemical contamination in a format accessible to the concerned public.

I would like NEJAC to make the following requests to US EPA and EPA Region 1.

- * Work with the states to develop some type of compromise on folks identified as EJ populations or EF communities which are affected by environmental stressors from nutrient pollution, toxic chemical contamination and the climate crisis.
- * US EPA should develop a maximum contaminant level of 1 ng/l or part per trillion for PFAS chemicals as a class which would serve as the cleanup standard for military bases and industrial sites
- * EPA Region 1 should work with the Massa. Department of Public Health to develop safe PFAS standards for sensitive populations who eat what they capture from fishing and hunting on public lands (Joint Base Cape Cod is controlled by

the Commonwealth of Massachusetts)

* EPA Region1 and the Massa. Environmental Management Commission should convert toxic threats monitoring to the three drinking water wells on the Upper Cape Water Supply Reserve into cleanup action on the ground.

* The Safe Drinking Water Act oversight of the Massa. ANG Impact Area Groundwater Study Program should require cleanup of source areas as well as on base plumes threatening the UCWSR. AFCEC should be required to release a cleanup approach for the PFAS6 sources (contaminated surface water and sediments) in Ashumet and Johns Ponds under its SDWA /CERCLA cleanup program. This includes the source areas for the FTA-1 plume which covers large areas in Falmouth and Mashpee leading to their GAC/IX filters on public drinking water wells.

* The Ma. ANG Climate Resilience Plan for the northern 15,000 acres at JBCC should be supplemented by scenario analysis which considers exceedances of "Tipping Points" and "Surprises".

* An Adaptive, Ecosystems-based Management (A,EbM) approach should be employed within the Waquoit Bay Watershed to explore the effects of climate change; eutrophication and toxic chemical contamination on wild places, wild things. A watershed approach is already required in the Ma. DEP/Cape Cod Commission Comprehensive Wastewater Management Plans to reduce "Nitrogen" loading from septic systems to improve water quality/restore Essential Fish Habitats in Waquoit Bay (salt marshes; oyster reefs and eelgrass beds).

Thanks for your consideration of these written comments in support of my oral comments at the November 29 NEJAC meeting.

Dr. David D. Dow
East Falmouth,, Ma.

Full Name (First and Last): David Dow

Name of Organization or Community: retired scientist/grassroots environmental activist from Cape Cod, Ma.

City and State: East Falmouth

Brief description about the concern: I have been engaged in the Massachusetts Office of Energy and Environmental Affairs Environmental Justice Council dialog on Environmental Communities (based on Federal Census Block data on income; minority status; and English language facility)

versus Environmental Populations (frontline groups effected by climate change; nutrient pollution; climate change; etc which are overseen by EPA). I live in the Waquoit Bay Watershed on Cape Cod where EJ populations (seniors on limited incomes; Mashpee Wampanoag tribal members who hunt and fish on ancestral lands; single women with kids living in Habitat for Humanity homes; folks whose drinking water is contaminated by the PFAS6 & 1,4-dioxane either from Town Public Water Supplies or the three drinking water wells on the Upper Cape Water Supply Reserve which partially serve Falmouth and Sandwich and cleanup the source areas for the Fire Training Area 1 Plume emanating from Joint Base Cape Cod. These environmental stressors to sensitive populations should qualify as EJ populations and be included in the Federal/state/local recovery and restoration programs.

What do you want the NEJAC to advise EPA to do? : EPA Region 1 is engaged in the Safe Drinking Water Act/Superfund cleanup at Joint Base Cape Cod which is overseen by the Air Force Civil Engineer Center. A separate entity at EPA Region 1 is engaged in exploring toxic chemical threats to the three drinking water wells on the Upper Cape Water Supply Reserve (one well is threatened by PFAS6 from a former Massa. Army National Guard Training Range which is regulated by the Safe Drinking Water Act). The Massa. Environmental Management Commission oversees current military training on the northern 15,000 acres at JBCC and has approval over the proposed Ma. ANG's Multipurpose Machine Gun Range which has met strong local opposition. Ma. DEP is engaged in commenting on the AGCEC SDWA/CERCLA cleanup documents. NEJAC should request EPA Region 1 to develop cleanup standards for the Source Areas for the FTA-1 plume (which includes the water and sediments of Ashumet and Johns Ponds). For Phosphorus pollution of Ashumet and Johns Ponds which leads to seasonal hypoxia in the bottom waters; cyanobacterial blooms in the surface waters and methyl mercury/algae toxins in the finfish and shellfish, EPA should work with Ma. DEP/Cape Cod Commission to reduce the nutrient pollution sources (JBCC Plumes and household septic systems). EPA Headquarter's Waquoit Bay Watershed Ecological Risk Assessment project identified the "P" challenges in 2006 and the problem has still not been adequately address by 2022. The Cape Cod Commission and Association for the Preservation of Cape Cod have been shining light on these "P" pollution problems in Cape Cod's freshwater kettle hole ponds.

In regards to Climate Change the Ma. ANG Climate Resilience Plan ignores "Surprises" and exceedance of "Tipping Points" and should be replaced by a "Scenario Analysis" approach over the next 20-30 years (the NOAA Fisheries East Coast Climate Scenario Planning Project provides a good case study to follow).

I have recently participated in the Massa. Executive Office Of Energy and Environmental Affairs EJ Council meetings where oral public comment was quite limited (5 minutes out of 90 at today's session). I often submit questions or comments in the Q&A Box which are either ignored with no follow up or misinterpreted by the Ma, EOEEA supporting staff in their posing of this input. I find this process to be inadequate and am considering submitting written

comments and ignoring their bi-monthly online EJC meetings. I don't think that many members of the public join these bi-monthly meetings.

I haven't participated in the EPA EJC online meetings, since the Trump Administration, (which ignored EJC input). What are current public comments under the Biden-Harris Administration?

Thanks for your consideration of this request.

Dr. David Dow

East Falmouth, Ma.

The Yonkers Housing Authority (YHA) has worked with community solar through sustainable Westchester. Real estate developer Robert Martin has a property in Yonkers called the Southern Westchester Executive Park where they installed solar panels and through a relationship with sustainable Westchester and Groundwork Hudson Valley, YHA and its tenants are now the recipients of these solar benefits. This is a great model of collective community engagement with affordable housing, not-for-profits and local businesses.

The YHA is also working with The Community Builders (TCB) to build new affordable housing with solar panels at the Ridgeway development in Northwest Yonkers. The development is a six-phase replacement project of 500 of all affordable housing units. Phases 4 and 5 have solar panels. Phase 6 will have solar panels and be built to passive house environmental standards. If you have any questions about these successes or want to use them as models, please contact us.

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Denise R. Wesley, Ph.D.

Full Name (First and Last): Emily Rodden

Name of Organization or Community: New Castle Prevention Coalition

City and State: New Castle, DE

Brief description about the concern: Air Quality Hi my name is Emily Rodden, I work with the New Castle Prevention Coalition a grassroots organization in the Route 9 corridor. The New Castle Ave / Route 9 Corridor served as one of the only areas available to black home buyers after WWII. Black suburban residents have consistently been located in areas that were, for various reasons, deemed less desirable or less attractive than other suburban areas. Black subdivisions were more likely to be situated close to industrial pollution, the noise and exhaust of busy roadways, and other unsightly elements. Communities in the Route 9 Corridor are historically and largely African American and low-income. There are approximately 17,994 people within the Route 9 census tracts (1902, 15400, 15502, 15600, 15802, 15900, 16000, 15100,16100). There is a large portion of the land in the Route 9 corridor zoned for "manufacturing". Companies including Fujifilm, Croda, Waste Management, The Port of Wilmington and Heritage Concrete. There is a lot of trucking traffic and motor vehicle traffic as well with Route I-295 to the north, Route I-495 to the south, DE Route 13 to the west. Not to mention Route 9 in itself is a massive and busy roadway. All contributing to the air quality in the area. There is no set air monitoring station within the Route 9 corridor, but the PM 2.5 concentration in New Castle is currently 1.1 times the WHO annual air quality guideline value. New Castle County as a whole received a failing air quality grade for ozone in the American Lung Associations 2018 State of Air report. Fujifilm, a local company, applied through the Department of Natural Resources and Environmental Control (DNREC) Coastal Zone Act Program for a major modification to a standard coastal zone permit. Through this permit Fujifilm has to create an Environmental Impact Offset Proposal for their planned project. (According to subsections 8.1.10 and 8.1.9). The proposed project's only air quality impact would be caused by air emissions associated with the operations of boilers. The increase in air emissions associated with this proposed project would be offset by Fuji's purchase of three tons of emissions reduction credits. Companies can buy "emissions reduction credits" for their increase in emissions, because according to the Coastal Zone Act, they must offset their increased emissions entirely in their Impact Offset Proposal. But this does not stop these companies from emitting into the immediate communities surrounding the plants. This project would emit 3.932 tons of emissions, and Fuji Planned to offset 4.392. Also, the Coastal Zone Regulations do not require the offset of Carbon Dioxide or Carbon Monoxide in these offset proposals. The two biggest polluters in the Route 9 Corridor, Croda and Fujifilm, Croda had an increase in Carbon Dioxide by 18900 tons in its application to the Coastal Zone Advisory Board. Tons, and an increase in Carbon Monoxide by 4.8 tons in 2015 and Fujifilm, in their most recent permit to the Coastal Zone Act, is asking for an increase in by 4768.4 tons in Carbon Dioxide emissions and an increase in Carbon Monoxide by 2.181 tons per year. Exposure to Carbon Dioxide (CO2) to a human being can produce a variety of health effects. These may include headaches, dizziness, restlessness, a tingling or pins or needles feeling, difficulty breathing, sweating, tiredness, increased heart rate, elevated blood pressure, come, asphyxia, and convulsions. The general increase in Carbon Dioxide in the atmosphere is rising, by adding more carbon dioxide to the atmosphere, we are supercharging the natural greenhouse effect, causing global temperature to rise. It is necessary that these companies offset their carbon dioxide emissions. Exposure to Carbon Monoxide (CO) on a human body can lead to serious tissue damage, dull headache, weakness, dizziness, nausea or vomiting, shortness of breath, confusion, blurred vision or loss of consciousness. The general increase in Carbon Monoxide in the atmosphere does not have a direct effect on the global temperature. Carbon Monoxide is regulated by the EPA but not regulated by the

Coastal Zone Act. We need to work to eliminate all emissions or mitigate emissions. If our goal is net zero, we cannot continue to allow companies to emit like this. It is important to add Carbon Dioxide and Carbon Monoxide mitigation language to the Coastal Zone Act. It is important for companies to create mitigation strategies that reduce all emissions, not just buy credits to offset emissions. Also, a history of past violations needs to be taken into consideration when providing these new permits to expand. There is nothing within the law that caps carbon dioxide or carbon monoxide emissions and also nothing that looks at past environmental violations as a way to know the compliance of these companies to the environmental law. We shouldn't be allowing these companies to expand and increase their emissions if they have a history of violations. Also, there needs to be an assessment of the cumulative impact in the increase of emissions on the immediate communities surrounding the plant. Climate change and the negative health impacts associated with it affect communities of color and low-income communities more heavily than white communities. This is the direct effect of policies created, and in the decisions made by the people in power and how they choose to uphold these policies, who they decide wins appeals battles against an increase in emissions. People like Sean Garvin, the secretary at DNREC, like the Governor, John Carney, who appoints the secretary at DNREC and also appoints 5 of the board members to the Coastal Zone Industrial Control Board. When a community resident appeals a decision made by the Secretary of DNREC, like the increase in pollution produced by Fujifilm, it is sent to the Coastal Zone Industrial Control Board. Five of the nine board members are appointed by the Governor. All of these people, and organizations, are complicit in the deaths and negative health impacts caused by these policies and the way they are upholding these policies. These decisions on who they want to protect, companies, are a flagrant disregard for people's health. It's ironic because DNREC's job is to protect the environment and the people but they seem to be putting profit and companies over people.

Water

The EPA is working to add the East Basin Rd watershed as a Superfund site to remediate an evaluation of contaminants in 11 ground water wells in New Castle County. These wells affect 200,000 residents of NCC. This site is approximately a seven-square mile area surrounding the new castle public wells. Artesian Water Company and the City of New Castle's Municipal Services Commission (MSC) are currently treating the public drinking water to remove contamination, including Volatile Organic Compounds (VOC's), or human-made chemicals used in the manufacture of paints, pharmaceuticals and refrigerants, such as industrial solvents like tetrachloroethene (PCE). Treatment is underway to address two chemical compounds, perfluorooctanoic acid (PFOA), and perfluorooctane sulfonic acid (PFOS), widely used in grease-resistant food packaging, water resistant clothing, nonstick cookware and many other everyday products. Potential sources of contamination near the wells include the Delaware air national guard base, new castle county airport, Duncan readiness center and army aviation support facility. The Base used aqueous film forming foam, AFFF, entered the ground, moved into the groundwater to offsite locations and affected nearby municipal wells. The Centers for Disease Control and Prevention (CDC) and the agency for toxic substances and disease registry conducted exposure assessments (EAs) in communities that were known to have PFAS in their drinking water. In 2014, two drinking water systems serving the New Castle area, Artesian Water and Municipal Services Commission of the City of New Castle, were found to contain PFAS levels exceeding the EPA's provisional health advisory. Both systems mitigated PFAS exposure below the provisional health advisory.

There have been elevated blood levels of PFHxS, PFOS, and PFOA in the New Castle County EA participants may be linked with past contamination of the drinking water systems. Adults who lived in the MSC service area had higher blood levels than those in the Artesian Water Service area. Adults who reported a history of kidney disease had 56% higher PFHxS blood levels than those who did not report kidney disease. These people were unknowingly exposed to contaminants that affected their overall health. PFAS exposure has been linked to a higher risk of kidney disease. At the informational session with the EPA in October, there were long-time community residents who were experiencing long-term health issues, like kidney disease, and there was recursive action available to them. These are people's lives and their health. There should be some way for these people to be compensated for their lives.

What do you want the NEJAC to advise EPA to do? : Add Carbon Dioxide and Carbon Monoxide remediation plans to Coastal Zone Act Requirements provide support to people who have already experienced the negative impacts of pollution on the health and lives stop companies from continuing to increase their emissions, we are working to get to net zero, that won't work unless companies are actually putting full remediation plans in action, they have the money to do so.

Full Name (First and Last): Jacqueline Shirley

Name of Organization or Community: Rural Community Assistance Corporation Native Village of Cheforank

City and State: Albuquerque, NM

Brief description about the concern: Lack of innovation and effort to bring reliable affordable safe drinking water to rural Alaska.

What do you want the NEJAC to advise EPA to do? : Increase funding specifically for Alaska. Not just funding but innovation and collaboration with other entities, including global partners who have been working decades on bringing water to poor rural communities.

Yonkers, New York is the third largest city in New York State with a population of over 200,000 people. It shares its border with New York City and has the dubious distinction of being the only City in America with a double desegregation order, housing and busing. The median income is \$35,000 and the city is majority minority, Hispanic and African American. It is also a melting pot with approximately 6.5 % Asian and many newly arrived immigrants from all over the world. The Municipal Housing Authority for the City of Yonkers (MHACY) own and or manages over 1700 units and administers over 5000 section 8 vouchers making it the fourth largest housing authority in New York State. MHACY properties spread across approximately 60 acres throughout Yonkers, ranging from high rise to townhomes.

Groundwork Hudson Valley is working with the Municipal Housing Authority for the City of Yonkers to address Climate change/climate resiliency at the City's municipal housing sites. Groundwork Hudson Valley and the MHACY received funds from New York State environmental facilities corporation which was leveraged to get more grant funds from the Bezos Earth Fund and Bank of America for the purpose of addressing climate resiliency at 10 of the MHACY'S 17 sites.

Flooding, although not in flood zones, heat island effect and other issues have been documented and studied by Groundworks through grants from NOAA. The heat differential from the east side of Yonkers to the west side is two degrees. Southwest Yonkers has traditionally been the area where indigent families reside and the neighborhoods that are generally hotter. Groundwork was able to lay a heat map over the traditionally redlined areas and document the correlation between heat island effect and redlining. Together Groundwork and MHACY have spoken nationally at housing conferences and parks conferences on the connection between heat, health, and standardized test scores. They have also spoken about white roofs, bioswales, rain gardens and tree canopies to mitigate heat island effect and address Environmental Justice (EJ).

We have been asking anyone who is interested to reach out to us so that we may provide them with a model of what teamwork among community partners can achieve in areas with climate resiliency and EJ. As of now, we have partnered with Mayor Mike Spano, Iona University, workforce development (the green team, comprised of MHACY residents), the business council of Westchester community college and others. We urge any and everyone to please reach out to us.

Joan Magoolaghan

The Yonkers Housing Authority (YHA) has worked with community solar through sustainable Westchester. Real estate developer Robert Martin has a property in Yonkers called the Southern Westchester Executive Park where they installed solar panels and through a relationship with sustainable Westchester and Groundwork Hudson Valley, YHA and its tenants are now the recipients of these solar benefits. This is a great model of collective community engagement with affordable housing, not-for-profits and local businesses.

The YHA is also working with The Community Builders (TCB) to build new affordable housing with solar panels at the Ridgeway development in Northwest Yonkers. The development is a six-phase replacement project of 500 of all affordable housing units. Phases 4 and 5 have solar panels. Phase 6 will have solar panels and be built to passive house environmental standards. If you have any questions about these successes or want to use them as models, please contact us.

Jo-Ann M. Rodriguez

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John Daoud, Esq

Full Name (First and Last): John Mueller

Name of Organization or Community: Private Citizen

City and State: Guthrie, Oklahoma

Brief description about the concern: I am John Mueller, activist, and retired public works engineer, now living in Guthrie, Oklahoma, and with respect to these public meetings, as they say, “this is not my first rodeo”. (But it really is for this hybrid meeting.) So, thank you again, NEJAC, WHEJAC and Richard Moore if you’re still there, and EPA for this ongoing opportunity to share more insight and perspective for a rare and time-sensitive challenge and opportunity. And thank you Matt and Marianne for your dynamic and motivating service. You are truly an inspiration in these transformative times. My argument again today is about water fluoridation, a well-documented environmental justice problem, and that ending the practice is a challenge that falls well within the scope of the just released report, EPA’s Fiscal Year 2023 Top Management Challenges, by the Office of Inspector General. The challenge is how to end water fluoridation and manage the widespread pushback from the special interest stakeholders; pushback from the ADA and traditional dentistry; pushback from the fluoridation chemical suppliers; and the pushback from dentists of a pro-fluoridation consortium with narratives that typically include false statements about the science, and in a press release just last week, even denigrating the esteemed authority and integrity of the National Toxicology Program for NTP’s review of fluoride science; a virtual ad hominem attack on our eminently respected NTP. But by the divine blessings of these virtual public meetings and President Biden’s executive orders and initiatives for scientific integrity and EJ, you are receiving the information you need about the harmful effects of fluoride ingestion and its environmental injustice. I’ll be submitting additional materials directly to the docket, as I know others are doing to support this solution, so I’ll go now to my main point: EPA and CDC, the time is now, and the opportunity is glaring at you, to do what the taxpayers pay you to do to protect public health. Administrator Regan must turn EPA’s support away from fluoridation and to supporting public health. The most readily available next step is to grant the petition in the current TSCA lawsuit to ban the addition of fluoridation chemicals to public water supplies because fluoride is confirmed to be a developmental neurotoxin. Finally, it is a fact, that the ADA, HHS and CDC have acknowledged that the beneficial effect of fluoride for preventing tooth decay is principally from topical application of sufficient solution strength, not from ingestion, drinking, as previously believed. We don’t drink mosquito repellent. And we don’t drink sunscreen. They are applied topically to protect the skin. Fluoride use, when strong enough to have the beneficial effect, must also be restricted to being applied topically.

What do you want the NEJAC to advise EPA to do? : I and untold others want EPA to concede in the current TSCA lawsuit now pending in U.S. District Court, San Francisco, Case #: 3:17-cv-02162-EMC Channeling that request through the NEJAC is one way to influence Administrator Regan to do the right thing, as this rare opportunity presents itself for eliminating one egregious and medically unethical environmental injustice, as pleaded in the following by the League of United Latin American Citizens:

I believe Administrator Regan can be convinced to make the decision to resolve the fluoridation controversy once and for all, and rightfully relegate fluoride to the same class of environmental toxins as lead and arsenic, and the PFAS and many others. Mr. Regan could proceed by recognizing and embracing the authority and White House support granted to him under Presidential Executive Order No. 13990. That EO provides for reversing the denial of the citizens' petition filed with EPA under Section 21 of TSCA in November 2016, subsequently denied in February 2017 by EPA under the Trump

administration, resulting in the lawsuit filing in federal district court. EPA conceding to the plaintiffs in the TSCA lawsuit would effectively and efficiently produce the same outcome as reversing the 2017 denial of the original petition, which has been supplemented and again will be further strengthened with more probative scientific studies that have been peer reviewed and published since the petition's original 2016 filing. The recent studies are in addition to the hundreds of scientific reports submitted and filed with the original petition in 2016.

Thank you for addressing this issue as your duty calls you to do in cooperation with the WHEJAC and affected offices in the CDC and the office of Secretary Xavier Becerra.

The statement for NDWAC 11-30-2022.pdf, is the basis for what I hope will be selected for a three minute time slot during the subject meeting's agenzized time for public comment. In the event that I am selected to present my statement, I will tailor the narrative text to a script of about 400 words to fit into three minutes.

I am also attaching two other documents for consideration by your council which acknowledge water fluoridation as an environmental injustice needing resolution.

Thank you for this opportunity to submit an important and time sensitive public comment.

Sincerely, John F Mueller

I am John Mueller, a concerned activist and retired public works engineer after a professional career that included 25+ years with water utilities in the public sector, including wastewater and drinking water treatment plant operations and maintenance. This comment is a very brief recap of the 3-page statement I submitted on Tuesday last week, but with some supplemental information.

The most immediate issues surrounding water fluoridation include but are not limited to the following:

THE UNFORTUNATE PROBLEM

- Community Water Fluoridation (CWF) since its beginnings 1945 has failed miserably in its mission of preventing childhood tooth decay. Childhood tooth decay is reported to be at epidemic levels among inner city minorities and other underserved populations.
- Also, the CDC's CWF program recklessly attempts to treat everyone against tooth decay, a treatable oral disease, whether needed or not, rich or poor, Black or White or in between, with no follow-up or even informed consent.

A MOST DAUNTING CONUNDRUM, INDEED!

- So, a dramatic paradigm shift is desperately needed if the CDC hopes to achieve the well-intentioned objective of preventing childhood tooth decay. But doing so efficiently and effectively will necessarily invoke pushback on a grand scale with the dismantling of the CWF program.
- Something that was not in my earlier submittal is that misinformation and outright falsification can frequently come from very active pro-fluoridation dentists with narratives that typically include false statements and fearmongering. A recently published press release from the American Fluoridation Society (AFS), even made a bold attempt to marginalize and denigrate the supreme authority and integrity of the National Toxicology Program to support their claim of fluoridation being "safe and effective"; a nonsense ad hominem attack on our eminently respected NTP.

THE PATH-FORWARD SOLUTION

- Referencing the recommendations from the NRC's 2006 report on fluoride in drinking water, the EPA now has more than enough data from high quality studies and expert testimony in the current TSCA lawsuit, to inform the rulemaking, long overdue, that revises the MCL and MCLG of fluoride. And CDC must dismantle its CWF program in favor of more effective individualized programs for improving oral health where needed most.
- I challenge Office of Water and Administrator Regan to embrace the spirit and intent of the Safe Drinking Water Act and reverse the Trump administration's denial of the citizens' petition filed under Section 21 of TSCA, to ban the addition of fluoridation chemicals to public water supplies. That should be a high priority that falls precisely within the scope of the EPA's Fiscal Year 2023 Top Management Challenges, just released yesterday by the Office of Inspector General.

Thank you.

Submitted on 12-11-2022 on the NEJAC Public Comment Submission form, in response to the form's question, "What do you want the NEJAC to advise EPA to do?"

I and untold others want EPA to concede in the current TSCA lawsuit now pending in U.S. District Court, San Francisco,

Case #: 3:17-cv-02162-EMC

Channeling that request through the NEJAC will help convince Administrator Regan to do the right thing for EPA's future integrity. It is often said that timing is everything. There can be no better time than now as this rare opportunity presents itself for eliminating one egregious and medically unethical environmental injustice, as pleaded in the following by the League of United Latin American Citizens:

https://lulac.org/advocacy/resolutions/2011/resolution_Civil_Rights_Violation_Regarding_Forced_Medication/

I believe Administrator Regan can be convinced to make the decision to resolve the fluoridation controversy and conundrum once and for all, and rightfully relegate fluoride to the same class of environmental toxins as lead and arsenic, and the PFAS and many others. Mr. Regan could proceed by recognizing and embracing the authority and White House support granted to him under Presidential Executive Order No. 13990. That EO provides for reviewing and reversing the denial of the citizens' petition filed with EPA under Section 21 of TSCA in November 2016, subsequently denied in February 2017 by the Trump administration's EPA resulting in the TSCA lawsuit filing in U.S. District Court. EPA conceding to the plaintiffs in the TSCA lawsuit would effectively and efficiently produce the same outcome as reversing the 2017 denial of the original petition, which has been supplemented and again will be further strengthened with more probative scientific studies that have been peer reviewed and published since the petition's original 2016 filing. The recent studies are in addition to the hundreds of scientific reports submitted and filed with the original petition in 2016.

Thank you for addressing this issue as your duty calls you to do in cooperation with the WHEJAC and affected offices in the CDC and the office of Secretary Xavier Becerra.

To NDWAC members and relevant EPA and CDC officials:

This statement is my basis for a condensed 3-minute oral presentation for EPA's National Drinking Water Advisory Council (NDWAC) public meeting, Wednesday November 30, 2022

Thank you for this opportunity to share important material for a rare and time-sensitive challenge. I am John Mueller, a licensed civil engineer, having practiced in the broad field of water resources engineering. I am retired after a professional career that included 25+ years with water utilities in the public sector, including wastewater and drinking water treatment plant operations and maintenance. My college degree is in geophysical engineering from the Colorado School of Mines, one of the world's premier research universities for science and engineering for developing Earth's mineral resources.

While this is my first time attending a NDWAC public meeting, I have been attending NEJAC and WHEJAC public meetings and have spoken at more than a few of them beginning with WHEJAC's inaugural meeting in March last year. Those meetings have created an unprecedented and rare opportunity under President Biden's initiatives. At those meetings I presented statements that argue the need to end water fluoridation. The time is ripe to further share the argument with EPA's decision-makers through the NDWAC. I know that other activists aspiring to help end fluoridation have also addressed the issue with the NEJAC and WHEJAC, some of them personally suffering painful physical, mental, family, and economic hardships from sensitivities to their respective fluoride exposures. Since I have some knowledge of what others may be submitting for this meeting, I'll forego extraneous references to the overwhelming science presented by others and go straight to the essence of my argument, which is the following:

EPA Administrator Michael Regan, with full authorization and justification from the initiatives created by and with Presidential EOs #13990 and #14008, can and must concede in the current TSCA lawsuit pending in the court of Judge Edward M. Chen in San Francisco, Federal District Court of the Northern District of California. The lawsuit, filed in April 2017 by plaintiffs "pursuant to TSCA, 15 U.S.C. § 2620(b)(4)," petitions EPA to institute rulemaking that will ban the addition of fluoridation chemicals to public water supplies. During the ongoing trial, the original petition, filed in November 2016, has been supplemented with additional high-quality, peer reviewed science published in reputable journals since the petition's original 2016 filing, including sources cited here in this quoted excerpt from a court filing:

"1) the trial record together with Plaintiffs' admitted exhibits and summary of the record; 2) the MIREC and ELEMENT studies; 3) the pooled BMD analysis of the MIREC and ELEMENT data; 4) the National Toxicology Program's [NTP's] revised draft monograph containing a systematic review of the fluoride literature; 5) a published statement from former NTP director Dr. Linda Birnbaum, about the 'consequential' findings of the NTP's revised monograph; 6) the facts to which the parties stipulated at trial; and 7) several orders of this Court which reject legal positions that EPA relied upon in its denial of the initial petition."

EPA declined to review the supplemental information for the plaintiffs and the court, claiming lack of resources due to other priorities.

We know the petition was initially denied by Administrator Scott Pruitt during the Trump Administration. Now, respecting President Biden's initiatives and the rare opportunities to right many wrongs, the denial under the Trump administration in 2017 can and must be reversed. Detailed justification for a proposed rulemaking

to be published in the Federal Register can be essentially bulletproofed as it is readily available in the evidence, the overwhelming weight of evidence, and expert testimony presented in the case. EPA's resource requirements to settle the case by concession would be the least of any other alternatives, especially if, in case EPA continues its scientific opposition, a ruling for the plaintiffs is left to Judge Chen with automatic opportunity for appeal, which would further delay protection of public health and would do so at significant additional cost. In that case, EPA might again claim absence of resources, and then the case goes, and on, and on, and on . . .

The most immediate issues needing acknowledgement and attention include but are not limited to the following:

THE UNFORTUNATE

- Community Water Fluoridation (CWF) had its beginnings as a scientific study in 1945 in Grand Rapids, Michigan - its purpose ostensibly to help prevent tooth decay (also known as dental caries) in children. Data in public health reports reveal it has failed miserably in achieving that objective, and instead has contributed to the problems of environmental justice issues. Attached to this email are documents acknowledging fluoridation as an environmental injustice.
- The public health issue of childhood dental caries is also reported to be at epidemic levels and rampant in the inner cities, on Tribal lands and in other areas lacking adequate professional dental care, and in populations living with poor diet and nutrition in neighborhood areas identified as grocery deserts.
- The CWF program wastefully attempts to treat everyone against tooth decay, whether needed or not, rich or poor, Black or White or in between; it claims to have achieved quantified but unverifiable rates of success that vary largely depending on who makes the claim and under what circumstances. So a dramatic paradigm shift is in order and desperately needed if the CDC hopes to achieve the longstanding and well-intentioned objective of preventing childhood tooth decay, which CWF has failed to accomplish.

THE MOST DAUNTING CONUNDRUM, INDEED!

- The functional relationship or interface of the EPA's regulatory authority with CWF is subject to the reality that the CWF program of the CDC's Division of Oral Health will come to an abrupt halt, surprising and disturbing to many, when EPA initiates rulemaking that will ban the addition of fluoridation chemicals to public water supplies, with predictable pushback from the special interests on a grand scale. Furthermore, CWF has been seen as the life-blood program of that division in the CDC. Interagency cooperation will be necessary and can be facilitated by the White House Environmental Justice Interagency Council (IAC), created by EO #14008.
- Despite the obstacles created and cultivated by the history of fealty to special interests, the EPA has this rare opportunity to take a giant leap and show more credibility of its leadership's morality, responsibility, and effectiveness in safeguarding public health. It must stop allowing fluoridation and begin the necessary rulemaking, and relegate CWF to the history books as a program which has for too long gone against the spirit and intent of the SDWA and as an egregious violation of the public trust among the exponentially growing population segment of the well-informed.

THE PATH-FORWARD SOLUTION

- After decades of promoting fluoridation as being "safe and effective" and "one of the ten greatest public health achievements of the twentieth century," the CDC and HHS will

need an out. The most effective out can be in the form of a PR strategy that shields public opinion from the guilt of contaminating our water, and forwardly channels it to the future positives of new programs that are guaranteed to be more effective at treating childhood tooth decay, with programs that can be achieved with the more technologically advanced, individualized treatment services, and with more scientifically advanced dental industry policies, practices and localized, targeted programs where needed most, along with increased Medicaid reimbursements for practicing dentistry professionals.

- The general public does not read the FR, so they will only see the positives of the newer, much more effective programs to the credit of the dental industry (ADA). But water utility managers and specialists at the AWWA do pay attention to the FR as a matter of course to ensure they stay current with regulations and recommendations. They and the other special interests will have to develop their own PR strategies similarly to advance and embolden the public trust.
- Dentistry's considerable advancements over seven decades, in knowledge and understanding of how oral health impacts a person's overall general health, should be applied where it is now needed most, as it has been with those who can afford regular check-ups and have reasonable and regular access to good diet and nutrition. Highly successful programs like Scotland's Childsmile can serve as models for CDC to develop and support with grant funding as the latest and greatest alternative to fluoridation.
- The Division of Oral Health will have an all new mission with its effectiveness having a much brighter future with staff having far greater job satisfaction from boots on the ground progress in promoting oral health. Such targeted and focused community service programs can have multiple, positive ripple effects in community economic development through improved school attendance and less time off from work needed by parents to care for sick children, along with their overall public health improvements.
- The evidence presented in the original TSCA citizens petition filed in November 2017, and additionally the scientific studies published since then, and the pending release of the NTP's report on fluoride's developmental neurotoxicity, provide all the science needed to fully justify on scientific grounds the EPA conceding in the TSCA trial and initiating the necessary rulemaking process.
- Answering the need for additional research, as was concluded in the NRC's 2006 report on fluoride in drinking water, now sixteen years later there is plenty of published scientific data necessary to inform and process the long overdue revisions to fluoride's MCLG and MCL.

Again, thank you for this opportunity to provide comment. EPA's integrity and public trust are at stake, and granting the petition to ban fluoridation can be a milestone in history to the credit of our current administration for the nation and the EPA.

Sincerely,

John Mueller
Guthrie, Oklahoma

Water Fluoridation and Environmental Justice

a report submitted to the

Environmental Justice Interagency Working Group

from

The Fluoride Action Network

<http://fluoridealert.org/>

September 25, 2015

Do you want them
drinking a
neurotoxic chemical ?



STOP
ARTIFICIAL WATER
FLUORIDATION

FLUORIDEALERT.ORG

Water Fluoridation and Environmental Justice

This report was prepared by Neil Carmen, Ellen Connett and Paul Connett, with contributions from other members of the Fluoride Action Network, including David Kennedy, Chris Neurath, John Graham, Tara Blank, and Dan Stockin.

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September 25, 2015

To the Environmental Justice Interagency Working Group

Re: Water Fluoridation and Environmental Justice

We are submitting these comments to the EJ Interagency Working Group in support of the formation and agenda goals of this group. We believe that the attached report (Water Fluoridation and Environmental Justice) gives a clear example of how such an interagency group working cooperatively together can right a bad policy for poor families and communities of color.

Hitherto, water fluoridation has fallen through the cracks as far as regulation by federal agencies has been concerned. The Food and Drug Administration has never regulated fluoridation nor have they ever tested the safety of fluoride. Their position is that fluoride is an “unapproved drug.” The Environmental Protection Agency’s Office of Water, since 1985, has had no jurisdiction over any chemical ADDED to water, only contaminants. The Department of Health and Human Services promotes fluoridation through the Division of Oral Health at the Centers for Disease Control and Prevention.

Here is the nub of the problem that needs correcting by interagency action. The CDC’s Oral Health Division has become a “rogue elephant” as far as this practice is concerned. Their mission is to promote fluoridation – and they do so effectively and aggressively – but the problem is that they have a conflict of interest when it comes to monitoring or even questioning the safety of this practice. That has led them into performing with gross negligence in regards to the adverse effects of fluoridation on the poor and communities of color for several decades. Moreover, the expertise in this department is largely dental. Few if any of their personnel have training in other areas of medicine, toxicology or health risk assessment.

Since 1950, when fluoridation was approved, the role of federal agencies has been only to support the policy and in so doing they have had to dismiss and discredit anyone or any of the thousands of studies that reveal the inherent risks in this anti-science experiment. For over 60 years-American citizens have been treated to Public Relations and propaganda rather than a dispassionate and objective analysis of either the effectiveness or safety of this practice.

Now that serious health effects have been documented – particularly fluoride’s neurotoxic effects - it is time to end this practice. Very seldom can the simple turning off a tap (i.e. the spigot at the public water works) do so much good for so many.

We urge you to continue on the trajectory you have started. Working together you may be able to right many wrongs and in so doing regain the respect and trust of the American people.

Neil Carman, Ellen and Paul Connett
and other members of the Fluoride Action Network

“Federal agencies must identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations.”

(Presidential Executive Order 12898
of February 11, 1994)

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WATER FLUORIDATION and ENVIRONMENTAL JUSTICE

Executive Summary

Evidence is presented that artificial water fluoridation as promoted by federal agencies has been ineffective in fighting tooth decay and in addition causes “disproportionately high and adverse human health...effects...on minority populations and low-income populations,” in violation of Presidential Executive Order 12898 of February 11, 1994. This problem has been seriously compounded by the failure of these same agencies to warn communities of color of their special vulnerabilities to fluoride exposure in general and the water fluoridation program in particular. The agencies' actions are fueling calls by civil rights and environmental leaders for investigative hearings by Congress.

The way the EPA Office of Water is approaching its requirement to establish a safe level of fluoride in drinking water is not scientifically defensible, is politically compromised and makes absolutely no attempt to address numerous environmental justice issues that arise from water fluoridation.

There are more positive, effective, and comprehensive ways of fighting tooth decay, which also prevent disproportionate harm to poor families and communities of color and do not violate their civil rights.

Those who promote fluoridation correctly claim that most of tooth decay is concentrated in low-income families and those from communities of color. That is why it is tragic that 80% of dentists in the U.S. refuse to treat children on Medicaid. The poor need special and focused attention. Putting a toxic substance into everyone’s drinking water is a very poor substitute. Water fluoridation has not evened-up the playing field as evidenced by the numerous reports of the dental crises being reported among low-income and communities of color in large U.S. cities that have been fluoridated for over 20 years. Far from helping low-income families and communities of color fluoridation causes them disproportionate harm.

Officials in the US Public Health Service knew as early as 1962 that African-Americans had a higher prevalence of dental fluorosis than whites. Dental researchers have continued to report this over many decades. In 2005 the CDC reported that both Blacks and Hispanic children had higher rates of dental fluorosis particularly in its most disfiguring categories (moderate and severe). However, in all this time neither the CDC nor any other federal agency that promotes water fluoridation has sought to warn communities of color of their particular vulnerability with respect to this permanent visually objectionable injury from systemic exposure to fluoride. Nor have they indicated what this means: their children have been over-exposed to fluoride before their permanent teeth have erupted and this over-exposure might indicate they have been damaged in other ways. This failure to warn communities of color of this problem is a clear example of environmental *injustice*.

When the US Public Health Service endorsed fluoridation in 1950 (before any trial had been completed or any meaningful health study had been published) it quickly fossilized into a policy that was considered beyond debate. Although the FDA has never *approved* any fluoride containing substance intended to be ingested for the purpose of reducing tooth decay it has *rejected* fluoride-containing vitamins stating that, “there is no substantial evidence of drug

effectiveness as prescribed, recommended, or suggested in its labeling.” Drug therapy 1975.

Water fluoridation has never been subjected to an individual-based random control trial (RCT) for either effectiveness or safety. Very few basic health studies have been conducted in fluoridated countries and only in recent years have some of the studies of serious toxic and health effects of fluoride (e.g. lowered IQ) been published, and mainly in non-fluoridated countries.

Fluoride is not an essential nutrient. There is no need to swallow it: fluoride’s beneficial action can be achieved with direct application of fluoridated toothpaste onto the tooth surface. Tooth decay in children from low-income families is not caused by too little fluoride but poor nutrition, including far too much sugar.

The EJ issue goes beyond just dental fluorosis and the failure of the government agencies to warn communities of color about their vulnerability. Fluoridation penalizes families of low-income in the following ways.

- 1) They cannot afford to avoid fluoridated water if they want to do so because both removal equipment and bottled water (for drinking and cooking) is very expensive.
- 2) They cannot afford the expensive treatments to conceal the effects of dental fluorosis (a discoloration and mottling of the enamel).
- 3) Dental fluorosis rates are higher in fluoridated communities especially in Black and Hispanic populations than White.
- 4) Fluoride’s toxicity is made worse by poor nutrition.
- 5) Lactose intolerance is more frequent among Blacks and other ethnic groups than white, and less consumption of dairy products means lower exposure to calcium, which helps to protect against absorption of fluoride from the gut.
- 6) Low-income families from communities of color are less likely to breast-feed their children. Low fluoride ready-to-feed formula is more expensive as is distilled water therefore when baby formula is made up with fluoridated water, the baby gets over 100 times more fluoride than a breast-fed child.
- 7) Fluoride has been associated with lowered IQ in children in 45 studies (as of Sept 2015).
- 8) Children living in the inner cities are more likely to be exposed to lead from flaking old paint, air pollution, etc. leading to cognitive damage. Exposure to fluoride adds to this toxic burden. Research from the University of North Carolina demonstrated that the chemicals used in fluoridation increase the leaching of lead from brass plumbing fixtures into drinking water.
- 9) Communities of color have a greater incidence of kidney disease. Because poor kidney function makes it more difficult for the body to get rid of fluoride kidney patients must avoid as much exposure to fluoride as possible.
- 10) Communities of color have a greater incidence of diabetes, which can lead to increased consumption of water, which in turns leads to a greater consumption of fluoride.

Two strategic goals in the Interagency Working Group on environmental justice (EJ IWG) action agenda for fiscal years 2016- 2018, create a very positive framework within which we can move forward on this issue. These strategic goals are:

- I. Enhance communication and coordination to improve the health, quality-of-life, and economic opportunities in overburdened communities;
- II. Enhance multi-agency support of holistic community-based solutions to solve environmental justice issues;

These goals challenge us to find a plan not just to fight tooth decay in children but also to improve their “health, quality of life and economic opportunities” and to do so with “community-based solutions,” which will involve “multi-agency support.”

We have taken up this challenge in our 5-step alternative plan to water fluoridation.

Our positive, creative and holistic plan aims to fight tooth decay in low-income children but also find ways to improve their health, their fitness, their quality of life, their intellectual development and possibly even their employment within the community. We would like to go further. Our plan also works on other aspects of community development, including its food supply, its discarded resources, its local employment and business opportunities and the need to lower its carbon footprint.

In our 5-step program we are proposing that we start with ending water fluoridation in step 1 and then use the money saved on chemicals, equipment and promotion to finance step 2. This second step involves an educational program for young children modeled after programs in Scotland and Denmark. One aim of this is to reduce sugar consumption. If that is done well it will also help to fight obesity and that over the long-term will produce huge savings in health costs. This should encourage the HHS to provide additional funding needed for step 2 and some of the funding for steps 3 and 4. Here is a summary of the 5 steps:

- 1) **End water fluoridation.** The EPA’s Office of Water could do this swiftly if they were instructed to determine a safe level of fluoride to protect all children from lowered IQ. This would not only remove a threat to children’s intellectual development and future economic potential, but it would also end a number of extra and unnecessary health threats for communities of color, especially for people with poor kidney function; borderline iodine deficiency and diabetes. Never has turning off a tap promised so much.
- 2) **Establish the equivalent of both Scotland’s very successful Childsmile program and the Danish program for pre-schoolers,** in all pre-school programs, kindergarten and primary schools (and possibly churches) and WIC programs in low-income areas.
- 3) **Set up dental clinics either in schools or stand-alone facilities** in the inner city and other low-income areas. In these we should use trained dental nurses to restore decay-damaged teeth and to remove infected ones.
- 4) **Expand these dental clinics into community centers** aimed at improving the child’s overall health. They could support better nutrition, physical fitness and cultural activities. Ideally these community centers would be linked to local community gardens and farms close to the city.

- 5) **Further expand these community centers** into job-creating operations and a foundation for local business opportunities. One concrete way of doing this is to integrate a "reuse and repair" operation into the Zero Waste approach for handling discarded materials.

More than anything else a scientifically balanced approach allows the transition from the politics of "no" to the politics of "yes." Once we get off the shortsighted notion that we can battle tooth decay by putting a neurotoxic chemical into the public drinking water, we can unleash not only the full potential of the children from low-income communities, but also of the communities themselves. The three key words are education, nutrition and justice. We need education (not fluoridation) to fight tooth decay and obesity. We need better nutrition to keep our children and ourselves as healthy as possible and we need Environmental Justice for all.

1. Abstract

Evidence is presented that artificial water fluoridation as promoted by federal agencies has been ineffective at helping fight tooth decay in the inner cities and in addition causes *“disproportionately high and adverse human health...effects...on minority populations and low-income populations,”* in violation of Presidential Executive Order 12898 of February 11, 1994. This problem has been seriously compounded by the failure of these same agencies to warn minority populations of their special vulnerabilities to fluoride exposure in general and the water fluoridation program in particular. The current *ongoing* determination by the Environmental Protection Agency’s (EPA) Office of Water of a new Maximum Contaminant Level Goal (MCLG) and the Maximum Contaminant Level (MCL) for fluoride as reported in 2011 is scientifically flawed and betrays an insensitivity to Environmental Justice issues. There are more positive and creative ways of fighting tooth decay in the inner city, which also address other EJ issues in a holistic fashion.

2. Introduction

Water fluoridation is the deliberate addition of a fluoride-containing compound to the water supply to produce a concentration of free fluoride ions at about 1 ppm (i.e. 1.0 milligram of fluoride per liter). As of April, 2015 the new recommended level by the U.S. Department of Health and Human Services (HHS) is 0.7 ppm. The stated purpose of this practice is to help fight tooth decay.

Fluoridation began in the U.S. and Canada in 1945 (see timeline below). This is a very unusual practice as it is the only time that the public water supply has been used as a vehicle to deliver medical or human treatment. All the other chemicals added to water are added to make the water safe or palatable to drink.

While fluoridation is widely practiced in the USA **most countries do not fluoridate their water.** 97% of the European population does not drink fluoridated water (a few countries fluoridate their salt, which allows the consumer the choice of whether to buy it or not). Yet according to World Health Organization (WHO) data (available online) there is little difference in tooth decay in 12-year-olds between fluoridated and non-fluoridated countries today.

In 1999 the CDC published a figure (see Figure 1) that suggests that dental caries was being reduced in 12-year-olds from the 1960’s to the 1990’s as the percentage of the US population drinking fluoridated water had increased.

Figure 1

FIGURE 1. Percentage of population residing in areas with fluoridated community water systems and mean number of decayed, missing (because of caries), or filled permanent teeth (DMFT) among children aged 12 years — United States, 1967–1992

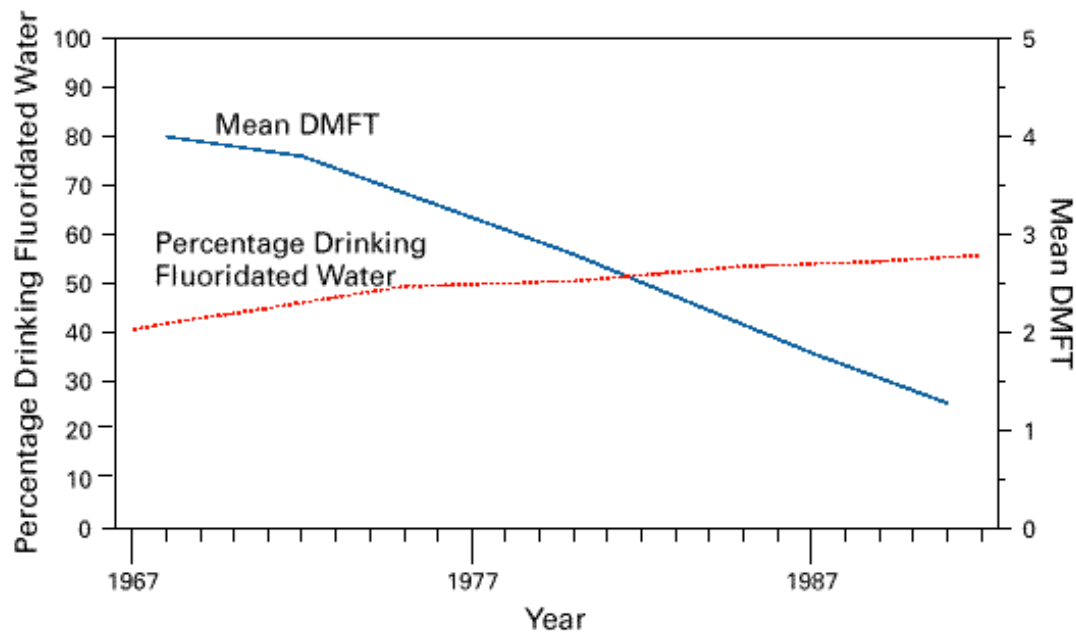


Figure 1: A copy of Figure 1 in the CDC review, TITLE CDC (1999).

However, in Figure 2, World Health Organization (WHO) data is plotted for tooth decay in 12-year-olds for both fluoridated and non-fluoridated countries, and it can be seen that the decay rates have been coming down as fast, if not faster, in the non-fluoridated countries as the fluoridated countries. It is surprising therefore the CDC should conclude that the declines in the US have been caused by fluoridation.

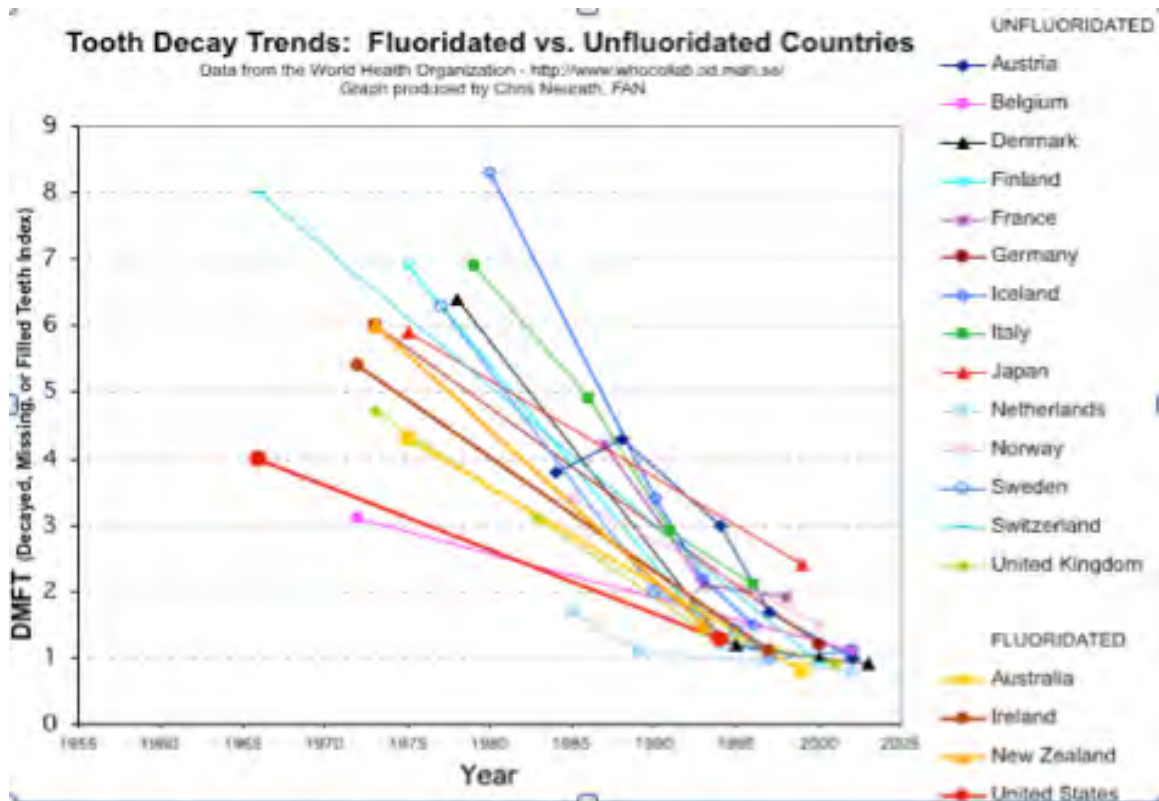


Figure 2: WHO data on tooth decay in 12-year-olds for 18 countries, 4 Fluoridated, 13 non-fluoridated and 1 (UK) partially fluoridated, plotted from the 1960s to 2000's (Graph by Chris Neurath; see FAN, 2012a).

We would do well to study the ways that European countries have achieved reduction of tooth decay in low-income families without forcing their citizens to swallow fluoride. Of particular interest are the Childsmile program in Scotland and the Nexø Program in Denmark.

3. Why are some people opposed to the practice of Water fluoridation?

The arguments given by many citizens and scientists opposed to fluoridation include the following.

- 1) Once added to the water there is no way that the dose each individual receives can be controlled.
- 2) Nor can we control who receives the treatment – it goes to everyone regardless of age, health or nutritional status.
- 3) It violates the individual's right to informed consent to human treatment.
- 4) It is difficult and expensive to avoid, as cheap filters don't remove the fluoride. This makes this doubly unethical for low-income families who don't want this treatment.
- 5) No doctors are overseeing the treatment or monitoring side-effects.
- 6) The Food and Drug Administration (FDA) has never regulated fluoride for ingestion. According to the FDA fluoride is an "unapproved drug".

- 7) Incredibly, after 70 years there has not been one single individually-based randomized control trial (RCT) to demonstrate safety or effectiveness
- 8) Fluoride is not an essential nutrient. No one has ever shown that if an animal is starved of fluoride in its diet that it develops a disease. An individual can have perfectly good teeth without fluoride. Tooth decay is not caused by too little fluoride but by poor dental hygiene and a poor diet, including too much sugar.
- 9) There is not one biological process in the body that needs fluoride to function properly but many that are harmed by it. Fluoride inhibits enzymes and interferes with G-proteins, which carry important messages across cell membranes. See Barbier et al. (2010) for a review of the biochemical mechanisms of fluoride's toxic action.
- 10) Nature in her wisdom has kept fluoride away from the baby. The level in mothers' milk is very low (0.004 ppm, NRC, 2006; 0.004 to 0.008, Sener, 2007) Thus the breast-fed baby is protected from fluoride, but that protection is removed by water fluoridation. A bottle-fed baby where the formula is made up with fluoridated tap water (at the new recommended guideline of 0.7 ppm fluoride) gets over 100 times more fluoride than a breast-fed baby.
- 11) Even promoters of fluoridation now admit the predominant mechanism of fluoride's beneficial action on the teeth is *topical* not *systemic* (CDC, 1999). In other words one does not need to swallow this toxic substance to get the purported benefit. Brushing the teeth with fluoridated toothpaste is a more rational delivery system, which minimizes exposure to other tissues and does not force it on people who don't want it.
- 12) Fluoridation promoters have wildly exaggerated the benefits of swallowing fluoride. A recent Cochrane review (the gold standard for evidence-based medicine) concluded that the scientific studies that have purported to demonstrate effectiveness have been of a very poor quality (Iheozor-Ejiofor et al., 2015) .
- 13) Fluoridation poses many health risks.
- 14) Of particular concern is the large number of animal and human studies that indicate that fluoride is neurotoxic (i.e. it can enter and interfere with brain chemistry) including 45 (out of 51) studies that have associated fairly modest exposure to fluoride and lowered IQ in children.
- 15) The last children in the USA that need their IQ lowered are children from low-income families, who are precisely those who have been targeted by those promoting this practice.
- 16) There are many other health concerns. These include lowered thyroid function (Peckham et al., 2015); accumulation in the human pineal gland (Luke 1997, 2001); ADHD (Malin and Till, 2015); accumulation in the bone (arthritis, NRC, 2006, increased hip fractures in the elderly, Li et al, 2001) and an increased risk of osteosarcoma in young boys when exposed in their 6th -8th years (Bassin et al, 2006).
- 17) U.S. children are being hugely over-exposed to fluoride from all sources as evidenced by the prevalence of dental fluorosis, which now impacts 41% of 12-15 year olds (Beltrán-Aguilar et al., 2010). The rates are higher for Black and Hispanics (Beltrán-Aguilar et al., 2005).
- 18) Now that it has become clear that low-income and minority communities are more

vulnerable to dental fluorosis and probably fluoride's other toxic effects fluoridation has become a major Environmental Justice issue and needs to be re-assessed from that perspective.

4. Fluoridation and Environmental Justice.

Those who promote fluoridation often do so based upon equity considerations. They correctly claim that most of tooth decay is concentrated in low-income families and especially in communities of color. In the United States, according to Kaste et al. (1996), 25 percent of children and adolescents experience 80 percent of all dental decay occurring in permanent teeth. However, the evidence suggests that promoters were being overly optimistic when they thought that forcing everyone to swallow fluoride would even-up the playing field when it comes to these dental inequalities.

As we explain below fluoridation far from helping low-income families is actually hurting them. In fact fluoridation is a rather graphic example of environmental *injustice*.

Fluoridation penalizes families of low-income, especially communities of color in the following ways.

- 1) Low-income families cannot afford to avoid fluoridated water if they want to do so because both removal equipment and bottled water (for drinking and cooking) is very expensive.
- 2) Low-income families cannot afford the expensive treatments to conceal the damage that fluoride can cause to the enamel (dental fluorosis).
- 3) Dental fluorosis rates are higher in Black and Hispanic communities than White communities especially in the more severe forms that require treatment (Beltrán-Aguilar et al., 2005).
- 4) Fluoride is more toxic when exposure is accompanied by poor nutrition. Poor nutrition is more likely to occur in low-income families than those with higher incomes. This is what was said about this issue in a 1952 article that appeared in the Journal of the American Dental Association:

“The data from this and other investigations suggest that malnourished infants and children, especially if deficient in calcium intake, may suffer from the effects of water containing fluorine while healthy children would remain unaffected...Thus low levels of fluoride ingestion which are generally considered to be safe for the general population may not be safe for malnourished infants and children. Therefore, the nutritional status must be carefully assessed and guarded in areas with endemic fluorosis. Nutritional studies should be included in any comprehensive program of fluoridation of water with special attention to chronically ailing infants and children.” (Massler & Schour 1952).

- 5) Lactose intolerance is more frequent among Blacks and other ethnic groups than white, and less consumption of dairy products typically means lower exposure to calcium. Calcium in the diet helps to a certain extent to protect against absorption of fluoride from the gut.

- 6) Minority families are less likely to breast-feed their children. When baby formula is made up with fluoridated water it leads to over 100 times more exposure to fluoride than breast-feeding.
- 7) Fluoride is neurotoxic and in 45 studies it has been associated with lowered IQ in children. The last children that need their IQ lowered are children from low-income families.
- 8) Low-income and minority groups living in the inner city are likely to have a greater exposure to lead. Fluoride appears to enhance the toxicity of lead. Lead increases the risk of dental fluorosis. Both lead and fluoride are neurotoxic.
- 9) Children from low-income families are more likely to get mercury amalgam fillings than families with higher income. Mercury is neurotoxic. The combined impact of mercury and fluoride on a child's mental development may be greater than either acting alone.
- 10) Minority communities have a greater incidence of kidney disease. Poor kidney function increases fluoride's uptake into the bone, which is likely to increase the rates of arthritis and hip fractures (over a lifetime).
- 11) Minority communities have a greater incidence of diabetes, some forms of which lead to an increased consumption of water, which in turns leads to a greater consumption of fluoride.

Many of these issues are discussed in more detail and documented in the text below.

5. The history of the water fluoridation program with a special emphasis on dental fluorosis and environmental justice issues

A timeline from the early 1900's to 2015

In the early 1900's a handful of dentists, particularly Frederick McKay (1916, 1928) and G.V. Black & McKay (1916) were interested in what was causing a condition (which was prominent in both Texas and Colorado), which led to discoloration and marking of the teeth. The condition was called "dental mottling." McKay described dental mottling as "the most poorly constructed enamel of which there is any record in the history of dentistry."

1925

Norman Ainsworth in a study of 4000 children in Essex County in England reported a lowered prevalence of dental caries in Maldon and Heybridge, which were areas endemic for "dental mottling" (now known as areas with high natural levels of fluoride in the water) – (see Mullen, 2005).

1928

Frederick McKay (1928) noted that while the discoloration and marking of the teeth in cases of "dental mottling" looked very bad it did not appear to increase the child's susceptibility to tooth

decay, in fact there appeared to be less tooth decay among children with dental mottling than those without.

1931

In 1931 three separate research teams (Smith et al., 1931; Churchill et al, 1931 and Vehu, 1931) identified the cause of this condition as fluoride in the drinking water and the name was changed to “dental fluorosis,” which literally means “poisoning of the teeth by fluoride.” It was quickly recognized that dental fluorosis was a “systemic” not a “topical” effect. It can only be contracted *before* the permanent teeth have erupted. It is occasionally seen in the primary teeth (Warren et al., 1999) but it is most frequently observed in the secondary teeth.

1930 and 40’s

Under the leadership of H. Trendley Dean the US Public Health Service (PHS) studied the occurrence of this condition throughout the USA. In addition to this mapping exercise Dean subsequently published his famous classification of the different levels of severity of this condition: very mild, mild, moderate and severe. According to Dean et al. (1934, 1935):

Very mild ranged from white patches on the cusp of the teeth to up to 25% of the enamel impacted.

Mild impacted between 25 and 50% of the enamel.

Moderate impacted 100% of the enamel.

Severe impacted 100% of enamel with pitting and chipping.

Pictures illustrating these four levels of dental fluorosis are given in Figure 3



“Very Mild”



“Mild”



“Moderate”



“Severe”

Figure 3. Pictures of the four levels of dental fluorosis. (Photographs by Dr. Hardy Limeback and Dr. Iain Pretty, et al. - see [more photos](#))

1942.

In 1941-1942, Dean and his colleagues published his famous 21-city study which purported to show that as the fluoride level in the water went from about 0.1 to 2.6 ppm tooth decay fell. Most of reduction occurred between 0.1 and 0.9 ppm, with only a modest further decrease occurring between 0.9 and 2.6 ppm. He further noted that there was little noticeable dental fluorosis occurring below 1 ppm. Thus was born the notion that the “optimal level” for reducing tooth decay while minimizing the risk of dental fluorosis was 1 ppm. Dean later indicated that at 1 ppm only about 10% of children would have dental fluorosis and only in the *very mild* category. Dean later testified in the US Congress that *mild* dental fluorosis would not be an acceptable trade off for lowered tooth decay. This is what he said to the Delaney Committee in 1952:

“We don’t want any ‘mild’ [fluorosis] when we are talking about fluoridation. We don’t want to go that high...I don’t want to recommend any fluoridation where you get any ‘mild’”. (Connett et al., 2010, page 110).

All the children in Dean’s 21-City study were white: there were no Blacks or Hispanics in the 7,257 children studied.

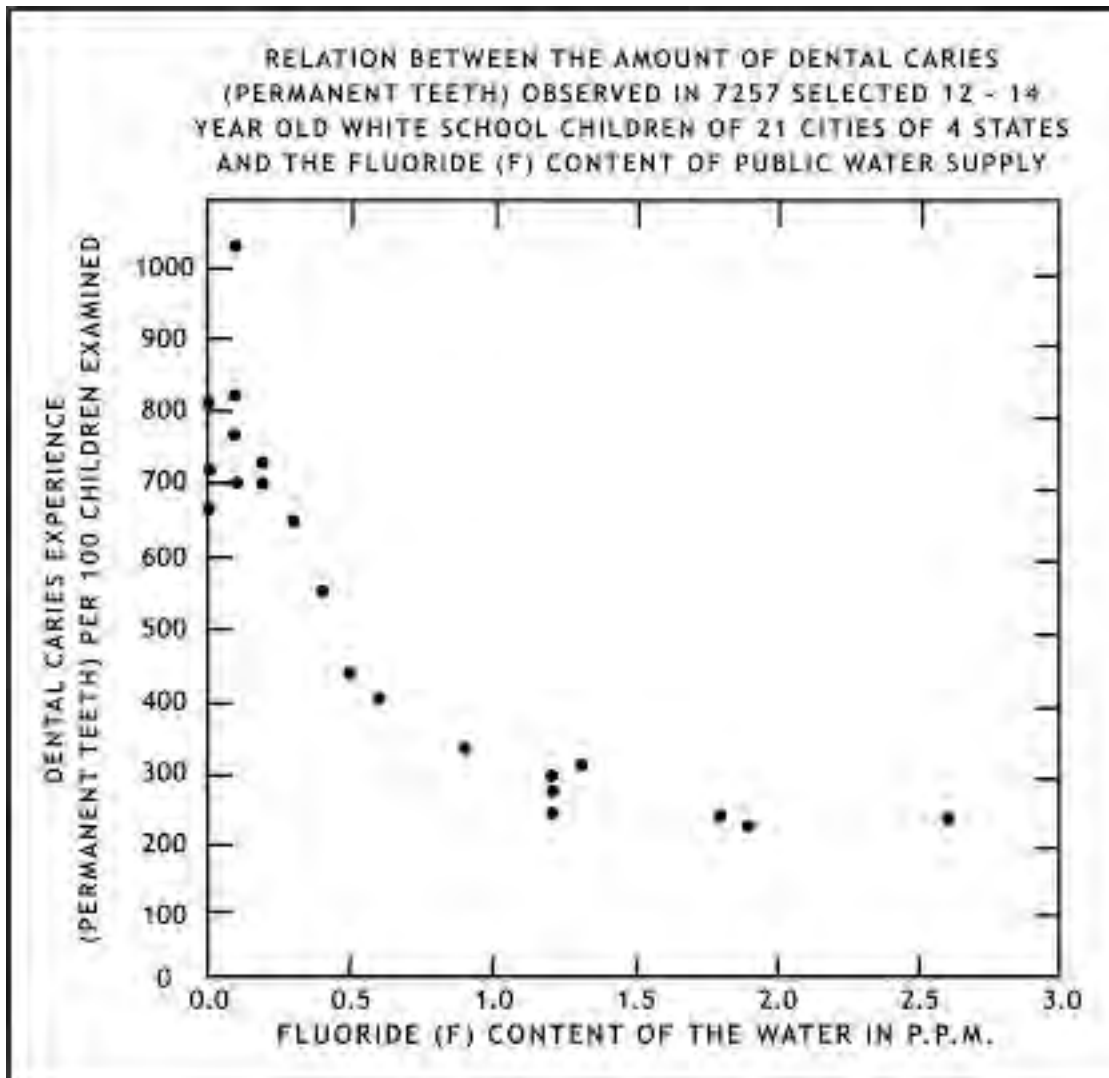


Figure 4: Dean’s famous 21-city plot of Dental caries experience in each community versus the concentration of fluoride in the community’s water supply in ppm (Dean et al., 1941, 1942)

1945

By 1945 Dean and others were convinced that natural levels of fluoride in the water lowered tooth decay and there were no side effects other than dental fluorosis. The question became: could one deliberately add a fluoride-containing compound to the public water supply and achieve the same result? The PHS decided to run a series of experiments to check this out. Instead of these experiments being conducted in the form of randomized control trials on

individual volunteers they were launched on whole cities. In their discussions the early promoters did not want to use the word experiment because as they said, "people don't like to be experimented upon!" They also saw them more as demonstrations – demonstrating that what they had seen with natural fluoride could be reproduced with artificial fluoride. These fluoridation experimental trials began in 1945 in Grand Rapids, MI; Newburgh, NY and Brantford, Ontario, Canada using sodium fluoride at 1 ppm (1 mg fluoride/liter of water). Most now agree that the methodology used in these experiments would not be acceptable by modern epidemiological standards but nevertheless they provided the foundation for the widely accepted belief in this practice for many decades. Dr. Philip Sutton wrote two monographs and a whole book on the inadequacies of these experimental trials, and his arguments have never been successfully rebutted by proponents (Sutton, 1959, 1960, 1996).

1950

The trials were meant to last for 10 years, but before any of them had been completed the PHS endorsed fluoridation in 1950 and over the next two years with little science on the table it was endorsed by nearly every dental, public health and medical body in the country. Despite their lack of science these endorsements have been used heavily by promoters ever since.

1956

In 1956, Schlesinger et al. published the health findings for the Newburgh, NY (control city Kingston, NY) experiment. They reported that young men in fluoridated Newburgh had a significantly greater number of cortical bone defects than non-fluoridated Kingston (about 2 to 1). There was no follow-up on this finding, which is surprising because the cortical bone is the outside layer of the bone and protects against fracture. However, Dr. Caffey who examined the X-rays said in 1955 that the age, sex and anatomical distribution of these defects were remarkably similar to osteosarcoma. 20 years later this comment prompted the National Academy of Science (NAS) in 1977 to recommend that researchers check to see if there was an increase in osteosarcoma in young men under 30 in fluoridated communities (NAS, 1977). The other finding by Schlesinger was that young girls were menstruating on average 5 months earlier in the fluoridated community than in the non-fluoridated one. This observation was not considered important at the time but today it is intriguing in the context of Luke's findings, a) that fluoride accumulates in the human pineal gland (Luke, 2001) and b) lowers melatonin production in animals and shortens the time to puberty (Luke, 1997).

1962

A January 10, 1962 internal memorandum, from a top PHS official, F.J. Maier, in connection with the first fluoridation trial, revealed that, "negroes in Grand Rapids had twice as much [dental] fluorosis than others." Based on this, Maier asked, "In a community with a larger number of negroes (say in Dekalb County, Georgia) **would this tend to change our optimum fluoride levels?**"(Maier, 1962).

1983

In 1983 the U.S. Surgeon General convened a panel to review the literature as part of the process of determining a safe drinking water standard for fluoride (the MCL, or Maximum

Contaminant level). One member of the panel on reviewing pictures of dental fluorosis stated that, “You would have to have rocks in your head to allow your child much more than two parts per million (Grossman, 1990 – see Appendix A)...” Over-exposure to fluoride damages teeth as the photos of the various stages of dental fluorosis above, also known as enamel fluorosis, clearly show.

1985

When the EPA published its rationale for both a MCL and MCLG (goal) at the very high level of 4 ppm they did not include dental fluorosis as an *adverse health effect* but as a “cosmetic effect” (for which they produced a non-enforceable secondary standard of 2 ppm). Instead of dental fluorosis the EPA used skeletal fluorosis as the health effect of concern – even so, they did not use the first signs of skeletal fluorosis (which are identical to arthritis) but the terminal stages in which the patient is crippled, i.e. crippling skeletal fluorosis. Choosing the gross end point of the problem conflicts with the normal way that the EPA comes up with protective standards. Normally they determine the Lowest Observable Adverse Effect Level (LOAEL) and then apply safety factors to that. Note also that U.S. standard of 4 ppm is about three times the WHO guideline of 1.5 ppm, which is the standard adopted by Canada, Mexico and most of the rest of the world.

Professionals at the EPA who witnessed this process have stated that the level of 4 ppm was chosen for political not scientific reasons. It was chosen to accommodate concerns of states like South Carolina which did not want to spend a lot of money removing high natural fluoride levels from drinking water if a lower level were chosen (Grossman, 1990 in Appendix A; and FAN, 2007).

1985

In a Texas survey, published in 1985, Butler et al. reported that the prevalence of dental fluorosis among African-American children was greater than for Hispanic and non-Hispanic white children. The reported Odds Ratio was 2.3.

1986-7

The National Institute of Dental Research (NIDR) conducted one of the largest surveys of tooth decay and dental fluorosis ever carried out in the USA. They looked at the teeth of approximately 39,000 children in 84 communities. The *dental caries* results were reported in 1990 by Brunelle and Carlos but the *dental fluorosis* data was not reported until 1997 by Heller et al. The latter reported 29.9% of the children living in communities with fluoride levels between 0.7 and 1.2 ppm had some form of dental fluorosis. Of these 22.5 % had very mild, 5.8% had mild, 1.3% had moderate and none were in the severe category.

As far as dental caries was concerned Brunelle & Carlos found that for children aged 5-17, who had lived all their lives in a fluoridated versus a non-fluoridated community, the *average* saving in tooth decay was 0.6 of one tooth surface (see their Table 6). There are 4 and 5 surfaces for the “cutting” and “chewing” teeth respectively, and by the time all the child’s teeth have erupted there are a total of 128 tooth surfaces. Even this very modest saving of 0.6 of one tooth

surface was not shown by the authors to be statistically significant, but this did not stop them declaring:

“The results show that water fluoridation has played a dominant role in the decline of caries and must continue to be a major prevention methodology.”

Brunelle and Carlos also noted that, “Contrary to some earlier observations, however, white children had lower mean DMFS scores than non-whites (blacks and all others) at most ages (Fig. 7).”

1988

In 1988, Bette Hileman, in an important review in *Chemical and Engineering News* reported disagreements among dental researchers as to whether dental fluorosis rates were increasing among children in the U.S.:

“Dennis Leverett, chairman of the department of community dentistry at the Eastman Dental Center in Rochester, N.Y., claims that the prevalence of dental fluorosis today in communities with fluoridated water is twice the level that H. Trendley Dean, a dental surgeon in the Public Health Service, reported in 1942 ... In contrast, William S. Driscoll, acting chief of the disease prevention and health promotion branch at the National Institute of Dental Research (NIDR), and his coworkers report that surveys in 1980 “suggest that no important changes in the prevalence and severity of fluorosis have taken place” since **Dean’s studies**. However, Driscoll did find eight children with either moderate or severe fluorosis in a community with a fluoride level of 1 ppm...” (Hileman, 1988)

1990

In 1990, Williams and Zwemer in a study from Georgia, reported that dental fluorosis was more severe among African-American children than white children. As the following table shows, 16.7% of black children in Augusta, Georgia had moderate/severe fluorosis versus 9.1% of white children. In Richmond County, the respective rates were 3.3% vs 0% (see Table 1)

Table 1. **Dental Fluorosis Rates in Augusta & Richmond County, Georgia**

Residence/Race	No Fluorosis (TSIF Score = 0)	Very Mild/Mild Fluorosis (TSIF Score = 1 - 3)	Moderate/Severe Fluorosis (TSIF Score = 4 - 7)
City/ Black	19.6%	63.7%	16.7%
City/White	18.2%	72.7%	9.1%
County/ Black	47.8%	48.9%	3.3%
County/White	44.9%	55.1%	0%

SOURCE: Williams JE, Zwemer JD. (1990).

In 1990 the long-awaited animal cancer study (requested by Congress) was published by the National Toxicology Program (NTP, 1990). This report caused great consternation because the authors reported a statistically significant increase in a bone cancer (osteosarcoma) in the male rats, which was “equivocal” evidence that fluoride was carcinogenic.

1991

Soon after the 1990 NTP study was published a cover story was published in the *Journal of the American Dental Association* speculating that fluoridation may actually be *protective* against cancer (McGuire et al., 1991). It was clear from the comments in this article that the authors were more worried that a finding that fluoride caused cancer would end water fluoridation, than it might be killing a few young men each year. They wrote:

“An incorrect inference implicating fluoride carcinogenicity and its removal from our water systems would be detrimental to the oral health of most Americans...a disruption in the delivery of fluoride through municipal water systems would increase decay rates over time...Linking of fluoride ingestion and cancer initiation could result in a large-scale defluoridation of municipal water systems under the Delaney clause.” (Connett et al., 2010, p. 187)

One of the authors of this report was Professor Chester Douglass, chairman of the Harvard dental department. In 1994 he received a large grant from the National Institute of Environmental Health Sciences to investigate the possible connection between fluoridation and osteosarcoma. This raises serious questions about why an investigation that had the potential to end fluoridation was given a) to a dental school and b) to a dental professor who was known to be pro-fluoridation and was simultaneously a consultant for Colgate (FAN, 2006).

Despite these doubts in 2001, Douglass’s graduate student, Elise Bassin, as part of her doctoral thesis, discovered in a carefully matched case control study that young boys exposed to fluoridated water in their 6th, 7th or 8th years had a 5-7-fold increased risk of succumbing to osteosarcoma by the age of 20. Over the next three years, Douglass – given several opportunities - hid this finding from his peers, his funders and the National Research Council of the National Academies (NRC) review panel. Bassin’s thesis (2001) was not “found” until 2004. For the rest of this intriguing story see the Harvard/Bone Cancer files (FAN, 2006); Harvard Crimson, 2006; Connett et al., 2010, chapter 18.

1997

Heller et al. (1997) paper published (see above)

1997 also saw the publication of a **controversial report from the Institute of Medicine (IOM)**. The title of the report included fluoride in a list of well-known nutrients needed for healthy bone growth: calcium, magnesium, phosphate and vitamin D (IOM, 1997). In response to a letter from a number of scientists complaining about this false classification of fluoride as a nutrient, Dr. Bruce Alberts, President of the National Academies, and Dr. Kenneth Shine, President of the IOM, wrote:

First, let us reassure you with regard to one concern. Nowhere in the report is it stated that fluoride is an essential nutrient. If any speaker or panel member at the September 23rd workshop referred to fluoride as such, they misspoke. As was stated in *Recommended Dietary Allowances 10th Edition*, which we published in 1989: “These contradictory results do not justify a classification of fluoride as an essential element, according to accepted standards. Nonetheless, because of its valuable effects on dental health, fluoride is a beneficial element for humans.” (Alberts and Shine, 1998).

We return to this story in section 26 where we challenge the EPA Office of Water for using the IOM report to support their false claim that fluoride is a nutrient in a 2010 report (EPA, 2010b, page 39).

1999 - 2000

Kumar et al. (1999) reported that “African-American children studied [in Newburgh and Kingston, NY] in 1995 were at higher risk for dental fluorosis than children of other racial groups. . . . The higher risk for dental fluorosis observed among African-American children is consistent with several other studies.”

In 2000 Kumar et al. noted, “The results support our earlier findings that African-American children were at **higher risk for dental fluorosis** in the fluoridated area. Even in the nonfluoridated area, there was a suggestion that African-American children were at higher risk. Whether this higher risk for African-American children is the result of their lower threshold for fluoride or due to other unknown sources of fluoride is not known. It has been reported that African-American children in the United States drink more water and less milk compared to white children. In Newburgh, this difference in the fluid consumption may have resulted in a higher prevalence of fluorosis in African-American children. . . . Because a race fluorosis association could have important policy implications, a large-scale study in a representative sample should be conducted to test specifically the hypothesis that African-American children are at higher risk for fluorosis.”

2003 -2006

The US EPA Office of Water asked the National Research Council of the National Academies to review their safe water standards for fluoride. A 12-membered panel (unusually for official reviews on fluoride, the panel was balanced with 3 pro-fluoridation, 3 anti-fluoridation and 6 undeclared) was appointed by the National Research Council of the National Academies to do this. The panel reported back in 2006 with a landmark 500-page review (NRC, 2006).

The NRC panel concluded that the safe drinking water goal and standard for fluoride in water (MCLG and MCL) of 4 ppm was not protective of health and a new risk assessment needed to be performed to determine a new MCLG (maximum contaminant level goal).

The panel had this to say on dental fluorosis:

“Severe enamel fluorosis is characterized by dark yellow to brown staining and discrete and confluent pitting, which constitutes enamel loss... Severe enamel fluorosis compromises that health-protective function by causing structural damage to the tooth.

The damage to teeth caused by severe enamel fluorosis is a toxic effect that is consistent with prevailing risk assessment definitions of adverse health effects...

“Severe enamel fluorosis occurs at an appreciable frequency, approximately 10% on average, among children in U.S. communities with water fluoride concentrations at or near the current MCLG [maximum contaminant level goal] of 4 mg/L. Thus, the MCLG is not adequately protective against this condition...

“The committee finds that it is reasonable to assume that some individuals will find *moderate* enamel fluorosis on front teeth to be detrimental to their appearance and that it could affect their overall sense of well-being. However, the available data are not adequate to categorize moderate enamel fluorosis as an adverse health effect on the basis of structural or psychological effects.

“Since 1993, there have been no new studies of enamel fluorosis in U.S. communities with fluoride at 2 mg/L in drinking water. Earlier studies indicated that the prevalence of moderate enamel fluorosis at that concentration could be as high as 15%...” (NRC, 2006)

However, even though the NRC panel concluded that *severe* dental fluorosis constituted an adverse health effect no federal or state agency has gone to any lengths to inform the public that this is the case. Nor have they warned the African-American and Mexican American communities with a total population of 101 million people (Colby & Ortman, U.S. Census, Table 2, 2015) that they are particularly vulnerable to this condition,

2005

In 2005, the Centers for Disease Control and Prevention (Beltrán-Aguilar et al. See Table 2 below) acknowledged for the first time publicly that the black community has higher rates of dental fluorosis than the white community. It took a Freedom of Information Act request, however, to learn the full extent of this disparity. **58% of black children** were diagnosed with dental fluorosis in CDC’s 1999-2004 national survey, versus 36% of white children. (Gracia, 2011; see also Stockin, 2015).

Table 2: A copy of Table 23. Enamel fluorosis* among persons aged 6- 39 years, by selected characteristics United States, National Health and Nutrition Examination Survey, 1999- 2002.

Source: Beltrán-Aguilar et al., 2005 (CDC, 2005)

<http://fluoridealert.org/content/table-23-enamel-fluorosis-among-persons-aged-6-39-mmwr-2005/>

Characteristic	Unaffected		Questionable		Very mild		Mild		Moderate/Severe	
	% [†]	SE [§]	%	SE	%	SE	%	SE	%	SE
Age group (yrs)										
6-11	59.81	4.07	11.80	2.50	19.85	2.12	5.83	0.73	2.71	0.59
12-15	51.46	3.51	11.96	1.84	25.33	1.98	7.68	0.93	3.56	0.59
16-19	58.32	3.30	10.21	1.70	20.79	1.78	6.65	0.67	4.03	0.77
20-39	74.86	2.28	8.83	1.23	11.15	1.22	3.34	0.58	1.81	0.39
Sex										
Male	67.65	2.63	9.09	1.45	15.65	1.52	4.58	0.54	2.12	0.39
Female	66.97	2.84	9.83	1.34	15.58	1.36	4.84	0.61	2.78	0.49
Race/Ethnicity[¶]										
White, non-Hispanic	69.69	3.13	10.43	1.62	14.09	1.56	3.87	0.60	1.92	0.48
Black, non-Hispanic	56.72	3.30	10.40	2.16	21.21	2.16	8.24	0.82	3.43	0.54
Mexican-American	65.25	3.89	8.95	1.29	15.93	2.24	5.05	0.72	4.82**	1.81
Poverty status^{††}										
<100% FPL	68.02	3.21	10.67	1.64	14.29	1.73	4.07	0.69	2.97	0.66
100%-199% FPL	66.92	2.91	9.11	1.79	16.11	1.46	5.21	0.78	2.65	0.56
≥200% FPL	68.88	2.75	10.73	1.33	15.56	1.56	4.83	0.50	2.00	0.37
Total	67.40	2.65	9.91	1.35	15.55	1.37	4.69	0.49	2.45	0.40

^{*} Using Dean's index. All estimates are adjusted by age (single years) and sex to the U.S. 2000 standard population, except sex, which is adjusted only by age.

[†] Weighted prevalence estimates.

[§] Standard error.

[¶] Calculated using "other race/ethnicity" and "other Hispanic" in the denominator.

^{**} Unreliable estimate; the standard error is 30% the value of the point estimate, or greater.

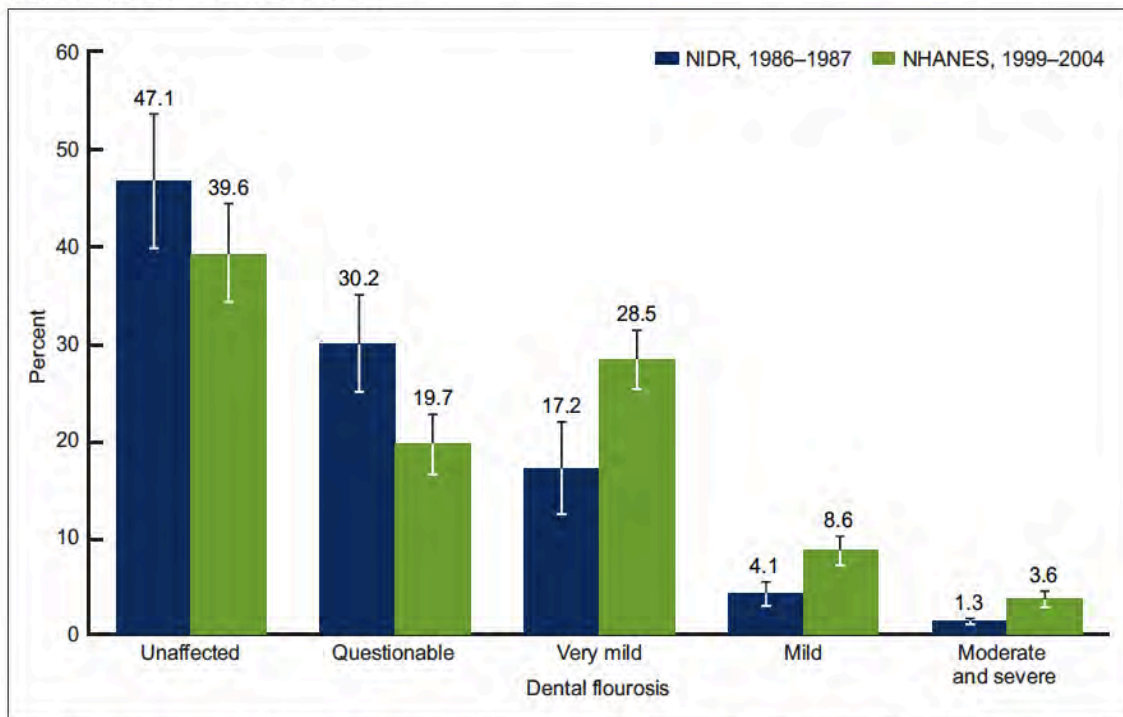
^{††} Percentage of the Federal Poverty Level (FPL), which varies by income and number of persons living in the household.

According to attorney Michael Connett and Special Projects Director for the Fluoride Action Network (FAN): "The epidemic of fluorosis now seen in the black community is the visible legacy of the government's failure to act on what it knew. They knew in 1962 that '**negroes in Grand Rapids had twice as much [dental] fluorosis than others**' (Maier, 1962)."

2010

In 2010 another report from the CDC revealed that **41% of U.S. children** between the ages of 12 and 15 had some form of dental fluorosis. This total included children from both fluoridated and non-fluoridated communities. No breakdown was given for race and ethnicity. A breakdown of the 41% total showed that **28.5 % has very mild, 8.6% had mild, and 3.6 % had either moderate or severe dental fluorosis** (Beltrán-Aguilar et al., 2010).

Figure 3. Change in dental fluorosis prevalence among children aged 12–15 participating in two national surveys: United States, 1986–1987 and 1999–2004



NOTES: Dental fluorosis is defined as having very mild, mild, moderate, or severe forms and is based on Dean's Fluorosis Index. Percentages do not sum to 100 due to rounding. Error bars represent 95% confidence intervals.

SOURCES: CDC/NCHS, National Health and Nutrition Examination Survey, 1999–2004 and National Institute of Dental Research, National Survey of Oral Health in U.S. School Children, 1986–1987.

Figure 6: Change in dental fluorosis prevalence among children aged 12-15 participating in two national surveys: United States, 1986-1987 and 1999-2004, 3 from Beltrán -Aguilar et al. (2010).

2011

On January 7 the U.S. Department for Health and Human Services and EPA held a joint press conference in Washington, DC (HHS, 2011a). The HHS announced its proposal to lower its recommended fluoride level in water to fight tooth decay from a range of 0.7 – 1.2 ppm to 0.7 ppm, largely because of the escalating prevalence of dental fluorosis among US children.

At this same press conference EPA's Office of Water announced that it had begun its determination of a new safe drinking water standard for fluoride (recommended by the NRC panel in March of 2006). While stating that they wanted to find a safe level for fluoride in drinking water (their federal responsibility), they also stated that they were interested in protecting children's teeth (*not* their federal responsibility). According to EPA Assistant Administrator for the Office of Water Peter Silva.

“EPA's new analysis **will help us make sure that people benefit from tooth decay prevention** while at the same time avoiding the unwanted health effects from too much fluoride (HHS, 2011a).” (our emphasis)

EPA at this juncture threw away its objectivity in the setting of a “safe” Maximum Contaminant Level goal (MCLG) for fluoride in drinking water. In other words they were indicating that they were going to select the safe level for fluoride as a contaminant that would not conflict with the HHS recommended level for fluoride in the fluoridation program. Clearly that is a political judgment. However, from a legal point of view no consideration of any perceived benefit of a contaminant should be allowed to interfere with the EPA’s obligation to determine a **safe** Maximum Contaminant Level Goal (MCLG). According to the Safe Drinking Water Act the MCLG should be determined based on a known or reasonably anticipated harmful effect, with appropriate safety factors applied to protect everyone in society, including vulnerable subsets. **Such calculations should be scientifically determined and should not be compromised by accommodating some perceived benefit.**

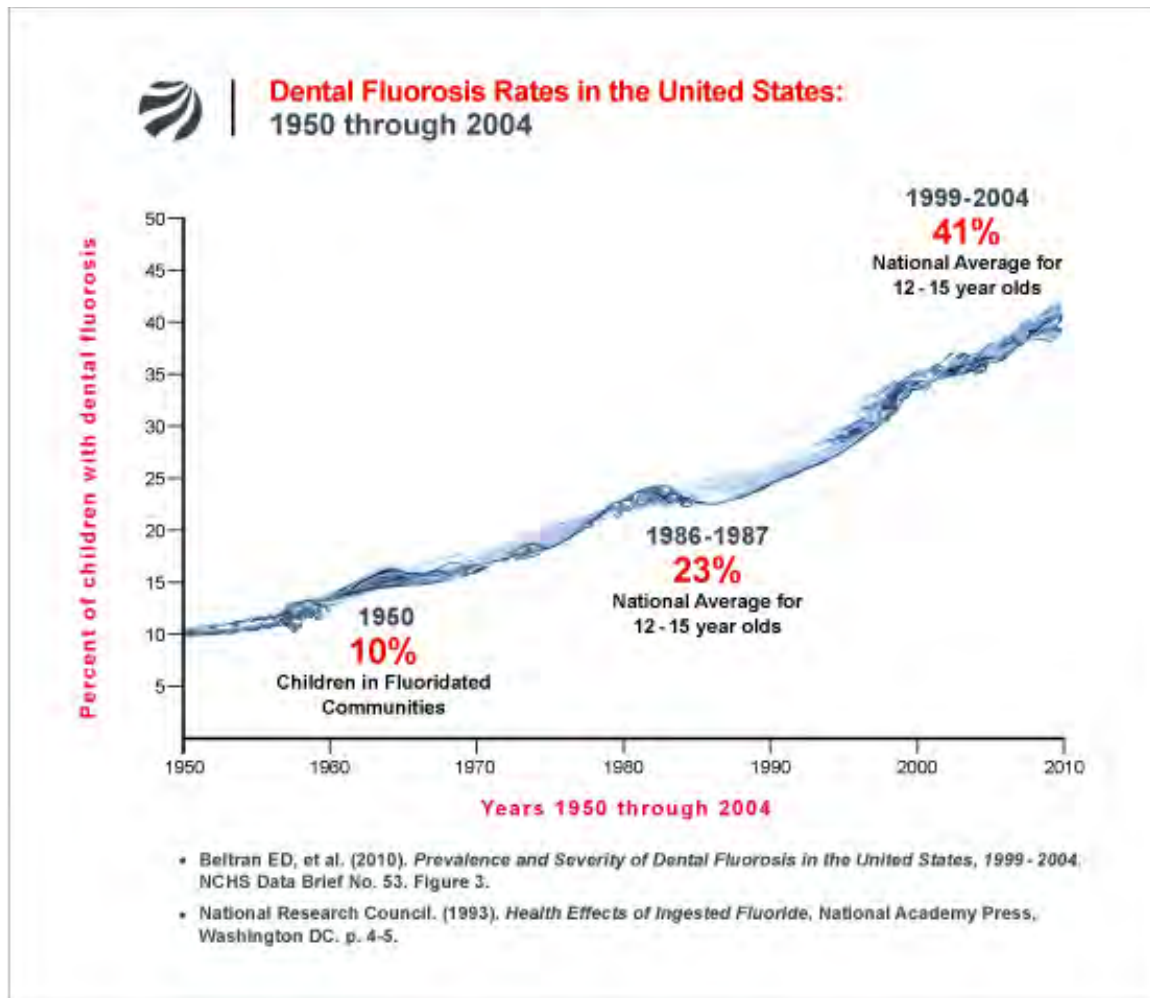
2015

The HHS formally announced its new recommended level of 0.7 ppm fluoride in water claiming that it would lower tooth decay, while minimizing the prevalence of the more objectionable stages of dental fluorosis (HHS, 2015). In so doing they continued their 60-year plus denial of any other potential health effect other than dental fluorosis at the doses experienced by any American, including the most vulnerable, drinking fluoridated water and getting fluoride from other common sources such as dental products (see section 25 for our response to this).

SUMMARY: DENTAL FLUOROSIS IN THE U.S. 1945-2015

In 1945 Dean estimated that about 10% of children would develop dental fluorosis in communities fluoridated at 1 ppm. Since then children are being exposed to fluoride not only in fluoridated water but also from all the beverages and processed foods made with fluoridated water, and from many other sources including dental products, and pesticide residues on food, including EPA permitted fluoride residues – from the fumigant sulfuryl fluoride – of 900 ppm fluoride in powdered eggs, 130 ppm fluoride in wheat flour, and 70 ppm fluoride in 99.99% of all processed food (FAN, 2005). As a result the rates of dental fluorosis are getting significantly worse across the U.S. However, the CDC’s Division of Oral Health continues to promote artificial water fluoridation despite its disproportionate impact on communities of color and low-income groups. Studies sponsored by this CDC division in 2005 and 2007 confirm the growing epidemic of dental fluorosis in minority populations. It is an open question as to whether reducing the fluoride levels from a range of 0.7 to 1.2 ppm across the country to a single value of 0.7 ppm, will have a major effect on decreasing the prevalence of this condition in general or in minority communities in particular. A larger question is whether the level of 0.7 ppm will cause other health problems, but for the CDC’s Division of Oral Health that is a mute question since they adamantly deny that any other tissue is harmed by water fluoridation or from all sources combined.

Meanwhile, at no time have federal government officials ever taken steps to warn black communities of their heightened fluorosis risk.



(Graph by [Fluoride Action Network](#))

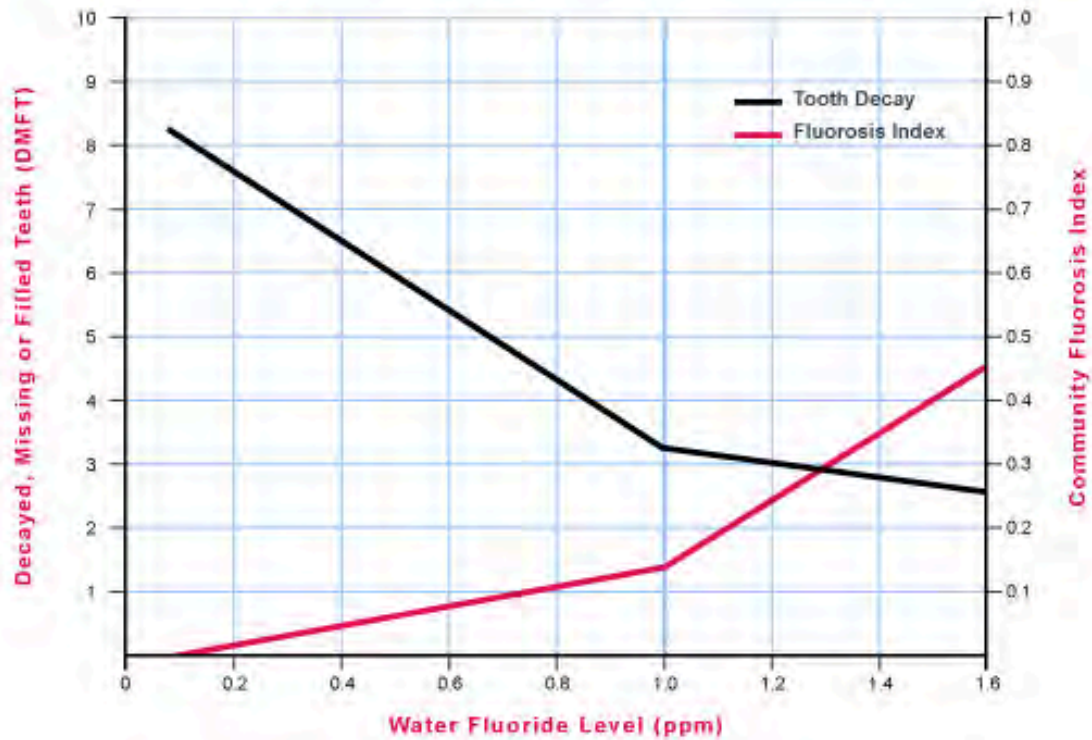
Figure 7: Dental fluorosis rates in the United States: 1950 through 2004 (FAN).



Fluoridation, Tooth Decay, and Dental Fluorosis

What was predicted vs. what has actually occurred

What was predicted in 1950*



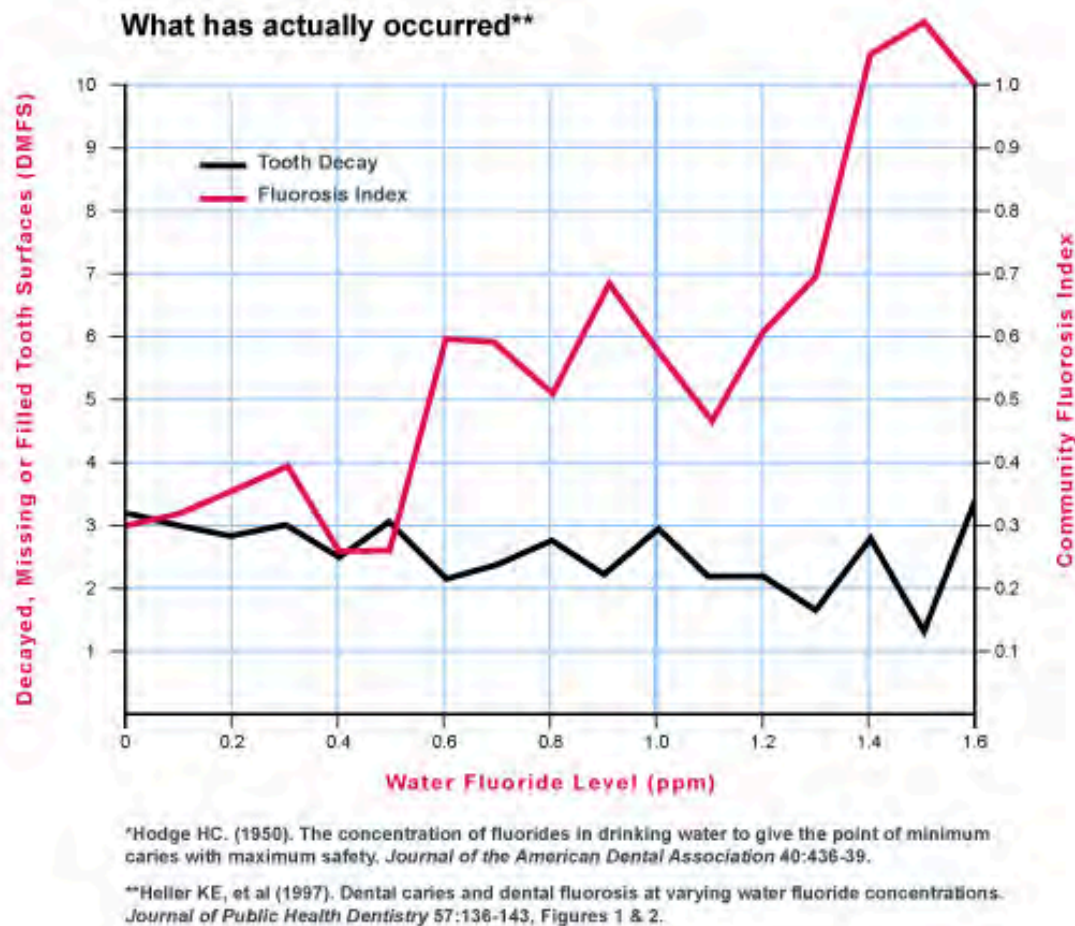


Figure 8: What was predicted in 1950 (top graph) vs. What has actually occurred (bottom graph). Legend: Black line is tooth decay measured as DMFT. Red Line is the Community Fluorosis Index. (FAN).

6. Has fluoridation helped reduce tooth decay in the Inner City?

While it is clear that the fluoridation program has failed to limit the prevalence of dental fluorosis to levels anticipated in 1945, what about the other half of the program? Has it reduced tooth decay? And in the context of this discussion has it reduced tooth decay in low-income families and minority communities especially in the inner city?

Despite the laudable aim to reduce the inequalities in dental care, putting fluoride in everyone's water to reduce tooth decay among inner city children has not been the magic bullet it was expected to be. Story after story in the media of major fluoridated cities in the US tell the same story: we still have a dental crisis among America's inner city children especially among poor and minority families. In Table 3 we summarize these reports from New Haven CT; Washington DC; Detroit MI; Boston MA; Concord NH; Manhattan and the Bronx in NY; Cincinnati OH; Pittsburgh PA; and San Antonio TX.

TABLE 3: Communities with water fluoridation and high dental decay

Fluoridation Status	Detail
<p>CONNECTICUT</p> <p>Mandatory Fluoridation since 1965 for water systems servicing a population of 20,000 or more</p> <p>90.3% of the population receive fluoridated water as of 2012</p>	<p>... Peters [director of New Haven Public Schools school health centers] said this past June New Haven Public schools screened 484 Troup students, from kindergarten on up to grade 8, and found that 35 percent had moderate to severe dental needs.</p> <p>“The need for dental care is very clear in Connecticut and New Haven,” Peters said at Troup Wednesday. “Tooth decay is the most common childhood disease. It is five times more common than asthma and its the leading reason for missed school across the state.” ...</p> <p>2015. Markeshia Ricks M. The dentist comes to Troup. New Haven Independent. September 11.</p>
<p>CONNECTICUT</p> <p>See above</p>	<p>“Dental decay remains the most common chronic disease among Connecticut’s children. Poor oral health causes Connecticut children to lose hundreds of thousands of school days each year. One in four Connecticut children is on Medicaid, but two of three Connecticut children receive no dental care. And DSS continues to exploit the seriously stretched public health providers and the few remaining private providers. There is an oral health crisis in Connecticut.”</p> <p>2005. Slate R. State must fund plan to provide oral health care for the poor. New Haven Register. May 5.</p>
<p>DISTRICT OF COLUMBIA</p> <p>Fluoridated since 1952</p>	<p>Washington DC has “one of the highest decay rates in children in the country.” The “typical new patient, age 6, has five or six teeth with cavities — a ‘staggering’ number” at the Children’s National Medical Center.</p> <p>2002. Morse S. Bottled Water: Just add Fluoride. Washington Post. March 5.</p>
<p>DISTRICT OF COLUMBIA</p> <p>Fluoridated since 1952</p>	<ul style="list-style-type: none"> • Low-income Children in Washington, DC are at High Risk for Poor Oral Health and Consequently Inadequate School Readiness • a large proportion (44 percent) of the 144 students examined had a history of dental caries, • Examined students are primarily from some of the most impoverished Wards (5, 6, 7, & 8) and exhibit high caries incidence <p>2007. Issue Brief: Oral Health is Critical to the School Readiness of Children in Washington, DC. By Altarum Institute.</p>
<p>ILLINOIS</p>	<p>Thousands of low-income children and adults in Illinois suffer from untreated dental disease. They can’t eat or sleep properly, do their best at</p>

<p>Fluoridation is mandatory</p> <p>98.5% of the state's population receive fluoridated water (as of 2012)</p>	<p>school or work or smile and are at risk for other serious health problems...</p> <p>... Illinois has among the lowest rates in the nation for government funded dental care. As a result we face an oral health care crisis... Illinois currently has just one clinic per 8,400 children who rely on government insurance...</p> <p>2009. Support Bill HB 388 for dental care. By Lauri Frichtl, Executive Director, Illinois Head Start. Pioneer Press.</p>
<p>INDIANA</p> <p>94.8% of the state's population receive fluoridated water (as of 2012)</p>	<p>Results from the 2006 BRFSS also indicated that 47 percent of Hoosiers ages 18 and older have had permanent teeth extracted—a percentage that was significantly higher than the national median of 44 percent (see Figure 2).</p> <p>Groups with the highest prevalence of tooth extractions included blacks; individuals with an annual household income of less than \$35,000; and individuals with lower educational attainment. Prevalence of extractions was highly associated with age – as age increased so did the percentage of Hoosiers who reported having had any permanent teeth extracted.</p> <p>... The elderly, minorities, and low income citizens often face the unfortunate need to have some or all of their teeth extracted.</p> <p>2009. Oral Health Needs in Indiana: Developing an Effective and Diverse Workforce. Center for Health Policy. May.</p>
<p>MICHIGAN</p> <p>Detroit Fluoridated since 1967</p>	<p>Excerpt from abstract: To describe the epidemiology of dental caries among low-income African American children 5 years old and younger in the City of Detroit.</p> <p>Conclusion: Dental Caries in primary teeth in children 5 years of age and younger in Detroit is a major dental public health problem.</p> <p>2006. Severity of Dental Caries Among African American Children in Detroit. By Ismail AI, Tellez M, Sohn W. Presented at the 35th Annual Meeting & Exhibition of the American Assoc. for Dental Research in Orlando, Florida. March.</p>
<p>MICHIGAN</p> <p>Detroit Fluoridated since 1967</p>	<p>From abstract: The aim of this study was to examine the relationship between dietary patterns and caries experience in a representative group of low-income African-American adults. Participants were residents of Detroit, Michigan, with household incomes below 250% of the federally-established poverty level (n = 1,021)... This population had severe caries, poor oral hygiene, and diets that are high in sugars and fats and low in fruits and vegetables. Apart from tap water, the most frequently consumed food item by adults of all ages was soft drinks; 19% of all energy from sugar came from soft drinks alone.</p> <p>2006: Dietary Patterns Related to Caries in a Low-income Adult Population. By Burt BA, Kolker JL, Sandretto AM, et al. Caries Research 40(6):473–80.</p>

<p>MASSACHUSETTS</p> <p>70.4% of the state residents receive fluoridated water</p>	<p>Children from low-income families and children from certain racial/ethnic groups not only have a much higher prevalence of oral disease but are also less likely to have had their dental caries treated. (Page 4)</p> <p>Significant racial, ethnic and socioeconomic disparities exist within all oral health indicators, at each grade level, and among the state’s 14 counties. (page 5)</p> <p>Kindergarten</p> <ul style="list-style-type: none"> • 39.4% of non-Hispanic Black kindergarten children have been affected by dental caries, 1.7 times higher than non-Hispanic white kindergarten children; • 40.9% of Hispanic kindergarten children have been affected by dental caries, 1.8 times higher than non-Hispanic white kindergarten children; and • 41.5% of kindergarten children from low-income families have been affected by dental caries, 1.9 times higher than kindergarten children from families with higher incomes. <p>2008. The Oral Health of Massachusetts’ Children. By White BA, Monopoli MP, Souza BS. Catalyst Institute. January.</p>
<p>MASSACHUSETTS</p> <p>70.4% of the state residents receive fluoridated water</p>	<p>... "Children are going to school with cavities, gum infections, rotting teeth. I don’t think people know how serious a problem it is," said Ms. Cepeda, who has served as coordinator of the volunteer committee.</p> <p>The problem is one that a special state legislative commission last year called an oral health crisis in Massachusetts: Not enough dentists are available for people on MassHealth, the state’s health plan that includes Medicaid and the Children’s Health Insurance Program...</p> <p>2001. Fluoridated Water Not Preventing Rampant Decay Among Southbridge’s Poor. Telegram & Gazette (Massachusetts). October 14.</p>
<p>NEW HAMPSHIRE</p> <p>Concord Fluoridated since 1978</p>	<p>“It’s overwhelming,” said Deb Bergschneider, dental clinic coordinator at the Concord center. “Because we serve the uninsured, we see the lower level of the community and the need is just astronomical. ... By the time they get to us, their mouths are bombed out. They are all emergency situations. It’s a severe, severe, problem. It’s sad.”</p> <p>2005. Gerth U. Nothing to smile about. Fosters Daily Democrat, May 22.</p>
<p>NEW YORK</p> <p>Manhattan Fluoridated since 1965</p>	<p>The level of untreated decay, %d/ dft, was 91%, significantly higher than the US national population which is 76% overall, and 76% for African Americans and Mexican Americans within the US national population.</p> <p>CONCLUSIONS: The children in this population have higher caries prevalence and a higher level of untreated caries than the national means as reported in NHANES III. The high level of untreated decay found in this particularly disadvantaged community suggests that enhanced dental services targeting the very young are needed in these communities.</p>

	<p>2002. Dental caries among disadvantaged 3- to 4-year old children in northern Manhattan. By Albert DA, Park K, Findley S, et al. <i>Pediatric Dentistry</i>, May;24(3):229-33. http://fluoridealert.org/studytracker/19188/</p>
<p>NEW YORK</p> <p>Bronx Fluoridated since 1965</p>	<p>“Bleeding gums, impacted teeth and rotting teeth are routine matters for the children I have interviewed in the South Bronx. Children get used to feeling constant pain. They go to sleep with it. They go to school with it. Sometimes their teachers are alarmed and try to get them to a clinic. But it’s all so slow and heavily encumbered with red tape and waiting lists and missing, lost or canceled welfare cards, that dental care is often long delayed. Children live for months with pain that grown-ups would find unendurable. The gradual attrition of accepted pain erodes their energy and aspiration. I have seen children in New York with teeth that look like brownish, broken sticks. I have also seen teen-agers who were missing half their teeth. But, to me, most shocking is to see a child with an abscess that has been inflamed for weeks and that he has simply lived with and accepts as part of the routine of life. Many teachers in the urban schools have seen this. It is almost commonplace.”</p> <p>1991. Kozol J. <i>Savage Inequalities</i>. Harper Perennial.</p>
<p>OHIO</p> <p>Cincinnati Fluoridated since 1969-1970</p>	<p>“We cannot meet the demand,” says Dr. Larry Hill, Cincinnati Health Department dental director.</p> <p>“It’s absolutely heartbreaking and a travesty. We have kids in this community with severe untreated dental infections. We have kids with self-esteem problems, and we have kids in severe pain and we have no place to send them in Cincinnati. People would be shocked to learn how bad the problem has become.”</p> <p>... An estimated 43 percent of the city’s 8-year-olds living in low-income homes have significant teeth decay. The rate of infection stood at 37 percent in 1996.</p> <p>2002. Solvig E. Special Report: Cincinnati’s Dental Crisis. <i>The Enquirer</i> (Cincinnati, Ohio). October 6.</p>
<p>PENNSYLVANIA</p> <p>Pittsburgh Fluoridated since 1952</p>	<p>“Nearly half of children in Pittsburgh between 6 and 8 have had cavities, according to a 2002 state Department of Health report. More than 70 percent of 15-year-olds in the city have had cavities, the highest percentage in the state. Close to 30 percent of the city’s children have untreated cavities. That’s more than double the state average of 14 percent.”</p> <p>2005. Law V. Sink your teeth into health care. <i>Pittsburgh Tribune-Review</i> February 13.</p>
<p>TEXAS</p> <p>San Antonio</p>	<p>“After 9 years and \$3 million of adding fluoride, research shows tooth decay hasn’t dropped among the poorest of Bexar County’s children it has only increased—up 13 percent this year. One out of two children in the Head</p>

Fluoridated since 2002	Start program who were checked for cavities had some last year.” 2011. Conger J. Added to our drinking water: A chemical more toxic than lead? KENS 5. November 11.
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So despite being fluoride-overdosed, it’s not working for poor families and communities of color in the U.S. as they still suffer from higher rates of tooth decay in fluoridated communities (see Table 3 and also FAN, 2013a). Many poor and minority communities suffer from what health officials have called a “silent epidemic” of untreated tooth decay.

According to Kaste et al. (1996), national data indicate that 80% of tooth decay in children is concentrated in 25% of the child population, with low-income children and racial/ethnic minority groups having more untreated decay on average than the U.S. population as a whole.

Little has changed since 1996. According to Dye et al. (2015): “Untreated tooth decay was higher for Hispanic (36%) and non-Hispanic black (42%) adults compared with non-Hispanic white (22%) and non-Hispanic Asian (17%) adults aged 20–64.”

This is not just the opinion of handful of dental researchers it is also the view of the number one promoter of fluoridation in the country: the CDC’s Division of Oral Health. In 2012, according to the CDC, the total population on fluoridated drinking water systems was 210,655,401 Americans or 67.1% of the population (CDC, 2012). Even with this astounding number, dental health disparities continue to thrive for communities of color and society’s poorest – the very groups that fluoridation was meant to serve. In the words of the CDC (2015):

- **Oral health disparities are profound** in the United States. Despite major improvements in oral health for the population as a whole, oral health disparities exist for many racial and ethnic groups, by socioeconomic status, gender, age and geographic location.
- **Overall.** Non-Hispanic blacks, Hispanics, and American Indians and Alaska Natives generally have the poorest oral health of any racial and ethnic groups in the United States.
- **Children and Tooth Decay.** The greatest racial and ethnic disparity among children aged 2–4 years and aged 6–8 years is seen in Mexican American and black, non-Hispanic children.
- **Adults and Untreated Tooth Decay.** Blacks, non-Hispanics, and Mexican Americans aged 35–44 years experience untreated tooth decay nearly twice as much as white, non-Hispanics.

So fluoridation is not working for poor families and communities of color in the U.S.

Why is this the case? The simple truth is that tooth decay is not caused by not enough ingested fluoride but by poor diet and too much sugar as well as too little intervention from dental professionals. This is what the Senate Subcommittee on Primary Health and Aging said about

the lack of access to dental care in 2012. Millions of Americans are “unable to get even the basic dental care they need.”(Sanders, 2012)

Poor nutrition and lack of access to professional dental care goes hand in hand with poverty. ***Sadly 80% of dentists in the US will not treat children on Medicaid because the financial returns are so low (FAN, 2013b).***

Some of the children that need the most care get the least.

Fluoridation simply cannot compensate for poor diet, lack of early professional interventions and poor practices like baby’s sucking on bottles of sugared water, juice, milk and even fizzy drinks for hours on end leading to baby bottle tooth decay (BBTD) which ravages the infant’s first teeth. Such abuse of the primary teeth cannot be prevented with fluoridation but the prevalence can be reduced with better education.

Even though fluoridation promoters know that BBTD cannot be prevented by fluoridation – or should know –that doesn’t stop them using pictures of BBTD as a scare tactic to persuade communities to start or to continue fluoridation. In Figure 9, a Medical Officer of Health from Canada holds up a picture of BBTD falsely implying that fluoridation will address this problem. It won’t. Such propaganda exercises are bad enough in the hands of rabid fluoridation promoters; they are even worse when practiced by civil servants whose salaries are paid for by the taxpayer.



Figure 9: In Canada, Medical Officer of Health Dr. Hazel Lynn holds up a picture of Baby Bottle Tooth decay (BBTD). Lynn claimed in Owen Sound’s Sun Times (Jan 31, 2014) that water fluoridation prevents tooth decay and is a safe practice. The implication is

fluoridation will mitigate against BBTB. It won't! Photo: James Masters/QMI Agency (Langlois, 2014)

7. Why are African Americans more sensitive to fluoride's toxicity?

As discussed above African Americans and Hispanics have been shown to be at an increased risk of developing dental fluorosis, and have a higher risk of suffering from the more severe forms of this condition (Russell, 1962; Butler et al., 1985; Williams & Zwemer, 1990; Beltrán-Aguilar et al., 2005, 2010; Martínez-Mier & Soto-Rojas, 2010).

It is not yet known why blacks suffer higher rates of dental fluorosis. According to the CDC, it may be a result of "biologic susceptibility or greater fluoride intake." (Beltrán-Aguilar et al., 2005). Whatever the explanation, it is clear that the black community is being disproportionately harmed by current fluoride policies in the United States.

Here are a few possible explanations:

1) African Americans consume significantly more total fluids and plain water, and thus receive more fluoride from drinking water, than white children (Sohn et al., 2009).

2) According to CDC, African Americans are less likely to breastfeed than most other racial groups: "non-Hispanic blacks had a lower prevalence of breastfeeding initiation than non-Hispanic whites in all but two states..."-(CDC, 2010). As human milk contains very low levels of fluoride (Ekstrand et al., 1981, 1984; Sener et al., 2007), babies fed formula made with fluoridated water at 0.7 -1.2 mg/L will receive 100 to 200 times more fluoride than a human-fed baby simply through consumption of the water. If the parent reduces the amount of formula in a fluoridated community to save money as many poor parents do (Stein 2008; Egemen et al., 2002; Parraga et al., 1988), and adds more water than recommended, these children will receive even higher levels of fluoride.

3) Another possible explanation was suggested by a study by Leite et al. (2011). The authors found that rats treated with both lead and fluoride had worse dental fluorosis than rats treated with fluoride alone. Thus it is possible that children with lead exposure will be more susceptible to developing dental fluorosis. African-Americans in the inner-city have had more exposure to lead than white children. In 1995 Stevens reported, "Of impoverished black children aged three to five living in American inner cities, 90% have elevated blood-lead levels." CDC in 2003 stated, "Of the children reported with confirmed elevated [blood lead levels] between 1997 and 2001, approximately 17% were non-Hispanic whites, 60% were non-Hispanic blacks, 16% were Hispanic, and 7% were of other races or ethnicities. As reported by the MMWR in 2013:

This report summarizes the results of that analysis, which indicated that the percentage of children aged 1–5 years with BLLs at or above the upper reference interval value of 5 $\mu\text{g}/\text{dL}$ calculated using the 2007–2010 NHANES cycle was 2.6%. Thus, an estimated 535,000 U.S. children aged 1–5 years had BLLs $\geq 5 \mu\text{g}/\text{dL}$ based on the U.S. Census Bureau 2010 count of the number of children in this age group. (MMWR, 2013)

No federal agency has investigated or published studies on the interaction of neurotoxicants such as lead and fluoride on children in fluoridated inner-cities or anywhere else.

4) Fluoride's toxicity is exacerbated by inadequate nutrition, including lower intakes of iodine and calcium (see studies at FAN, 2012).

5) Certain racial groups are more likely to be lactose intolerant than others. Included among these are Central and East Asians (80-100% lactose intolerant; de Vrese et al., 2001), Native Americans (80-100% lactose intolerant; National Institute of Child Health and Human Development, 2006), African Americans (**75% lactose intolerant**), and Southern Indians (70% lactose intolerant; de Vrese et al., 2001). The elevated incidence of lactose intolerance may indicate lower rates of milk consumption, and higher consumption rates of water or other beverages, than Whites (21% lactose intolerant; Scrimshaw, 1988). Thus these groups may be more heavily exposed to fluoride in water and other beverages than are Caucasian Americans, and their calcium intakes may be compromised. Calcium in the diet is partially protective of fluoride because it lowers uptake of fluoride from the gut.

8. Reckless assumptions underpin fluoridation promotion

Dental fluorosis is a clear indicator that the child has been over-exposed to fluoride before their permanent teeth have erupted. This can be compared to the purple-blue line on the gums of those who have been over-exposed to lead. Both markers tell a story. But not all fluoride exposure outcomes are so easily recognizable as dental fluorosis.

One of the most reckless assumptions made by those who endorsed fluoridation in 1950 was the notion that while fluoride was interfering with some biochemical mechanism in the growing tooth cells causing the damage to the enamel which we call dental fluorosis, that it was not causing damage to any other developing tissue in a baby's body.

It was also reckless to ignore the fact that nature provides only a miniscule amount of fluoride in mothers' milk.

It was also reckless to ignore the fact that there is not one biochemical process in the body that needs fluoride to function properly.

It is even more reckless to ignore the fact that fluoride is highly toxic to many fundamental biological processes, see Barbier et al., 2010, *The Biochemical Mechanisms of Fluoride's Toxicity*.

If fluoride limits its toxic effects to the cells laying down the enamel in our teeth (Den Besten & Li, 2011), we have been extremely lucky and undeservedly so considering the recklessness of exposing a huge population to this toxic substance every day of their lives for a whole lifetime with every glass of water they drink.

9. Pro-fluoridation governments have undertaken very few studies to seriously investigate fluoride's potential to cause both short-term health effects in children or long-term health effects in adults.

The consequences of the reckless assumptions discussed in section 8 above have been largely hidden from the public and media because of an atrocious lack of basic research on fluoride's health effects until fairly recent years.

Once the Public Health Service had endorsed fluoridation in 1950 the U.S. government showed little interest in funding studies to investigate the health of fluoridated communities. The same has been true in other (largely English speaking) fluoridated countries.

Based on what has been reported in the scientific literature one would have expected a responsible government that has endorsed the experiment of fluoridation to have carefully investigated a possible association of the following conditions with an increased exposure to fluoride:

- a) Arthritis rates
- b) Decreased thyroid function
- c) Lowered IQ in children
- d) Increased ADHD rates in children.
- e) Reduced time to puberty
- f) Reproductive health
- g) Alzheimer's disease

A responsible government would have also:

Attempted to put the anecdotal reports of people claiming to be sensitive to fluoride on a scientific level using double-blind studies;

Further investigated Bassin et al.'s (2006) suggested age window of vulnerability to osteosarcoma in young boys;

Attempted to reproduce Jennifer Luke's findings of fluoride's accumulation in the human pineal gland and lowered melatonin production in fluoride-treated animals (Luke, 1997, 2001), and

Made a comprehensive effort to monitor fluoride levels in urine, blood and bone to establish a baseline for future research. One simple strategy would have been to have collected the hip-bone of patients undergoing hip replacement (of which there are many thousands each year) and monitored them for fluoride. This was done in one small Canadian study and it was found that the levels were considerably higher in the bones collected in fluoridated Toronto compared to unfluoridated Montreal (Chachra et al., 2010). We need more studies like this.

Used dental fluorosis as a biomarker for exposure to probe any possible correlation with bone fractures, osteosarcoma, age of puberty, even IQ scores.

Most of this research should have started 70 years ago before this reckless fluoridation experiment was begun. But Instead of basic scientific research like this the public has been treated to over 60 years of promotion, propaganda and PR. The central plank of which is the

foolish notion that “the absence of study is the same as the absence of harm.” According to Paul Connett, PhD, retired chemistry professor, “**When policy is king, science becomes a slave.**”

Another way that the pro-fluoridation health establishment in the U.S. has kept western scientists in the dark about fluoride’s toxicity is the exclusion of the journal *Fluoride* from Pub Med, the largest online search engine for biomedical papers and maintained by the National Institutes of Health (NIH). Pub Med refuses to index the only scientific journal dedicated to all aspects of fluoride research. It is published by the International Society for Fluoride Research (ISFR) four times a year, and all issues are available online for free at <http://www.fluorideresearch.org/backissues.pdf> (see section 15 below).

Despite its exclusion from PubMed many studies published in *Fluoride* have been widely cited by scientists in the field — including U.S. government researchers. A review of the references in the landmark report on the toxicology of fluoride by the National Research Council of the National Academies in 2006 reveals an important story: the journal *Fluoride* had the highest number of references -see table 4 for the top 10 journals referenced by the NRC

Table 4: The top ten journals cited in the NRC (2006) review

Name of Journal	# of Citations
Fluoride	56
Journal of Dental Research	34
Community Dentistry and Oral Epidemiology	31
Journal of Public Health Dentistry	31
Journal of the American Dental Association	23
Journal of Bone and Mineral Research	21
Calcified Tissue Research	19
Caries Research	18
Bone	13
Pediatric Dentistry	12

The feeble excuses offered by the NIH for keeping *Fluoride* out of Pub Med is that the ISFR is anti-fluoridation (and therefore biased). But a) the ISFR has never taken a formal position against fluoridation and b) there is far more to fluoride research than the issue of water fluoridation so why deprive scientists access to that other research? It is true that the editors of *Fluoride* over many years have been anti-fluoridation, but if that is the reason for exclusion from Pub Med the NIH has exercised a glaring double standard here because the editors of every major dental journal are pro-fluoridation but that hasn’t kept their journals out of Pub Med.

10. Non-fluoridated countries lead research effort on fluoride’s toxicity

The understanding of fluoride’s dangers and the potential risks posed by water fluoridation by independent scientists (outside government agencies) in the western world is changing because of research efforts in countries like India, China, Iran, and Mexico. These countries have high natural levels of fluoride in regions of their countries and are genuinely interested in finding out

what level of fluoride in water is safe to drink. Moreover, they do not have a fluoridation program to protect and their researchers are not worried about offending those who promote this practice. (There are also areas in the U.S. where drinking water contains high fluoride levels (FAN, 2007).

A great deal of this research effort was revealed to the Western world by the landmark review of fluoride's toxicity by the U.S. National Research Council of the National Academies report in 2006.

11. National Research Council of the National Academies review of 2006

It is hard to overstate the significance of this review titled, *Fluoride in Drinking Water: A Scientific Review of EPA's Standards* (NRC, 2006).

First and foremost the panel put together by the NRC was truly balanced which was most unusual for official reviews of fluoride's toxicity. In the 12-membered panel three were known to be pro-fluoridation, three anti-fluoridation and six undeclared.

Second, the panel was expected to take about one year to complete their review but they ended up spending three and half years on this task.

Third, the panel did not limit themselves to human epidemiological studies, they looked at animal studies, biochemical studies, clinical trials, case studies, epidemiological studies and even theoretical modeling in the case of fluoride's impact on the bone.

In short, they looked at everything that pertained to understanding fluoride's toxicity. Nor did they shun the use of the huge database provided by the journal *Fluoride*, which has published research papers on fluoride since 1968.

As a result the NRC's final report, which is 507 pages long, with over 1100 references, is a veritable textbook on the toxicology on fluoride. What they did not do was to review the practice or the purported benefits of water fluoridation, which they were asked not to do by the EPA. They described their mission as follows,

The committee was charged to review toxicologic, epidemiologic, and clinical data on fluoride—particularly data published since the NRC's previous (1993) report—and exposure data on orally ingested fluoride from drinking water and other sources.

On the basis of its review, the committee was asked to evaluate independently the scientific basis of EPA's MCLG of 4 mg/L and SMCL (secondary maximum contaminant level—a concentration intended to avoid cosmetic damage) of 2 mg/L in drinking water, and the adequacy of those guidelines to protect children and others from adverse health effects. The committee was asked to consider the relative contribution of various fluoride sources (e.g., drinking water, food, dental-hygiene products) to total exposure. The committee was also asked to identify data gaps and to make recommendations for future research relevant to setting the MCLG and SMCL for fluoride. *Addressing questions of artificial fluoridation, economics, risk-benefit assessment, and water-treatment technology was not part of the committee's charge* [emphasis added] (see

also Donahue, 2003).

The enormous breadth covered by this panel is revealed by the chapter titles:

1. Introduction
2. Measures of Exposures to Fluoride in the United States
3. Pharmacokinetics of Fluoride
4. Effects of Fluoride on Teeth
5. Musculoskeletal effects
6. Reproductive and Development Effects of Fluoride
7. Neurotoxicity and Neurobehavioral Effects
8. Effects on the Endocrine System
9. Effects of the Gastrointestinal, Renal, Hepatic and Immune Systems
10. Genotoxicity and Carcinogenicity
11. Drinking Water Standards for Fluoride

This important publication can be searched online without charge at

<http://www.nap.edu/catalog/11571/fluoride-in-drinking-water-a-scientific-review-of-epas-standards>

Based on this massive review the NRC panel concluded that the current MCLG (the maximum contaminant level goal) and MCL (maximum contaminant level) for fluoride (4 ppm) was not protective of health and recommended that the EPA's Office of Water (that commissioned the review) conduct a new risk assessment for fluoride to determine a new (and safer) MCLG.

The MCLG is supposed to be the safe level based upon the best science available on harmful effects with the application of appropriate safety factors to protect everyone including vulnerable subsets of the population from "known and reasonably anticipated" harm. The MCLG is an ideal goal. Once the MCLG has been identified the MCL (a federally enforceable standard) is determined and takes into account the economic costs of reaching this standard in a situation where there are high natural levels in the water, either naturally or from industrial pollution.

The NRC recommendation was made in March 2006, but as of September 2015 the determination of the MCLG (and hence the MCL) has still not been completed by the EPA Office of Water (OW) and the U.S. continues to operate with an unsafe standard nearly three times higher than the WHO recommended safe level of 1.5 ppm, which has been adopted by nearly every other country in the world.

While not discounting any of the other health concerns revealed in the eleven chapters of the report, the authors singled out three clinical conditions that they believed triggered the need for

a new health risk assessment:

1. Clinical stage II skeletal fluorosis: “The committee judges that stage II is also an adverse health effect, as it is associated with chronic joint pain, arthritic symptoms, slight calcification of ligaments, and osteosclerosis of cancellous [porous] bones.”
2. Bone fractures: “The majority of the committee concluded that the MCLG is not likely to be protective against bone fractures.”
3. Severe dental fluorosis: “After reviewing the collective evidence, including studies conducted since the early 1990s, the committee concluded unanimously that the present MCLG of 4 mg/L for fluoride should be lowered. Exposure at the MCLG clearly puts children at risk of developing severe enamel fluorosis.”

In addition to these end points the NRC panel pointed to many gaps in the literature and recommended numerous research questions that needed to be addressed. An independent observer should wonder why after over 60 years of fluoridation (as of 2006) there should be so many gaps in the literature. We have attempted to answer that question in section 9 above. This is what the chairman of the NRC panel had to say about this in a *Scientific American* article in January 2008:

“What the committee found is that we’ve gone with the status quo regarding fluoride for many years—for too long really—and now we need to take a fresh look . . . In the scientific community people tend to think this is settled. I mean, when the U.S. surgeon general comes out and says this is one of the top 10 greatest achievements of the 20th century, that’s a hard hurdle to get over. But when we looked at the studies that have been done, we found that many of these questions are unsettled and we have much less information than we should, considering how long this (fluoridation) has been going on.” (Fagin, 2008)

On the day that the NRC (2006) was published the American Dental Association (ADA) rushed in to deny its relevance to fluoridation and six days later the CDC’s Division of Oral Health did the same. This was an extraordinary position to take because in chapter 2 the NRC panel provided an exposure analysis, which clearly demonstrates that certain subsets of the population are exceeding the EPA’s safe reference dose for fluoride (0.06 mg/kg/day) drinking fluoridated water. These subsets included high water drinkers, people with poor kidney function, people with borderline iodine deficiency and bottle-fed babies. The latter case is illustrated by figure 2.8 that appears on page 85 of the report.

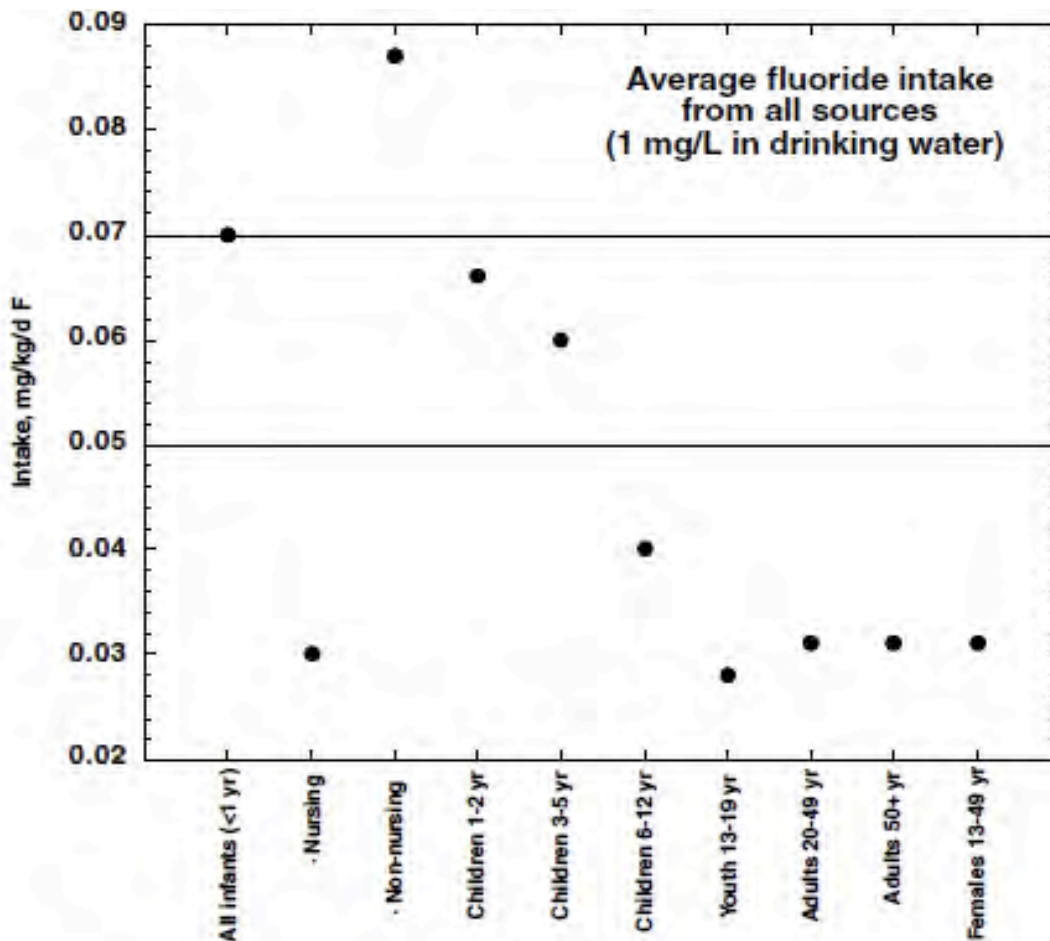


FIGURE 2-8 Estimated average intake of fluoride from all sources, at 1 mg/L in drinking water (based on Table 2-11). Horizontal lines indicate an intake of 0.05-0.07 mg/kg/day.

Figure 10: Copy of Figure 2-8 in NRC (2006), p.85.

More studies since 2006

Because of the huge delay in the EPA Office of Water completing the recommended risk assessment – its now been 9 years - more studies have been published since 2006, which further underline the need and urgency for a new more protective MCLG. These include many more studies on neurotoxicity, a key study on thyroid function, another on ADHD and an important study on osteosarcoma. Had these been available at the time of the NRC review it is more than likely that these would have been added to the list of endpoints cited above by the panel that should be considered in a new risk assessment.

The EPA's Office of Water in 2011 claimed that the end point of severe dental fluorosis will also protect against arthritic symptoms, bone fractures and harm to any other tissue.

Here we will start with some of the findings in the NRC review and update them with more recent studies.

12. NRC and Endocrine Disruption

The NRC panel labeled fluoride an endocrine disruptor. The authors state:

“The chief endocrine effects of fluoride exposures in experimental animals and in humans include decreased thyroid function, increased calcitonin activity, increased parathyroid hormone activity, secondary hyperparathyroidism, impaired glucose intolerance, and possible effects on the timing of sexual maturity. Some of these effects are associated with fluoride intake that is achievable at fluoride concentrations in drinking water of 4 mg/L or less, especially for young children or for individuals with high water intake. (p. 8, NRC 2006)

“In summary, evidence of several types indicates that fluoride affects normal endocrine function or response; the effects of the fluoride-induced changes vary in degree and kind in different individuals. Fluoride is therefore an endocrine disruptor in the broad sense of altering normal endocrine function or response, although probably not in the sense of mimicking a normal hormone.” (p. 266, NRC 2006)

The 2006 NRC report notes that six prior major reviews (1991, 1993, 1999, 2000, 2002, 2003) of the health effects of fluoride did not consider the endocrine system in detail apart from the reproductive system.

13. NRC on Thyroid Function

On thyroid function, the NRC panel reported: “Fluoride exposure in humans is associated with elevated TSH concentrations, increased goiter prevalence, and altered T4 and T3 concentrations; similar effects in T4 and T3 are reported in experimental animals, but TSH has not been measured in most studies.” (p. 262)

The panel also indicated that affects on the thyroid have been observed at very low levels. They state that, “In humans, effects on thyroid function were associated with fluoride exposures of 0.05-0.13 mg/kg/day when iodine intake was adequate and 0.01-0.03 mg/kg/day when iodine intake was inadequate (Table 8-2).” (p. 263, NRC 2006).

To reach these dosages (which depend on bodyweight) it takes remarkably little fluoride. For those with borderline iodine deficiency it would only take the consumption of 0.1 to 0.3 mg of fluoride per day for a 10 kg infant and 0.7 to 2.1 mg/day for a 70 kg adult. These are easily exceeded in a fluoridated community. For someone whose iodine levels are adequate for a 10 kg infant it would take between 0.5 and 1.3 mg /day and for a 70 kg adult it would take 3.5 mg to 9.1 mg/day. The lower end of these ranges would be reached by some people in a fluoridated community.

These statements have been recently buttressed by new research conducted in the UK and published in 2015.

14. Hypothyroid and fluoride study from UK

This study by Peckham et al., 2015 used the records of over 98% of the General practices in England on the numbers of patients treated for hypothyroidism and examined the prevalence of this condition as a function of the fluoride levels in the local drinking water supplies. The authors noted that:

“Approximately, six million people (10%) in England live in areas where drinking water contains natural fluoride or which has been artificially fluoridated at a target concentration of 1 ppm (1 mg/L). Using prevalence data from the UK QOF, an analysis was undertaken to determine whether prevalence was affected by practice populations being situated in fluoridated areas at >0.7 mg/L and areas with lower levels of fluoride. While there are other sources of fluoride in people’s diet (e.g., tea), drinking water is the most significant source of ingested fluorides in the UK.” (Peckham et al, 2015)

The UK research team found that higher levels of fluoride in drinking water was a useful predictor of the prevalence of hypothyroidism. They found that general medical practices located in the West Midlands (a wholly fluoridated area) are nearly twice as likely to report high hypothyroidism prevalence in comparison to Greater Manchester (non-fluoridated area). (Peckham et al, 2015)

They concluded:

“In many areas of the world, hypothyroidism is a major health concern and in addition to other factors—such as iodine deficiency— fluoride exposure should be considered as a contributing factor. The findings of the study raise particular concerns about the validity of community fluoridation as a safe public health measure.” (Peckham et al, 2015)

It is hard to overstate the significance of these findings.

First, Peckham’s findings are not totally unexpected. Scientific and medical research stretching back to the 1920s has shown that fluoride can affect the thyroid. In fact from the 1930s to the 1950s doctors in Argentina, France and Germany used fluoride to lower thyroid function in hyperactive thyroid patients. The levels of fluoride used overlap with the levels of exposure known to occur in some people drinking artificially fluoridated water today (Galletti & Joyet, 1958).

Second, hypothyroidism is a very common disorder in the US. In fact, one of the most prescribed drugs in the USA is synthroid, which is used to treat hypothyroidism. It can have serious adverse health effects. For a further discussion of the extent and concern about hypothyroidism in the USA see Appendix B.

Third, race may be a factor in sensitivity to certain thyroid diseases, which may make communities of color more vulnerable to fluoride’s impacts on thyroid function (see Appendix C).

Fourth, reduced thyroid function in pregnant women is linked to reduced IQ in their children and there is accumulating evidence that fluoride, at levels within the range to which fluoridated populations are exposed, is associated with lowered IQ. Fluoride’s effect on thyroid function

might be the mechanism by which it lowers IQ.

15. Fluoride and brain function

Whether or not the mechanism for fluoride's ability to lower IQ is caused by fluoride's interference with thyroid function in pregnant women or not, there is a huge body of evidence from animal, fetal and human studies that fluoride is a potent developmental neurotoxin (see <http://fluoridealert.org/issues/health/brain/>). The NRC examined some of that evidence in 2006 but much more has been published (or translated) since then. For example, in 2006 the NRC panel reviewed 5 IQ studies, there have been – as of Sept 2015 - 45 studies (out of 52 studies) that have found an association between lowered IQ and exposure to fairly modest levels of fluoride.

27 of these IQ studies were subjected to a meta-analysis by a team from Harvard University, which included Philippe Grandjean (Choi et al., 2012). While they noted that many of the studies had weaknesses (particularly control of a number of conflicting variables) they also noted that the results were remarkably consistent considering the investigations had been conducted in different countries (China and Iran) in widely different geographical areas, at different times and by different research teams. 26 out of the 27 studies found a lowered IQ in the “high-fluoride” village compared with the low-fluoride village. The average lowering was 7 IQ points. Such a downward shift in a large population would have huge ramifications. It would halve the number of geniuses and double the number of mentally handicapped. This in turn would have enormous social and economic consequences.

In a press release from Harvard University that accompanied the Choi et al., 2012 meta-analysis, co-author Philippe Grandjean was quoted as saying that, “Fluoride seems to fit in with lead, mercury, and other poisons that cause chemical brain drain.”

When one considers the pains that our society has taken to either eliminate or drastically reduce the use of lead and mercury (e.g. banning lead in paint, solder, and gasoline and the phasing out the use of mercury in industrial switches, thermometers and other medical equipment, as a fungicide in paint, use in alkaline batteries, limiting emissions from coal-fired power stations and incinerators, fish advisories and in some countries the use in dental fillings) all in the name of protecting children and pregnant women from known neurotoxins, it is absolutely bizarre that we should continue to knowingly add this neurotoxin (i.e. fluoride) every day to the drinking water of over 200 million people.

In a radio debate with Dr. Howard Pollick, a well-known promoter of fluoridation, Grandjean was more succinct when he said:

"Because I've worked in this field long enough to know that with time, we have always found that lead, mercury and pesticides were more toxic than we originally thought. I am not willing to sit here and say, OK, let's expose the next generation's brains and just hope for the best." (WBUR, 2015)

Fluoridation promoters have done their best to dismiss the Choi et al. 2012 findings claiming

that the fluoride concentrations in the High-Fluoride villages made the findings irrelevant to artificial water fluoridation programs. It is true that in two of the studies the fluoride concentrations ranged as high as 11 and 11.5 ppm, but this was the exception not the rule. Table 5 gives the fluoride concentrations in the 20 studies where the fluoride exposure was from water not coal and for which the concentrations was given.

Table 5: A listing of the Fluoride concentrations in the “high-fluoride” villages in 20 of the 27 studies subjected to a meta-analysis by Choi et al., 2012. The data was compiled by Paul Connett from Table 1 in the Choi paper.

Author/year	ppm in High F village
Chen 1991	4.55
Lin 1991	0.88
An 1992	2.1 – 7.6 (mean = 4.9)
Xu 1994	1.8
Yang 1994	2.97
Li 1995	1.81 – 2.69 (mean = 2.25)
Yao 1996	2 – 11 (mean = 6.5)
Zhao 1996	4.12
Yao 1997	2
Lu 2000	3.15
Hang 2001	2.90
Wang 2001	2.97
Xiang 2003	0.57 – 4.5 (mean = 2.54)
Seraj 2006	2.5
Wang 2006	5.44 +/- 3.88 (1.52 – 9.32)
Fan 2007	1.14 – 6.09 (mean = 3.62)
Wang 2007	3.8 – 11.5 (mean = 7.65)
Li 2010	2.47 +/- 0.75 (1.72 – 3.22)
Poureslami 2011	2.38
Wang 1996	>1- 8.6 (mean = 4.8)

Mean of 20 results (using means) = 70.49 / 20 = 3.52

Taken from Choi et al, 2012 – Table 1, pp 24-26.

From Table 5 it can be seen that many of the studies had fluoride concentrations less than 3 ppm and that the mean for all the studies combined was 3.52 ppm, which is lower than the current safe drinking water standard in the USA (4 ppm). Such levels offer **no adequate margin of safety** to protect all children in a large population drinking fluoridated water (and getting fluoride from other sources) sufficient to protect against this serious harmful effect.

Such a conclusion becomes even more obvious when we look at the details of one particularly well-conducted study (Xiang et al. 2003a,b.).

Xiang controlled for iodine intake (Xiang et al, 2003a) and lead exposure (Xiang 2003,b) and retrospectively for arsenic. The average level of fluoride in the well water for the Low-fluoride village was 0.36 ppm (range 0.18 -0.76 ppm) and the average level in the High Fluoride was 2.5

ppm (range 0.57- 4.5 ppm). The average drop in IQ was 5-10 IQ points across the whole age range. Xiang et al also sub-divided the High- Fluoride village into 5 sub-groups (A,B,C,D and E) with mean fluoride concentrations of 0.75, 1.53, 2.46, 3.28 and 4.16 ppm. As can be seen from his Table 8 (reproduced below as our Table 6) as the fluoride concentration increases in these 5 sub-groups the mean IQ decreases in an apparent linear fashion (see the results plotted graphically in Figure 11.

Table 6: A reproduction of Table 8 in Xiang et al., 2003a

Table 8. Level of fluoride in drinking water and children's IQs

Village	F in drinking water (mg/L)			IQ and rate of retardation		
	Group	No. samples	Water F level (Mean±SD)	No. children	IQ (Mean±SD)	Rate of IQ<80 (%)
Xinhuai	F	290	0.36±0.15	290	100.41±13.21	6.55
Wamiaio	A	9	0.75±0.14	9	99.56±14.13	0.00
	B	42	1.53±0.27	42	95.21±12.22*	9.52
	C	111	2.46±0.30	111	92.19±12.98 [†]	14.41*
	D	52	3.28±0.25	52	89.88±11.98 [†]	21.15 [†]
	E	8	4.16±0.22	8	78.38±12.68 [†]	37.50 [†]

* $p < 0.05$. [†] $p < 0.01$ compared with group F.

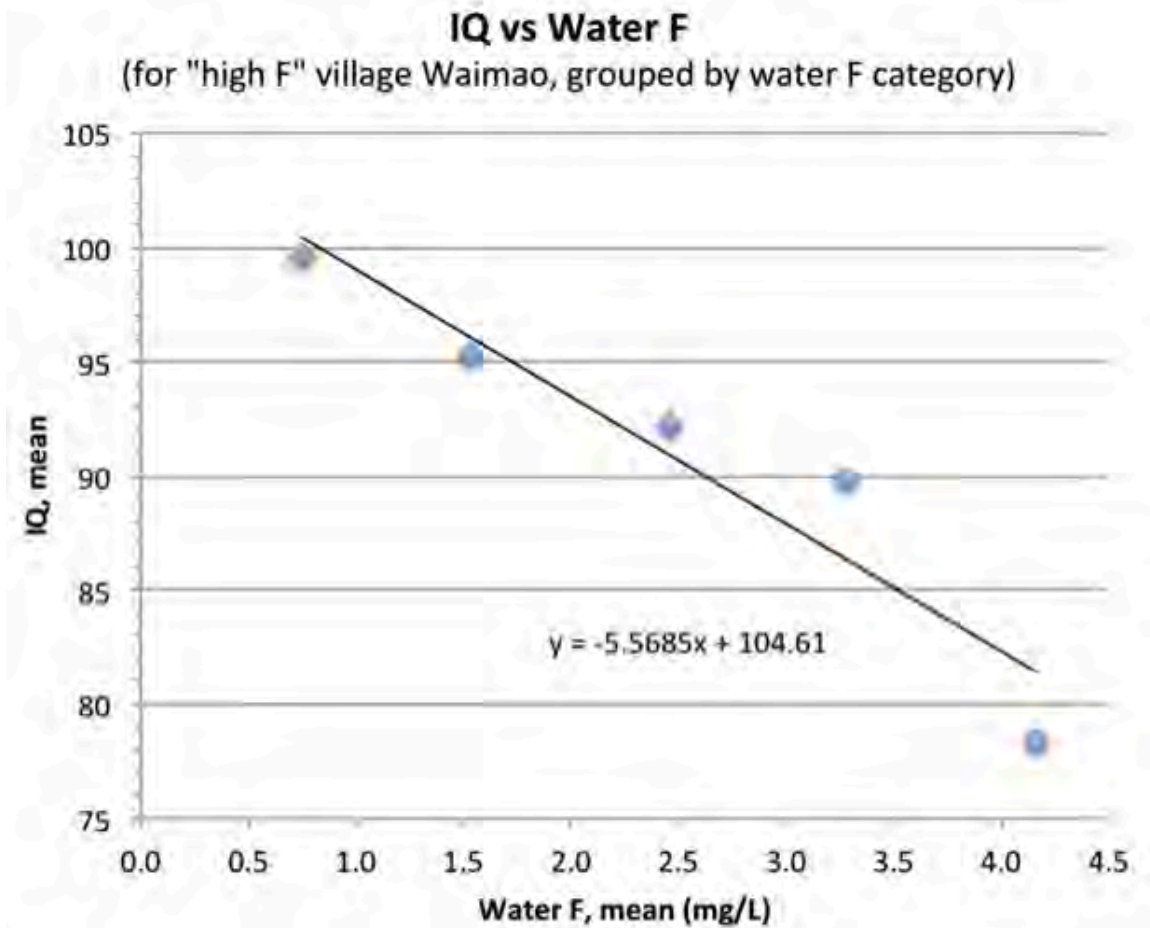


Figure 11: A plot of the mean IQ versus the mean IQ in the 5 sub-groups (A- E) in the high fluoride village, data taken from Table 8 in Xiang et al, 2003a.

From this plot one can see that IQ was lowered at a concentration somewhere between 0.75 and 1.5 ppm. This overlaps the range at which communities are fluoridated in the U.S. (0.7 to 1.2 ppm). This finding offers NO margin of safety to protect all children drinking fluoridated water from this serious end point. To make matters worse still according to the authors the children in these rural Chinese villages are unlikely to be using fluoridated toothpaste nor are they likely to be bottle-fed. Thus if we take into account these two sources many American children will be getting more fluoride *from all sources combined* than these Chinese children whose IQ was lowered.

Xiang also found that as the fluoride concentration went up in the 5 sub-groups the percentage of children with an IQ less than 80 (note that an IQ 70 -80 is borderline mentally handicapped and below 70 is outright mentally handicapped) increases dramatically from 0% (at 0.75 ppm) to 37.5% at 4.16 ppm (see Xiang's Table 8 reproduced above in Table 6).

By sub-dividing the children in the high-fluoride village Xiang eliminated any confounding factors that may have existed between the low and high-fluoride villages.

Other studies demonstrating fluoride's neurotoxicity

The evidence that fluoride is neurotoxic does not rest entirely on the 45 IQ studies. These findings are consistent with many animal studies that show that fluoride can enter the brain and alter brain chemistry in several ways. Of particular relevance are the 31 (out of 33) studies that show that when animals are placed in mazes they learn and memorize simple tasks less well when exposed to fluoride (see <http://fluoridealert.org/issues/health/brain/>).

There are also other human studies that have been conducted on very young children (too young to undertake IQ tests). One of these techniques tests the child's ability to copy and reproduce from memory drawings with a multiple of simple features. These have also shown that child's cognitive function is impaired by fluoride exposure. One example of this was a well-designed study from Mexico by Rocha Amador et al. (2009). They used the Rey-Osterrieth Complex Test (see Figure 12 below). They found that approximately **9 out of 10 children exposed to fluoride** were unable to copy the ROCF as expected for their age. For Immediate Recall, almost **6 out of 10 children** were unable to draw the figure as expected for their age.

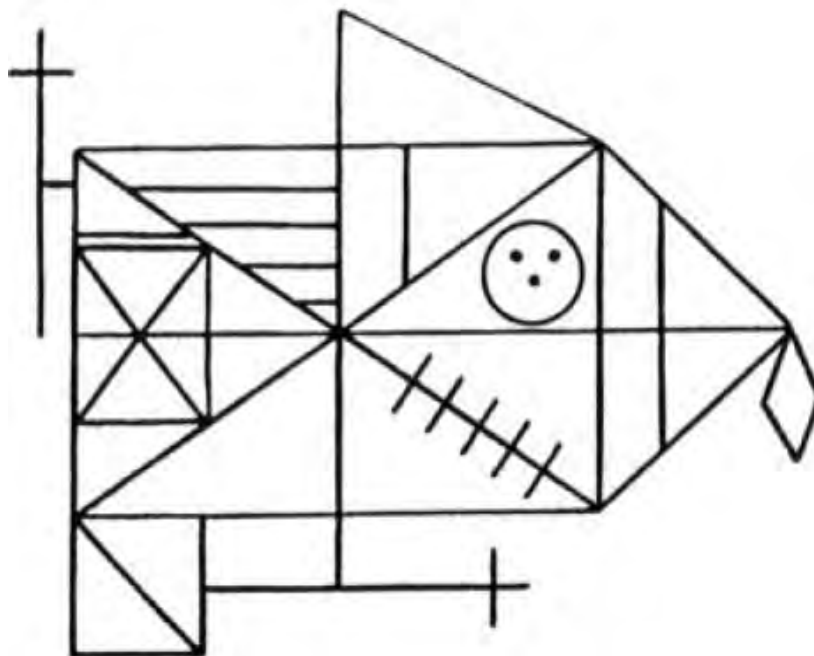


Figure 12: The Rey-Osterrieth Complex Figure Test used in the Rocha Amador et al. (2009) study.

There have also been four studies of aborted fetuses from China, which show that those from endemic fluorosis areas have impaired brain structures compared to non-fluorosis areas (Yu, 1996; Dong, 1989; Du, 1992; He, 1989).

The last children that need their IQ lowered in the US are children from low-income and minority families

16. Fluoridation and ADHD.

Attention Deficit Hyperactivity Disorder (ADHD) has become one of the most commonly diagnosed childhood behavioral disorders. Its basic characteristics are inattention, hyperactivity and impulsivity. “ADHD often continues into adolescence and adulthood, which can lead to medication dependency and a lifetime of treatment (Maddox, 2003).”

In early 2015 a study was published that examined the relationship between exposure to fluoridated water and ADHD prevalence among children and adolescents, ages 4-17, in the United States. The authors found that, “[s]tate prevalence of artificial water fluoridation in 1992 significantly positively predicted state prevalence of ADHD in 2003, 2007 and 2011, even after controlling for socioeconomic status. A multivariate regression analysis showed that after socioeconomic status was controlled each 1% increase in artificial fluoridation prevalence in 1992 was associated with approximately 67,000 to 131,000 additional ADHD diagnoses from 2003 to 2011. Overall state water fluoridation prevalence (not distinguishing between fluoridation types) was also significantly positively correlated with state prevalence of ADHD for all but one year examined.” (Malin & Till, 2015). See figure 13 below

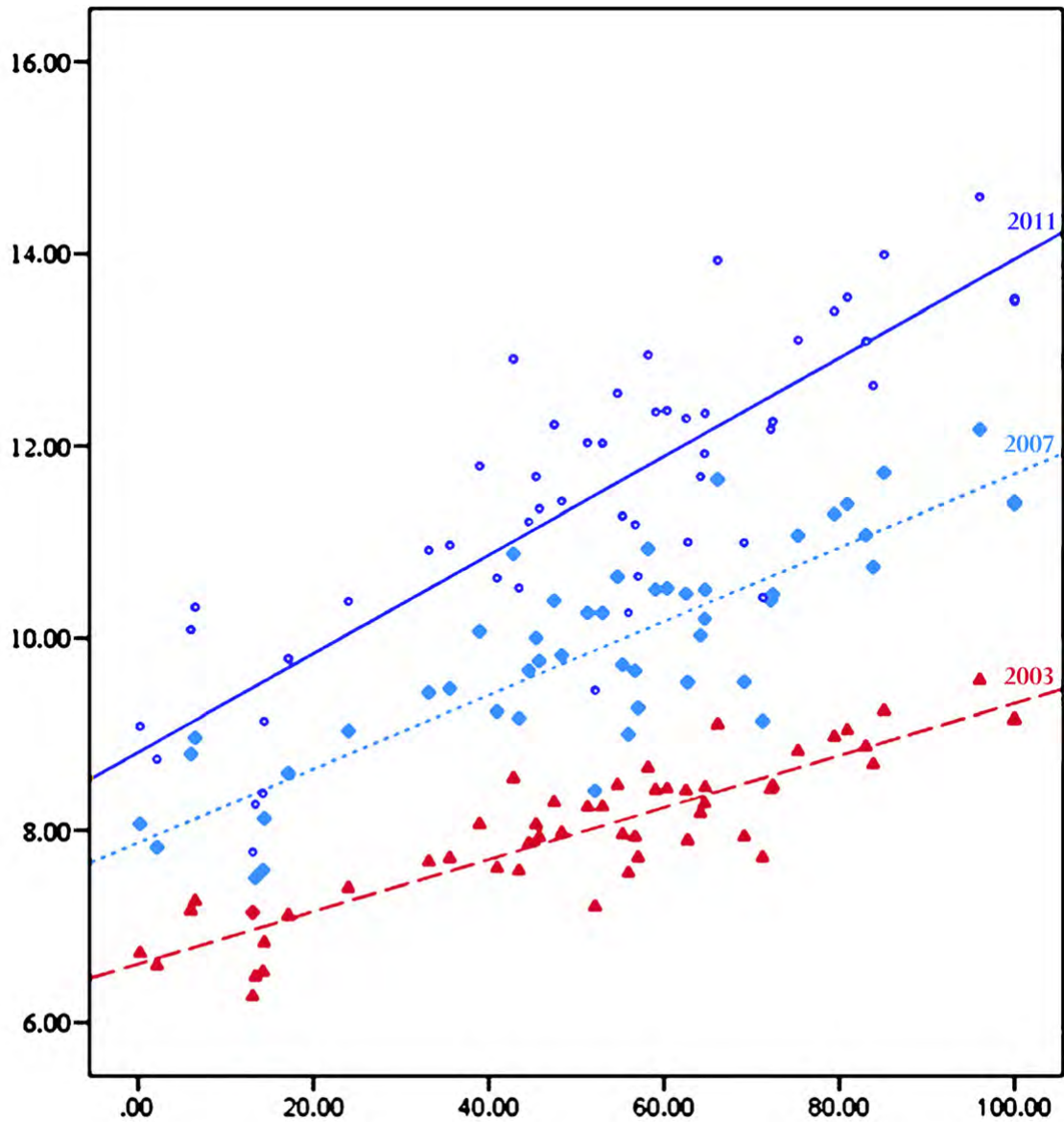


Figure 13: Percent of children with ADHD (by U.S. state) for 2003, 2007 and 2011 plotted against the % of population in each state fluoridated in 1992 (Malin & Till, 2015)

17. African Americans suffer greater exposure to other neurotoxins (lead and mercury)

LEAD

Lead exposure and lead poisoning have been concerns for decades in African American communities. The Huffington Post cites a CDC report that says that lead poisoning is a disease that primarily impacts African-Americans. According to the CDC (Jones et al.), children of color whose families are poor and who live in housing built before 1950 have the highest lead poisoning risk:

On average, between 1999 and 2004, **black children were 1.6 times** more likely to test positive for lead in their blood than white children. And among children who tested positive for extremely high lead levels (≥ 10 micrograms per deciliter), the disparity was even more stark. Black children were nearly three times more likely than white children to have highly elevated blood-lead levels, the type of lead poisoning where the most damaging health outcomes occur. (Jones et al., 2009).

Combined Lead and fluoride exposure

As far we know, no federal agency has published anything on the synergistic effects of exposure to fluoride and lead. The Agency for Toxic Substances and Disease Registry (ATSDR, 2004) produced an “interaction profile” to exposures of the mixture containing uranium, fluoride, cyanide and nitrate. However, no information was available on any interaction.

There are some experiments that have exposed animals to a combination of lead and fluoride. These have reported the following:

- Liu et al. (2008) reported that co-exposing rat pups to lead and fluoride resulted in “alterations in testis morphology and sperm quality, including low viability and high abnormality, thereby suggesting that disturbance of energy metabolism may be one of the mechanisms by which F or Pb affects the male reproductive system.”
- In the animal study cited above by Leite et al. (2011), rats treated with both lead and fluoride had worse dental fluorosis than rats treated with fluoride alone.
- Niu et al. (2009) rat study: “Results showed that the learning abilities and hippocampus glutamate levels were significantly decreased by F and Pb individually and the combined interaction of F and Pb. The activities of AST and ALT (markers of lead toxicity) in treatment groups were significantly inhibited, while the activities of GAD were increased, especially in rats exposed to both F and Pb together. These findings suggested that alteration of hippocampus glutamate by F and/or Pb may in part reduce learning ability in rats.”
- Niu et al. (2008) study with adult rats: “From results of the Y-maze test, we can see a significant decrease in learning ability of animals in the HiF+HiPb (High fluoride with high lead) group.”
- Panov et al. (2015) reported the following from a study where rats were exposed to both fluoride and lead:
 - * Comparison of the values obtained for the groups of separate and combined exposure shows that, for the majority of the toxicodynamic indices, the combined effect is more marked than the effect of fluoride alone or lead alone.
 - * With a combined exposure of lead and fluoride (but not alone) significant reduction in the thyrotropin level was observed. Thyrotropin is a hormone secreted by the pituitary gland that regulates the production of thyroid hormones.

* Neither fluoride nor lead produced a reduction in triiodothyronine level, but it was reduced under the combined effect (i.e. overt synergism took place). On the contrary, at exposure to lead alone or in combination with fluoride the level of thyroxine was raised.

In addition to the interaction between lead and fluoride is the additional problem that the chemicals used to fluoridate water appear to interact with chloramine (a common disinfection agent) to increase the dissolution of lead from brass fittings (see Appendix D).

MERCURY

According to Kaste et al. (1996), national data indicate that 80% of tooth decay in children is concentrated in 25% of the child population, with low-income children and racial/ethnic minority groups having more untreated decay on average than the U.S. population as a whole. This means that they also have greater exposure to mercury via mercury amalgam fillings.

According to the Food & Drug Administration,

Dental amalgam is a mixture of metals, consisting of liquid (elemental) mercury and a powdered alloy composed of silver, tin, and copper. **Approximately 50% of dental amalgam is elemental mercury by weight.** The chemical properties of elemental mercury allow it to react with and bind together the silver/copper/tin alloy particles to form an amalgam.

Dental amalgam fillings are also known as “silver fillings” because of their silver-like appearance. Despite the name, “silver fillings” do contain elemental mercury (FDA, 2015).

According to Counter & Buchanan (2011), “Children are particularly vulnerable to Hg intoxication, which may lead to impairment of the developing central nervous system, as well as pulmonary and nephrotic damage...” Exposures from dental amalgams “release Hg vapors, and Hg₂⁺ in tissues... [and] fetal/neonatal Hg exposure from maternal dental amalgam fillings.” The authors state:

It has been known for sometime that dental amalgam is a major source of Hg⁰ (elementary mercury) exposure in humans because Hg is the principal metal in most dental fillings (approximately 50% Hg by weight) (Nadarajah et al., 1996). The health effects of dental amalgam Hg have been a subject of considerable debate for years, with no scientific consensus on an association between amalgam Hg exposure and adverse health consequences, either in adults or children (Clarkson, 2002; Ratcliffe et al., 1996). However, questions have been raised regarding a possible association between maternal Hg dental fillings and the health of the developing fetus, neonate, and infant. Significant levels of Hg have been measured in oral vapor, blood, and in organs of animals and humans with Hg containing dental amalgam restorations (Abraham et al., 1984; Snapp et al., 1989; Vimy et al., 1990, 1997). In the oral cavity, Hg⁰ vapor is rapidly oxidized to inorganic divalent Hg (Hg₂⁺) in vivo after release from dental amalgam and absorbed through inhalation.

18. Association of pre-term births in upstate New York with community water fluoridation

According to the CDC:

In 2012, preterm birth affected more than 450,000 babies—that's 1 of every 9 infants born in the United States. Preterm birth is the birth of an infant before 37 weeks of pregnancy. Preterm-related causes of death together accounted for 35% of all infant deaths in 2010, more than any other single cause. Preterm birth is also a leading cause of long-term neurological disabilities in children. Preterm birth costs the U.S. health care system more than \$26 billion in 2005.

<http://www.cdc.gov/reproductivehealth/MaternalInfantHealth/PretermBirth.htm>

In November 2009, Hart et al. presented an abstract at the American Public Health Association on the "Relationship between municipal water fluoridation and preterm birth in Upstate New York." In part, the authors stated:

"The annual incidence of preterm birth (PTB) (<37 weeks gestation) in the United States is approximately 10% and is associated with considerable morbidity and mortality. Current literature suggests an association between periodontal disease and PTB. Domestic water fluoridation is thought to have lessened the burden of dental disease. Theoretically, one would expect water fluoridation to be protective against PTB. The aim of our study was to examine the relationship between municipal water fluoridation and PTB.

Domestic water fluoridation was associated with an increased risk of PTB (9545 (6.34%) PTB among women exposed to domestic water fluoridation versus 25278 (5.52%) PTB among those unexposed, $p < 0.0001$)). This relationship was most pronounced among women in the lowest SES groups (>10% poverty) and those of non-white racial origin. Domestic water fluoridation was independently associated with an increased risk of PTB in logistic regression, after controlling for age, race/ethnicity, neighborhood poverty level, hypertension, and diabetes (Hart et al., 2009).

In 2013, the Henry J. Kaiser Family Foundation reported that non-Hispanic blacks had the highest rate for *"Preterm Births as a Percent of All Births by Race/Ethnicity."*

16.3% - Non-Hispanic Black

11.3% - Hispanic

10.2% - Non-Hispanic White

<http://kff.org/other/state-indicator/preterm-births-by-raceethnicity/>

19. State Oral Health Reports have provided little or no information on dental fluorosis and no warnings to communities of color on their extra vulnerabilities

While the federal government has been grossly negligent about warning communities of color about their findings that they are more vulnerable to dental fluorosis, at least they have provided important dental fluorosis data on the national level which allows interested parties to find out what is going on if they had the time and inclination to do so (Beltrán-Aguilar, 2005, 2010).

However, this has not happened to any significant extent at the state level. Most of the state

seen in the primary teeth
(Warren et al., 1999; Hong et al 2006a) but most frequently observed in the secondary teeth.

- The 2011 Washington state report gives the rate for White Spot Lesions in Head Start/ECEAP Preschoolers at 20.5%, with African American children having the highest percent.
- The 2007 Georgia report notes: "20% of 2 to 5 year old Georgia Head Start children surveyed have white spot lesions."

A small non-profit called the Fluoride Action Network, not paid for, or funded by, any federal or state agency working on infant health, childhood health, or oral health, succeeded in getting New Hampshire to become the first state to require notification that infants under 6-months of age should not be routinely fed infant formula mixed with fluoridated water. The law passed in August 4, 2012, *against the opposition of nearly every health and oral-health group in the state (see list below)*, is a proactive approach to reduce fluorosis rates by notifying parents about the risk posed to their infants by fluoridated water so they can take action to prevent a further increase in overexposure to fluoride.

It was passed by the New Hampshire House, 253-23, unanimously by the Senate, and signed by the Governor, the legislation (HB-1416) read:

"If a public water supply is fluoridated, the following notice shall be posted in the water system's consumer confidence report: 'Your public water supply is fluoridated. According to the Centers for Disease Control and Prevention, if your child under the age of 6 months is exclusively consuming infant formula reconstituted with fluoridated water, there may be an increased chance of dental fluorosis. Consult your child's health care provider for more information.'"

The law requires the above notice on all annual water consumer confidence reports in fluoridated communities, which must be mailed to all water consumers, be posted on water department websites, and available at city halls.

The legislation was initially introduced in 2011, but was killed in the House Health and Human Services committee, which at the time was chaired by a retired dentist and proponent of fluoridation. In 2012 the bill was sent to a different committee, the House Municipal and Public Works committee, **where it was approved by a 13-2 vote despite the same opposition it had met a year earlier by more than a dozen groups, including the**

New Hampshire Dental Association
New Hampshire Oral Health Coalition
Delta Dental
American Water Works Association
Municipal Association
Oral Health Advocacy Taskforce
Dental Hygienists' Association
Partners for a Healthier Community
Health Law Advocates
PEW Charitable Trusts
Granite State Children's Alliance (PEW Grantee)
New Hampshire Department of Health and Human Services

The simplest explanation for this negligence is that those who specialize in oral health are far more interested in promoting water fluoridation, than revealing its downside. However, whatever the explanation, minority communities have every reason to feel let down by those who are paid to protect their health.

In Appendix F we also examine the oral health reports prepared by private entities like the Pew Foundation. Again we find little or no discussion of dental fluorosis or the different prevalence for different races. Clearly their interest is in promoting fluoridation with little desire in undermining their message that fluoridation is “safe and effective” and certainly no desire to draw attention to the disproportionate harm this practice is causing poor and minority communities.

20. Civil Rights Leaders mobilize to fight fluoridation because of the increased risks to minority communities.

Beginning in March 2011 Civil Rights leaders began to speak out publicly about the lack of warning from the CDC and other health agencies about the higher rates of dental fluorosis and extra vulnerability of minority communities to fluoride's toxic effects. Below we provide excerpts of the statements from prominent leaders on this issue. Links to the full text of each statement listed below is in Appendix G.

We present them in chronological order starting with Rev. Durley's letter of March 9, 2011, presented in full.

1) March 9, 2011. Letter from Dr. Gerald L. Durley, Pastor, Providence Baptist Church, to Senator Chip Rogers, Senate Majority Leader, Georgia State Capital, Atlanta. **Re: Repeal of Georgia's Mandatory Fluoridation Law.**

Dear Senator Rogers,

As a citizen, a minister, and a community leader, I am writing to state my opposition to the practice of water fluoridation, and to ask that the current Georgia law mandating water fluoridation throughout our state be repealed.

First and foremost, water fluoridation takes away people's choice. We have a God-given right to not have fluoride forced into our bodies or the bodies of our children. Fluoridation supporters attempt to say that people are not forced to drink fluoridated water, but that is a disingenuous statement that ignores reality. Many families do not have funds to buy an expensive home water fluoride removal system, or to buy unfluoridated bottled water for making their babies' milk formula, so in truth they are forced to drink fluoride in their water simply because of their economic status or household income.

Second, fluoridation disproportionately harms members of the black community. The Centers for Disease Control's own information acknowledges that blacks have significantly more "dental fluorosis" teeth staining than whites. For many, the stains are not simply "barely visible" or "faint" in color, or "just a cosmetic issue" as fluoridation promoters call it. Common sense tells us that if fluorides affect the teeth, which are the hardest surfaces of the body to cause permanent staining, certainly other soft tissue organs in the body are affected. Also, the National Research Council of the National Academy of Science, has designated kidney patients, diabetics, seniors, and babies as "susceptible subpopulations" that are especially vulnerable to harm from ingested fluorides. Black citizens are disproportionately affected by kidney disease and diabetes, and are therefore more impacted by fluorides.

Third, we cannot control the dose of fluoride people ingest if we put fluoride in drinking water. Layered on top of this, we do not know what each person's medical history or nutritional status is. Therefore, the "one size fits all" approach to fluoridation makes no sense at all.

We need to focus on helping people get access to dentists. Lack of fluoride does not cause cavities. Too many sugars on the teeth, lack of access to dental care, and lack of dental health education –these cause cavities.

We also need to know why the full story about harm from fluorides is only just now coming out. I support the holding of Fluoridegate hearings at the state and national level so we can learn why we haven't been openly told that fluorides build up in the body over time, why are government agencies haven't told the black community openly that fluorides disproportionately harm black Americans, and why we've been told that decades of extensive research show fluoridation to be safe, when the National Research Council in 2006 listed volumes of basic research that has never been done. This is a serious issue for all Americans, of every race and in every location.

2) March 29, 2011. Letter from **Ambassador Andrew Young** to Chip Rogers, Senate Majority Leader, Georgia State Capitol, Atlanta, GA.

I am writing to convey my interest in seeing that Georgia's law mandating water fluoridation for Georgia communities be repealed...

I am most deeply concerned for poor families who have babies: if they cannot afford unfluoridated water for their babies milk formula, do their babies not count? Of course

they do. This is an issue of fairness, civil rights, and compassion. We must find better ways to prevent cavities, such as helping those most at risk for cavities obtain access to the services of a dentist

3) April 6, 2011. Letter from **Matt Young, DDS**, President, International Academy of Oral Medicine and Toxicology, to Thomas Frieden, MD, MPH, Director, Centers for Disease Control and Prevention, Atlanta, GA. RE: Disproportionate Harm From Water Fluoridation to Babies, Kidney Patients, and African Americans.

As President of the International Academy of Oral Medicine and Toxicology, I am writing to communicate our organization's concern that the CDC-supported practice of water fluoridation disproportionately harms certain subsets of the population: such as babies, kidney patients, and African Americans.

There is much science we could cite here, but the purpose of this letter is to succinctly summarize the basis for our conclusion that fluoridation must end.

4) June 2011. **Alveda King**, nationally known minister and niece of civil rights leader Martin Luther King Jr.:

"This is a civil rights issue ... No one should be subjected to drinking fluoride in their water, especially sensitive groups like kidney patients and diabetics, babies in their milk formula, or poor families that cannot afford to purchase unfluoridated water. Black and Latino families are being disproportionately harmed."

5) July 1, 2011. A Resolution on fluoridation was passed by the **League of United Latin American Citizens (LULAC)** titled, Civil Rights Violation Regarding Forced Medication.

WHEREAS, minority communities are more highly impacted by fluorides as they historically experience more diabetes and kidney disease; and...

WHEREAS, minorities are disproportionately harmed by fluorides as documented by increased rates of dental fluorosis (disfiguration and discoloration of the teeth); and...

WHEREAS, the CDC now recommends that non-fluoridated water be used for infant formula (if parents want to avoid dental fluorosis – a permanent mottling and staining of teeth), which creates an economic hardship for large numbers of families, minority and otherwise...

6) April 2013. **Portland chapter of the NAACP** voted to oppose the fluoridation of the public water supply.

... Clifford Walker, chair of the branch veteran's committee, says he believes the vote was unanimous. They had been **debating the issue vigorously** for several months," Walker says. "People with **diabetes** would be [affected] by adding fluoride to the water. African-Americans have a higher rate of diabetes." The decision, he says, is "in the best interest of our constituents."

A key narrative of this spring's fluoridation campaign has been that **fluoride supporters had gathered a coalition of 80 groups representing low-income and minority Portlanders**, while the anti-fluoride campaign had none.

WW [reported this morning](#) that the pro-fluoridation campaign, Healthy Kids Healthy Portland, has **rewarded that support with cash payments totaling more than \$119,000**. Groups like the Urban League, the Native American Youth and Family Center and the Latino Network are using that money for "outreach," according to Eryn Mitchell, the campaign manager for Healthy Kids. (Mesh, 2013)

7) November 11, 2014. A Resolution was passed by the **Santa Rosa-Sonoma County NAACP** Opposing Fluoridation of Our Public Water Supply.

Whereas: Studies have found that in fluoridated communities, African-American and Latino children are at greater risk for dental fluorosis (discolored teeth from damaged tooth enamel caused by fluoride exposure) and,

Whereas: Former Ambassador Andrew Young, one of many civil rights leaders opposed to fluoride, has pointed out that: "we...have a cavity epidemic today in our inner cities that have been fluoridated for decades"

8) May 11, 2015: Letter from **Rev. William (Bill) Owens, President of the Coalition of African American Pastors** to Rep. Barry Loudermilk, Chairman, House Subcommittee on Oversight / Science, Space, & Technology Committee, Washington DC:

African Americans should have been told that we are disproportionately harmed by "dental fluorosis," the disfigurement of teeth caused by overexposure to fluorides as a young child. And who among us was told that kidney patients, diabetics, seniors, and children are susceptible subgroups that are especially vulnerable to harm from fluorides? There are more patients with kidney disease and diabetes in the black community, and this is all the more reason federal officials should have told us that kidney patients and diabetics are especially vulnerable to harm. Additionally, low-income families often times lack the resources to purchase unfluoridated water or a filtration system to remove fluoride from drinking water.

21. The emergency "fluoridation-defense" meeting held at Morehouse College

After the statements from civil rights leaders became public (Lillie Center, 2011; FAN, 2011c), Ambassador Young and Rev Gerald Durley were invited to a hastily organized semi-confidential meeting held at Morehouse College on June 1, 2011.

Freedom of Information documents reveal the enormous concern that the pro-fluoridation lobby (both inside and outside government) had about the traction the statements by the Civil Rights leaders were receiving both in the media and on the internet. An extraordinary number of important and influential governmental and professional representatives were brought together for this meeting.

This “army of officials” was a magnified version of the “shock and awe” tactics used to intimidate decision makers should they ever have the temerity to question the wisdom of the fluoridation program. Council chambers are flooded by dentists, dental students, local and state dental and health spokespersons claiming that if they should end fluoridation they would be threatening the future health and well-being of their children.

Those at the Morehouse meeting included the following (FAN, 2015a):

- Dr. David Satcher (former US Surgeon General)
- Dr. John Maupin, Morehouse School of Medicine
- Gwen Keyes Fleming, EPA, Administrator Region IV
- Dr. Ursula Bauer, Director, National Center for Chronic Disease Prevention and Health promotion
- Dr. Scott Presson, CDC program services
- Dr. Gina Thornton-Evans – CDC oral health epidemiologist
- Dr. Desmond Williams, Lead, Chronic Kidney Disease Initiative

Department of Health and Human Services/Office of Minority Health

- Dr. Garth Graham –Deputy Assistant Director for Minority Health
- Dr. Rochelle Rollins, Director, Division of Policy and Data
- Dr. Arlene Lester, Regional Minority Health Consultant, Georgia State

National Dental Association

(The NDA represents over 6,000 Black dentists, and 30 million Black Americans)

- Dr. Elizabeth Lense, State Dental Director, NDA
- Dr. Sheila Brown, President, NDA
- Dr. Roy Irons, DDS
- Dr. Kim Perry, Chairman of the Board, NDA
- Mr. Robert Johns, ED

American Dental Association (ADA)

- Dr. Bill Cainon, Pres-Elect, ADA
- Dr. Leon Stanislav, former Chairman NFAC
- Judy Sherman, Washington DC office, ADA

This was a lot of muscle to use against the two Civil Rights leaders who attended this meeting. It is a pity that a fraction of that muscle power has not gone into informing minority communities about the special risks posed to them by fluoride and water fluoridation. Some people might be impressed that so much effort is going into protecting children’s teeth, for others it is disheartening that the rest of their bodies cause so little concern.

22. A better way of tackling tooth decay in the inner city and address other EJ issues

Here we offer a creative and positive holistic approach to address dental decay and other aspects of Environmental Justice in the Inner City. Our suggestions are in line with items I and II

of the “Action agenda on three collective and strategic goals for fiscal years 2016- 2018” of the Inter Agency Working Group on Environment Justice (EJ IWG), namely:

- I. Enhance communication and coordination to improve the health, quality-of-life, and economic opportunities in overburdened communities;
- II. Enhance multi-agency support of holistic community-based solutions to solve environmental justice issues

Our 5-step alternative plan to water fluoridation for low-income areas and the inner city.

1) End water fluoridation. This could be accomplished swiftly by the US EPA Office of Water (OW). If OW were to determine the safe dose of fluoride that would protect all our children from lowered IQ it would force an immediate end to fluoridation. Such protection against fluoride’s neurotoxic effects would improve the “health, quality-of-life, and economic opportunities” for children and young people in many ways, especially from low-income families.

2) Establish the equivalent of Scotland’s very successful Childsmile program in all kindergarten and primary schools (and possibly churches and WIC programs) in low-income areas. In this program involving both teachers and parents, children are taught to brush their teeth properly; are provided more nutritious snacks and beverages and encouraged to reduce sugar consumption. The program also provides annual dental check-ups and treatment if required. This could be combined with a program along the lines of the Danish program for pre-school toddlers – see Appendix I.

3) Set up dental clinics either in schools or stand-alone facilities in the inner city and other low-income areas. Recruit dentists, dental hygienists and nutritionists to provide part-time pro bono services to these clinics and support the educational services in step 2.

4) Expand these dental clinics into community centers aimed at improving the child’s overall health, nutrition and physical fitness as well as stimulating other health supporting activities. Such a center, depending on local interest and skills could include keep-fit equipment and classes, community gardens, community composting, cooking, nutritional and canning advice. Depending upon demand it might also be linked to local farms..

5) Expand these communities still further into job creating operations. One example we know that works well is a “reuse and repair” operation to handle discarded appliances, furniture and other reuseable items from the local and nearby communities. Reuse and repair can also involve job training, skill-sharing, tool sharing, a community workbench and value added enterprises. Such an operation can be linked to a Zero Waste strategy involving source separation, composting, recycling and other waste reduction and prevention initiatives. This strategy not only fights the pollution generated by landfills and incinerators (which are often sited in low-income areas), it also provides many jobs and local business opportunities. One of the authors of this report has lectured and written extensively in this area, see *The Zero Waste Solution: Untrashing the Planet One Community at a Time* by Paul Connett (Chelsea Green, 2013). There are many other creative schemes including

community gardens, a community culinary school that teaches new chefs how to make food that is inexpensive, tasty and nutritious, and many many more.

- 6) It is not difficult to see how many federal and local agencies could be involved with such an ambitious scheme. These could include the HHS as well as the departments of Education and Agriculture and the waste management folks at the EPA. Step 5 could be integrated with the ongoing efforts along these lines in many municipalities. This is one of many ideas that with a little creativity a community can embrace.

More than anything else a holistic approach allows the transition from the politics of “no” to the politics of “yes.” Once we get off the shortsighted notion that we can battle tooth decay by putting a neurotoxic chemical into the public drinking water, we can unleash not only the full potential of the child, but also of our communities and maybe even our civil and professional services. The three key words are education, nutrition and justice. We need education not fluoridation to fight tooth decay and obesity. We need healthy soil, to produce healthy food to produce healthy people to produce a healthy economy and ultimately a healthy planet and we need Environmental Justice for all. A great deal can be achieved with creativity and vision. A threatened community is a strengthened community when people work together to solve their problems in a creative and positive way..

23. FAN responds to HHS Jan 7, 2011 announcement proposing to lower recommended level of fluoride in water to fight tooth decay

In a joint press release issued January 7, 2011, the Department of Health and Human Services and the Environmental Protection Agency’s Office of Water (OW) announced a recommendation to lower the level of fluoride in community water fluoridation schemes to 0.7 mg/L (down from the level set in 1962: 0.7 to 1.2 mg/L) (HHS, 2011). In this announcement Assistant Secretary for Health Howard K. Koh said: **“One of water fluoridation’s biggest advantages is that it benefits all residents of a community...”** Simultaneous with this announcement the public was encouraged to submit **comments** on this new recommendation. On April 19, 2011, the Fluoride Action Network (FAN) responded with two submissions (a,b) and documented the issue of Environmental Justice as it pertains to fluoridation and African Americans (FAN, 2011a).

On April 19,2011 FAN sent a letter to the then director of HHS Kathleen Sebelius. Subsequently approximately 18,000 people sent in emails in support of this letter. A full copy of the letter can be found in Appendix H. Below is a shortened version.

Fluoride Action Network
February 4, 2011

To HHS and Honorable Secretary Sebelius

In response to your request for comments on the recent change in your recommended level of fluoride added to community drinking water, I respectfully submit the following points

supporting the stance that a reduction in fluoride levels is not sufficient, and that the United States should follow the approach of western Europe and end water fluoridation completely:

- Fluoride is not a nutrient, nor is it essential for healthy teeth...
- Using the water supply to mass medicate the population is unethical...
- The benefit and safety of ingested fluoride has never been proved by accepted medical standards...
- Any benefits of fluoride are primarily topical, not systemic...
- Americans will still be over-exposed to fluoride at 0.7 ppm.,,
- African-American children and low-income children will not be protected...
- HHS has failed to consider fluoride's impact on the brain...
- HHS has failed to consider fluoride as an endocrine disruptor...
- HHS has failed to consider or investigate current rates of skeletal fluorosis in the U.S. ...
- HHS has failed to consider fluoride as a potential carcinogen...
- HHS has failed to confirm the safety of silicofluorides...

Most of the arguments listed above are covered in far more detail in the recently published book "The Case Against Fluoride" by Connett, Beck and Micklem (Chelsea Green, 2010). We urge director Sebelius to appoint a group of experts from HHS, who have not been involved in promoting fluoridation, to provide a fully documented scientific response to the arguments and evidence presented in this book. Were director Sebelius to do this we strongly believe that neither she nor these experts will want to see the practice of water fluoridation continue. The practice is unnecessary, unethical and hitherto the benefits have been wildly exaggerated and the risks minimized. A scientific response to this book from a HHS team would allow the public to judge the cases both for and against fluoridation on their scientific and ethical merits.

24. FAN's critique of the EPA's initial steps to determine a new MCLG for fluoride

In the timeline above (see section 5) it has already been explained how inappropriate it was for the EPA Office of Water (OW) at the HHS/EPA joint press conference on Jan 7, 2011 to indicate that it was going to take into account the benefits of the water fluoridation program while determining a new MCLG (safe drinking water standard goal) for fluoride in water (HHS, 2011a). Here we will address concerns about the way they have gone about determining the MCLG and indicate a) that it is based upon poor scientific assumptions and b) how it is insensitive to EJ issues.

In determining a new MCLG for fluoride the EPA announced that they were going to use **severe**

dental fluorosis as the most sensitive health effect for fluoride. They argued that if they found a safe level (safe reference dose or RfD) that protected against severe dental fluorosis it would protect against impacts on all other tissues including bones in adults. In so doing they completely ignored all the scientific evidence sent to them by Fluoride Action Network (FAN, 2011a,b; Thiessen 2011, 2015) and others that fluoride is a neurotoxin that has been associated with lowered IQ in children – a far more serious end point as far as protecting the population is concerned.

In order to support its hypothesis that severe dental fluorosis was the most sensitive outcome to fluoride's toxicity the EPA would have to show that in all the studies where IQ has been lowered (45 studies as of September 2015 at <http://fluoridealert.org/studies/brain01/>) *all the children with lowered IQ* had **severe** dental fluorosis. If any had moderate, mild or very mild dental fluorosis their hypothesis collapses. The EPA has not shown this; instead they have simply ignored all the evidence presented to them on IQ studies. In a delegation to the EPA's OW on Sept 8 2014 FAN provided evidence that children with moderate, mild and even very mild dental fluorosis had a lowered IQ. This evidence came from Xiang's important IQ study from 2003. Xiang was part of the delegation. EPA OW continues to remain silent on this evidence.



Figure 14: A photo taken of the FAN delegation (from left to right: Quanyong Xiang, Paul Connett, Chris Neurath and Bill Hirzy) outside the EPA's Headquarters after they had met with two top officials at the EPA Office of Water on Sept 8, 2014

Severity of dental fluorosis on the Dean scale

The level of fluoride and IQ in different group by dental fluorosis

Group	No.	Water F	IQ	Urine F	Serum F
0	301	0.50±0.53	99.76±3.50	1.13±0.71	0.044±0.017
1	65	1.88±1.07	94.18±13.77	2.70±1.15	0.071±0.023
2	59	2.44±0.66	93.27±13.10	3.69±1.61	0.082±0.016
3	63	2.67±0.63	91.51±12.84	3.85±1.79	0.085±0.019
4	24	2.89±0.81	95.33±14.64	3.81±1.80	0.084±0.018

Figure 15: A copy of a slide in Dr. Quanyong Xiang's presentation at the FAN conference in Crystal City, Sept 6, 2014. The left hand column (0,1,2,3,4) corresponds to Dean's classification of the different levels of dental fluorosis (0 = none, 1 = very mild, 2 = mild, 3 = moderate and 4 = severe. Note by comparing with column 4 that children had lowered IQ who had very mild, mild and moderate dental fluorosis. This refutes the claim by the OW that severe dental fluorosis is the most sensitive health effect of fluoride exposure. Lowered IQ is a more sensitive end point.

The EPA further indicated in the calculations made available simultaneously in the Federal Register (HHS, 2011b) that they were going to use Dean's studies from the 1940's to estimate the threshold level where **severe** dental fluorosis would occur. Having estimated that level they then applied an "uncertainty factor of 1" to protect all the members of society – including the most vulnerable – from this effect.

Normally a factor of 10 is used to extrapolate from the study group to protect a large population to account for the very wide range of sensitivity expected in any large population (this is sometimes referred to as the intra-species variation factor). An uncertainty factor of 1 means 100% certainty that Dean's study in the 1940s was so large and so inclusive that it covered the full range of sensitivity of the total US population of children in the 21st century. This is extraordinarily cavalier. In his early studies (from the 1930s) Dean did look at age, sex and color and even mentioned in a 1933 paper, the case of a negro girl with mottled teeth in the bicuspid who used the fluoride water for just three years. However, in his 21-city study from 1942 he focused only on white children. Dean states, "The Study embraced 7,257 **white** urban school

children, aged 12 to 14 years of 21 cities...” (our emphasis).

Thus the only children who featured in Dean’s 21-city study were white – so it wasn’t even inclusive of the US population in 1942, let alone in the twenty-first century.

By using studies that did not include low-income families and communities of color clearly makes the EPA’s calculations inappropriate for estimating a level which would protect every child from severe dental fluorosis – **without a safety factor applied to it** - especially in the light of the discussion above that indicates that both Blacks and Hispanics are more sensitive to dental fluorosis than Whites. Choosing an uncertainty factor of one is scientifically indefensible on the one hand, and betrays an insensitivity to EJ issues on the other.

If the EPA is serious about eliminating environmental injustice from its policy decisions this is a classic case to address. In determining a safe reference dose for fluoride and a new MCLG the EPA OW has to do two things:

- 1) They need to provide evidence that severe dental fluorosis is a more sensitive end point than lowered IQ. The last children in the U.S. who need their IQ lowered are children from low-income families.
- 2) Even if they use severe dental fluorosis as the end point they need to use a more appropriate database and uncertainty factors to produce a safe reference dose to protect all individuals in society including the most vulnerable.

If they don’t do either of these things it will make a mockery of the Presidential Executive Order of 1994: ***“Federal agencies must identify and address, as appropriate, “disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations.”*** (Presidential Executive Order 12898 of February 11, 1994)

The above discussion updates our concerns to those we submitted in two formal responses to the OW’s reports, which appeared in the Federal Register at the same time as their press conference of Jan 7, 2011.

FAN’s two formal responses submitted to the EPA’s Office of Water in April 2011 can be accessed online at:

http://www.fluoridealert.org/wp-content/uploads/epa-2010.dose_.pdf

and

<http://www.fluoridealert.org/wp-content/uploads/fan.exposure.revised.4-22-11.pdf>

Below we have given a skeletal summary of our responses so that readers will have a quick access to the many criticisms we had of OW’s assumptions and calculations in both documents.

A) A summary of FAN’s Responses to EPA OW’s report, [Fluoride: Dose-Response Analysis For Non-cancer Effects](#).

We identified 16 flaws in the methodology and rationale behind OW’s proposed RfD (safe reference dose)

We argued that

- 1) *Consideration of the adverse effects of fluoride should take precedence over any presumed benefits in OW's determination of an RfD and MCLG*
 - 2) *OW has failed to offer convincing evidence that severe dental fluorosis should be considered the critical effect associated with exposure to fluoride.*
 - 3) *failed to consider potential variation in responses to the different types of fluoride in drinking water.*
 - 4) *failed to apply appropriate safety factors.*
 - 5) *unnecessarily delayed consideration of the potential carcinogenicity of fluoride.*
 - 6) *failed to consider fluoride's effects on the brain.*
 - 7) *failed to consider fluoride as an endocrine disruptor.*
- failed to consider the disproportionate impact on a number of susceptible populations in its analysis.***
- 8) *disregarded pregnant women and embryos/fetuses in its analysis.*
 - 9) *completely ignored infants 0-6 months of age in its analysis, and has failed to consider the disproportionate burden placed on bottle-fed infants.*
 - 10) *failed to consider the disproportionate impact on above-average water consumers, which account for at least 10% of the population.*
 - 11) *failed to consider the disproportionate impact on minority Americans.*
 - 12) *failed to consider the disproportionate burden placed on low-income families.*
 - 13) *failed to consider the disproportionate harm to people with inadequate nutrition.*
 - 14) *failed to consider those with impaired kidney function.*
 - 15) *failed to consider those co-exposed to lead, arsenic, or aluminum.*
 - 16) *failed to consider those with an increased sensitivity to fluoride.*

B) A summary of FAN's Comments on the EPA OW's Report Fluoride: Exposure and Relative Source Contribution Analysis

*The policies used to calculate fluoride exposures are flawed, especially when no margin of safety is applied. **FAN identified 12 flaws in their analysis***

- 1) *OW's policy of using the 90th percentile for water consumption ignores 10% of the U.S. population —nearly 31 million people*
- 2) *OW's policy of using the mean drinking water fluoride concentration ignores as much as half of the population whose drinking water has higher fluoride levels.*
- 3) *OW's policy of using the average body weight of the population of interest ignores as much as half of the population in the lower 50th percentile for weight.*
- 4) *OW has failed to consider studies of urinary fluoride excretion as an estimate of total fluoride intake.*
- 5) *OW has failed to consider fluoride exposures for several of the most sensitive groups — pregnant women, embryos/fetuses, and infants 0-6 months*
- 6) *failed to adequately consider racial, ethnic, regional, and socioeconomic differences in food and beverage consumption patterns*

OW has ignored several sources of fluoride as contributors to total intake. OW has

- 8) *ignored fluoride exposures from several dental products, including professionally applied topical fluorides, mouthwashes, and various dental devices.*
- 9) *failed to consider fluoride exposure from dietary fluoride supplements in its analysis.*
- 10) *failed to consider pharmaceuticals and anesthetics that metabolize to the fluoride anion in its exposure analysis.*
- 11) *failed to consider ambient air as a source of fluoride in its exposure analysis.*
- 12) *does not adequately consider exposure from cigarettes in its analysis.*

25. The EPA's false characterization of fluoride as a nutrient.

In addition to all the other flaws discussed above there is another major misrepresentation that the EPA made in both the documents discussed in section 24 above to which we would like to draw special attention because it is a false claim that is often made by promoters of fluoridation. This is the claim that fluoride is a nutrient. In the case of OW they should not have made this claim in 2011 because twice they were informed in 2003 that the source they were using had rejected the claim. Here are the details.

The EPA states that the source for this claim is the Institute of Medicine (IOM). Here are the exact quotes.

In their report, "[Fluoride: Exposure and Relative Source Contribution Analysis](#)" on page 39 EPA's Office of Water states:

However, it should be recognized that **fluoride is a nutrient** and reconstitution of infant formulas with water containing lower levels of fluoride may result in infants not consuming the Adequate Intake for fluoride (0.5 mg/day) established by the Institute of Medicine (1997).

And in their report, "[Fluoride: Dose-Response Analysis For Non-cancer Effects](#)", on page 95 they state:

The dietary guidelines for fluoride were revised by the Institute of Medicine (IOM) in 1997. The 1997 revisions (see Table 5-1) considered **fluoride as a nutrient** based on its presence and function in bones and tooth enamel. (p. 95)

To appreciate the blatancy of this falsehood a little history is needed. In 1997 the Food and Nutrition Board of the IOM caused considerable consternation among scientists who have taken an interest in the fluoride debate. The IOM produced a report entitled, *Dietary Reference Intakes for Calcium, Phosphorus, Magnesium, Vitamin D, and Fluoride* (IOM, 1997) and held a public meeting in Washington DC, Sept 23, 1997, to discuss a draft of the report. William Hirzy PhD (then with the EPA) and Paul Connett PhD attended this day-long meeting and several times questioned the inclusion of fluoride among a list of well-known nutrients, when there is no scientific study justifying such a characterization for fluoride.

To demonstrate that a substance is an essential nutrient one has to remove the proposed nutrient from an animal's diet and demonstrate that some disease occurs as result. This has never been done for fluoride. Moreover, no one has ever shown that there is any biochemical process in the body that needs fluoride to function properly or any molecule (fat, amino acid, protein, nucleic acid or metabolite) that contains fluoride.

Despite the intervention of Hirzy and Connett the IOM went ahead and finalized its draft retaining fluoride among a list of known nutrients needed for healthy bone growth. About a dozen scientists wrote to the heads of both the Institute of Medicine (Dr. Kenneth Shine) and the National Academies (Dr. Bruce Albert) complaining of this false implication. Alberts and Shine (1998) replied as follows:

First, let us reassure you with regard to one concern. Nowhere in the report is it stated that fluoride is an essential nutrient. If any speaker or panel member at the September 23rd workshop referred to fluoride as such, they misspoke. As was stated in *Recommended Dietary Allowances 10th Edition*, which we published in 1989: "These contradictory results do not justify a classification of fluoride as an essential element, according to accepted standards. Nonetheless, because of its valuable effects on dental health, fluoride is a beneficial element for humans."

Run the clock forward to April 2003 when Paul Connett had a semi-debate at the EPA headquarters in Washington DC as part of their annual science fair. Ed Ohanian of the EPA's Office of Water was present. He didn't formally debate Connett but he did summarize some of

the EPA's activities on fluoride. In these comments he cited the IOM (1997) as characterizing fluoride as a nutrient. Connett corrected him citing the Shine-Alberts letter (1998).

Then in October 2003 before Connett testified before the NRC panel, which was reviewing fluoride's toxicity discussed above (section 11), Joyce Donahue (2003), also of EPA's Office of Water, presented the parameters of the review they wanted from the panel. She also referred to fluoride as a nutrient and used the IOM report to justify that claim. Connett corrected her from the floor again citing the Alberts-Shine letter (1998).

it is extraordinary that the EPA 's Office of Water should try to get away with this false characterization yet again.

26. Fluoride has no known role in nutrition or biochemistry (a summary)

Here is what FAN submitted to the EPA in April 2011 on this point.

Fluoride is not considered by knowledgeable experts to be an essential nutrient for humans, and it has no known, beneficial role in human biochemistry (Nielsen, 1996; Hunt & Stoecker, 1996; NRC, 1989).

The U.S. authority for recommended dietary intakes concluded in 1989 that contradictory studies in rats and mice in the 1970s "do not justify a classification of fluorine [as fluoride] as an essential element, according to accepted standards" (NRC, 1989). (Because animal diets can be more stringently depleted in fluoride than human diets, studies in short-lived rats and mice are considered the best way to discover the possible essentiality of minerals in mammals.)

In its most recent publication on recommended dietary intakes, the same U.S. authority makes no mention of fluoride essentiality in the diets of humans or animals (IOM, 1997).

Human milk is extraordinarily low in fluoride, ranging from 0.007 parts per million (ppm) to 0.011 ppm (IOM, 1997)—100 times less than in fluoridated water in the U.S. (0.7 to 1.0 ppm).

Human milk also has about 3 times less fluoride than the blood of the mothers producing it (Sener et al., 2007).

Thus it seems clear that nature has evolved active mechanisms to limit the transfer of fluoride in humans—both from ingested food and water to blood, and from blood to breast milk.

Thus either by accident or intent mothers' milk protects the baby from more than minimal exposure to fluoride. Water fluoridation removes that protection for bottle-fed babies.

It is well-established that fluoride's toxicity may be exacerbated by poor nutrition. By not accounting for this fluoridation promoters are contributing to the disproportionate

harm fluoride exposure and water fluoridation may be causing both low-income and minority families, who are more likely to suffer from poor nutrition.

However, nutritional factors may enhance fluoride's toxicity. These include deficiencies in iodine, calcium, magnesium, and vitamin C (ATSDR, 1993, p.112), selenium, and vitamin D (e.g. ATSDR, 1993, p.112; NRC, 2006).

Poor nutrition has been found to increase the incidence and severity of dental fluorosis (Pandit et al., 1940; Murray et al., 1948; Littleton et al., 1999) and skeletal fluorosis (Pandit et al., 1940; Marier et al., 1963; Fisher et al., 1989; Teotia et al., 1984; Littleton et al., 1999).

The dose of fluoride at which disturbed endocrine function occurs is reduced in situations of iodine deficiency (NRC, 2006). Lin et al. (1991), in a UNICEF - sponsored study, found that even modest levels of fluoride in the water (0.88 mg/L vs. 0.34 mg/L) resulted in reduced IQ (and increased frequency of hypothyroidism) when combined with low iodine, even more so than with iodine deficiency alone.

The increasing dietary intake of fats in the U.S. may have negative repercussions in terms of fluoride metabolism, as "Diets high in fat have been reported to increase deposition of fluoride in bone and, thus, to enhance toxicity" (HHS, 1991).

As we have not received a response to our April, 2011 submission (as of Sept 2015), we have yet to hear whether the EPA OW has retracted their claim that fluoride is a nutrient or whether they are going to try to convince the world that it is.

27. Final HHS ruling in 2015 uses sleight of hand to dismiss FAN's input on fluoride's neurotoxicity

In April 2015 the HHS released its opinion in support of its recommended level of 0.7 mg/L level for water fluoridation programs in the US (DHHS, 2015). ***In this HHS document there is no mention of the Environmental Justice issue and thus no discussion of the adverse potential this recommended level bodes for the children of low-income and minority families.***

The HHS statement was accompanied by a statement from the director of the CDC's Division of Oral Health on the "evidence supporting the safety and effectiveness of fluoridation". In this statement the terms "minority" and "racial" were each used once; the term "poor" was used twice, and all with the same reference to the Surgeon General's report of 2000 (Weno, 2015; Surgeon General's reference) discussed above.

The CDC also rejected our concerns about Fluoride's neurotoxicity. Here is the short section that deals with this:

IQ and other neurological effects

.

The standard letters and approximately 100 unique responses expressed

concern about fluoride's impact on the brain, specifically citing lower IQ in children. Several Chinese studies considered in detail by the NRC review reported lower IQ among children exposed to fluoride in drinking water at mean concentrations of 2.5–4.1 mg/L—several times higher than concentrations recommended for community water fluoridation.

The NRC found that “the significance of these Chinese studies is uncertain” because important procedural details were omitted, but also stated that findings warranted additional research on the effects of fluoride on intelligence.

Based on animal studies, the NRC committee speculated about potential mechanisms for nervous system changes and called for more research “to clarify the effect of fluoride on brain chemistry and function.”

These recommendations should be considered in the context of the NRC review, which limited its conclusions regarding adverse effects to water fluoride concentrations of 2–4 mg/L and did “not address the lower exposures commonly experienced by most U.S. citizens.”

A recent meta-analysis of studies conducted in rural China, including those considered by the NRC report, identified an association between high fluoride exposure (i.e., drinking water concentrations ranging up to 11.5 mg/L) and lower IQ scores; study authors noted the low quality of included studies and the inability to rule out other explanations.

A subsequent review cited this meta-analysis to support its identification of “raised fluoride concentrations” in drinking water as a developmental neurotoxicant.

A review by SCHER also considered the neurotoxicity of fluoride in water and determined that there was not enough evidence from well-controlled studies to conclude if fluoride in drinking water at concentrations used for community fluoridation might impair the IQ of children. The review also noted that “a biological plausibility for the link between fluoridated water and IQ has not been established.”

Findings of a recent prospective study of a birth cohort in New Zealand did not support an association between fluoride exposure, including residence in an area with fluoridated water during early childhood, and IQ measured repeatedly during childhood and at age 38 years. (CDC, 2015) **(our emphasis)**.

Please note the highlighted section in this excerpt. This statement is referring to the Harvard meta-analysis by Choi et al., 2012 discussed in section above. We have already noted that fluoridation promoters have tried to dismiss the relevance of this review with respect to artificial water fluoridation by referring to the “high concentrations” in the “high-fluoride villages.” However, we saw in table xx that for the 20 studies where the source of fluoride was water and not coal and for which fluoride concentrations were given, the mean value in the “high-fluoride” villages was 3.52 ppm, which is lower than the current safe drinking water standard of 4 ppm. We also noted that a number of studies were lower than 3 ppm, and when we looked at one study (Xiang et al. 2003 a,b) in more detail some of the children had their IQ

lowered at 1.5 ppm, and extrapolating from a linear fit of the data, could possibly have occurred between 0.75 and 1.5 ppm.

To see the “sleight of hand” operating here note the way the CDC authors qualify “high fluoride exposure” as “ **drinking water concentrations ranging up to 11.5 mg/L.**”

When we look at the study in question (Wang, 2007) we find that the 11.5 ppm is one end of a range “3.5 to 11.5 ppm.” Thus this value of 11.5 ppm was not experienced by all the children in this particular study, nor was it typical for all 20 studies, where the mean value was 3.52 ppm, so singling it out is highly misleading. (See Table 5, section 15)

Moreover, as any regulatory toxicologist should know when looking at a table of results like this it is not the *highest* value, which is of concern but the *lowest*. It is the lowest value (i.e. the lowest observable adverse effect level, or LOAEL), which is the starting point for determining the safe reference dose (RfD) needed to protect all the individuals in a large population that may be exposed to this toxic. The RfD is the stepping stone in determining the MCLG in water.

So once again we see the CDC Oral Health Division presenting the data in a way to minimize concerns about the practice they vigorously promote. This is not science but a public relations exercise in the name of protecting its long-standing policy. Once again we see an example of where, “**When policy is king, science becomes a slave.**”

28. Summary

Water fluoridation is a very poor and unethical practice, which infringes on the right of every individual to informed consent to human treatment.

It throws an extra burden on poor families and communities of color. These range from an increased risk to dental fluorosis (the first telltale sign that the body has been over-exposed to this toxic substance) to a lowered IQ. The last children in the U.S. who need their IQ lowered are children from poor families and communities of color because their intellectual development is more likely to have been compromised by exposure to other neurotoxins like lead and mercury and because fluoride’s toxicity is made worse by poor nutrition.

While the Oral Health Division of the Centers for Disease Control and Prevention lauds the fluoridation experiment as “One of the top public health achievements of the Twentieth Century” it is probably our greatest public health mistake and needs to be ended as soon as possible.

We believe that it is not enough to say “no” to this program but to say “yes” to a viable and better alternative. We have done this using the challenge of the agenda goals of the EJ IWG for 2016 – 2018 and have proposed a 5-step plan which addresses these goals (see section 21)

29. Recommendations

The Environmental Justice Interagency Working Group (EJ IWG)

We urge all the agencies involved in the EJ IWG to see how they can become involved in our

proposed 5-step plan. We believe there is a role for every single agency.

The CDC.

If the CDC's Division of Oral Health resists our 5 step plan, and is going to continue to spend millions of taxpayers' dollars on fluoridation promotion then it should not be spent on propaganda. That should be left to private organizations like the ADA and Pew. The CDC's Division of Oral Health should provide balanced information. As well as providing information on benefits they need to do a better job of providing information on side effects. Such a task should be given over to a different section of the CDC, not the Oral Health Division, whose personnel have little or no training in specialized areas of medicine other than the teeth and no expertise in toxicology and risk assessment.

Meanwhile, the CDC should be warning, those particularly vulnerable to fluoride's toxic actions of their vulnerabilities. These citizens include low-income families and Black and Hispanic Americans.

The EPA

1) As we have made clear above the EPA Office of Water could end fluoridation tomorrow if it used the best science to determine a safe reference dose (RfD) for fluoride that would protect all our children from lowered IQ. If they use standard procedures and appropriate safety factors the RfD would be so low that an MCLG would have to be set at zero, as is the case for both lead and arsenic. Needless to say, as with arsenic and lead, an MCL (the federally enforceable standard) would have to be chosen, which took into account the costs of removing naturally-occurring fluoride down to some compromise that didn't make removal too cost-prohibitive. The key for the EPA under the Safe Water Drinking Act is to produce a scientifically defensible MCLG for fluoride.

2) The EPA should live up to its self-proclaimed interest in making sure that their decisions take into account EJ issues. In 2011 the EPA stated that:

Environmental Justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. EPA has this goal for all communities and persons across this Nation. It will be achieved when everyone enjoys the same degree of protection from environmental and health hazards and equal access to the decision-making process to have a healthy environment in which to live, learn, and work.

An excellent place to start making these noble words into a reality would be for the EPA OW to take them into account in their ongoing determination of a safe MCLG for fluoride in water. As of Jan 7 2011 the initial steps they have taken in this determination conflicts with these goals in two fundamental ways:

- A) They have ignored all the evidence that fluoride is neurotoxic falsely claiming that severe dental fluorosis is the most sensitive end point of fluoride's toxicity. If this is uncorrected it will further hurt the interest of children of low-income and communities of color: they are the last children that need their IQ lowered or have their mental development impacted in any way.
- B) Even if severe dental fluorosis is erroneously accepted as the most sensitive end point it is ridiculous for them to use data from the 1930s and 1940s in which the vast majority of the

children were white. This foolishness was compounded by their applying to this outdated and incomplete data an uncertainty factor of one, instead of the normal default value of 10, when extrapolating from a small study that has found harm to produce a reference dose to protect all the individuals in a large population from that harm. The normal safety factor of 10 is used to protect for the full range of sensitivity to any toxic substance expected in a large population (i.e. intra-species variation). This variation in sensitivity is caused by many differences in a large population, including genetics, race, ethnicity, income levels, social circumstances, diet and health status. The fact that one of the factors which influences the prevalence of dental fluorosis – especially in its more severe forms - is race underlines the enormous insensitivity being shown to EJ issues by the EPA in their selection of this uncertainty factor and needs urgent and immediate correction.

3. The EPA should acknowledge that fluoride is not a nutrient unless they can produce science to substantiate this claim.

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APPENDICES

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APPENDIX B: Hypothyroidism in the USA

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APPENDIX F: Pro-Fluoridation groups have also downplayed or ignored dental fluorosis

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APPENDIX H: On April 19, 2011 (check date) FAN sent a letter to the then director of HHS Kathleen Sebelius. Subsequently approximately 18,000 people sent in emails in support of this letter

APPENDIX I: The Nexø Method from Denmark

APPENDIX A

Fluoride's Revenge: Has this cure, too, become a disease?

The Progressive | December 1990 | By Daniel Grossman

[\(See Photocopy of this article\)](#)

Daniel Grossman is a free-lance science writer specializing in environmental and health issues. Research for this article was supported by a grant from the Fund for Investigative Journalism.

Terry Rich, a Colorado Spring dentist, recently treated Molly, a teenage patient, for an ugly brown stain on her front teeth. "She was dissatisfied with her teeth," he recalls, noting that dark, brown horizontal lines marred an otherwise straight smile. Though his acid-etching treatment failed to remove the stain, Rich hopes to try again with a different formula. Molly is Rich's own child. Like other people across the nation, she suffers from dental fluorosis, an ailment caused by excessive levels of the chemical fluoride in naturally mineral-rich water.



Moderate/Severe Dental Fluorosis (Photograph by BMC Oral Health)

An investigation of the health effects of fluoride, including two Freedom of Information Act requests that pried loose more than 10,000 pages of documentation, shows that a Government regulation intended to prevent fluorosis was [derailed](#) by a decades-old controversy between two agencies over a legally unrelated Government policy.

Officials at the Public Health Service, the Federal Government's all-purpose health agency, stopped the Environmental Protection Agency from issuing a standard to prevent [dental fluorosis](#) because they feared the rule would disrupt their own plans to protect dental health. As a result, what might have been an open public debate became an obscure internecine battle between two bureaucracies, each with its own idea of what makes good public policy. Though dental fluorosis is hardly a life-threatening ailment, this

story demonstrates how a powerful agency, intent upon enforcing its own view of the public good, can suppress anyone who gets in its way.

On October 31, 1985, employees of the EPA were circulating a [memo](#) written by Paul Price, a staff member in the regulatory agency's drinking water program. It was a spoof of an official press release issued that day to announce a new regulation.

"The Office of Drinking Water," it began, "proudly presents their new improved FLUORIDE REGULATION, or 'How We Stopped Worrying and Learned to Love Funky Teeth.'" The takeoff reflected the frustration felt by staff members who had invested years in developing the protective regulation only to see it diluted because of pressure from another agency.

Though fluoride is best known as the chemical added to drinking water and toothpaste to prevent dental decay, it can also cause a variety of harmful ailments, including one that puts brown stains on teeth and may make them brittle and crumbly. The amount of fluoride added to drinking water to prevent tooth decay is about the same as the amount that can cause moderate staining.

Such staining, known as dental fluorosis, was discovered even before the beneficial effects of fluoride were recognized. The convoluted history of fluoride -- perhaps one of America's most bizarre encounters with a chemical contaminant -- holds the secret to why two agencies, each ostensibly concerned about the effects of fluoride on teeth, should clash.

Dental fluorosis was first noted in Colorado Springs at the turn of the century by a young dentist who became obsessed with discovering the cause of the disease, then known as "Colorado Stain." When minute amounts of fluoride dissolved in drinking water were identified as the culprit in 1931, the Public Health Service dispatched H. Trendly Dean, a talented epidemiologist, to determine the concentration at which the disease occurs.

"In moderate cases, all enamel surfaces of the teeth are altered," Dean wrote. "Brown stain is frequently a disfiguring feature." In severe cases, he added, "brown stains are widespread and teeth often present a corroded-like appearance." The disease, researchers later discovered, is caused in children up to the age of eight during the formation of their teeth.

Fluoride would probably be treated today with the same degree of concern as any other contaminant that affects human health, were it not for the fact that Dean also confirmed an observation that changed the course of preventative health care. He showed that people with dental fluorosis had fewer cavities--then considered a public-health scourge. This discovery was greeted with enthusiasm by activists in the dental community, especially in Wisconsin, a stronghold of the Progressive movement, where a small group of energetic dentists campaigned vigorously to add fluoride to drinking water.

Dean and his agency were more circumspect, as were the American Dental Association and the American Medical Association, which preferred to await the results of investigations of the benefits of fluoride. But by the mid-1940s, a few communities began experimenting with fluoridation - as the process of adding fluoride came to be known. By 1950, the Public Health Service, under increasing pressure from advocates, endorsed the process.

As a full-blown campaign to fluoridate the entire country - nourished by the once-skeptical Public Health Service - began to build, grass-roots opposition appeared as well. Some critics questioned the safety and efficacy of fluoridation, and others raised ethical, moral, and philosophical objections to the injection of a potent chemical into a public resource. There were crackpots, too, who countered advocates of fluoridation with McCarthy-era anticommunist and anti-Semitic rhetoric. One activist who gained

notoriety in California claimed that fluoridation would produce "moronic atheistic slaves." It would "weaken the minds of the people," she said, and make them prey to communists. Another called fluoridation a Jewish attempt to "weaken the Aryan race mentally and spiritually."

When the strategy of challenging fluoridation in local referendums began to threaten the nationwide endeavor, proponents responded by tarring all opponents - indeed the very idea of opposition - with this "quack" brush. According to fluoridation advocate G.F. Lull, for example, "We will find in the antifluoridation camp the antivaccinationists, the antivivisectionists, the cultists and quacks of all descriptions: In short, everyone who has a grudge against legitimate scientific progress."

The controversy over fluoridation is no longer as visible as it was in the 1950s, but it continues. The Public Health Service is still trying to make fluoridation universally available, and opponents are still at work with roadblocks and sandbags. Today, proponents note with alarm that fluoridation was actually rejected in about 100 of the more than 150 referendums on the measure in the past decade. With only two-thirds of the public water supplies served by what dentists consider the optimal level of fluoride today, the longstanding Public Health Service goal of 95 per cent by 1990 was recently lowered to 75 per cent by the year 2000.

Though many beneficial chemicals are dangerous when consumed at excessive levels, fluoride is unique because the amount that dentists recommend to prevent cavities is about the same as the amount that causes dental fluorosis. The Public Health Service recommends that about one part of fluoride be added for every million parts of water to prevent tooth decay -- the amount depends on the climate -- while the Environmental Protection Agency says water with as little as 0.7 parts per million of fluoride can cause moderate dental fluorosis in a small percentage of the people who drink it.

Today, according to the EPA, there are 1,300 communities -- mostly rural towns -- serving nearly two million people with water naturally enriched with fluoride in concentrations greater than two parts per million (ppm). And there are 200 communities serving more than a quarter-million people with water exceeding four ppm. At two ppm, according to agency studies, 10 per cent of all children will contract either moderate or severe fluorosis. At four ppm, nearly half the children will be afflicted. The Public Health Service estimates that nearly half a million American schoolchildren suffer from mild or severe dental fluorosis.

The EPA issued a regulation to protect the public from dental fluorosis in 1977, under authority of the then newly enacted Safe Drinking Water Act. The rule prohibited public water suppliers from distributing water with more than two ppm of fluoride, though the deadline for compliance extended until 1984. As the deadline neared, however, none of the offending suppliers moved to comply, since defluoridation equipment costs hundreds of thousands of dollars. Instead, EPA came under increasing pressure to reexamine the rule. The regulation was a temporary standard, promulgated hastily with the expectation that the agency would later issue a permanent rule based on further deliberations.

EPA staff scientists were convinced of the need to prevent fluorosis. "This was the only contaminant up to this time that we knew had a human health effect," recalls David Schnare, an EPA drinking water analyst. Other drinking-water contaminants, he explains, were recognized by the results of animal studies only.

Nevertheless, EPA was besieged by petitions from state governors and [dental officials](#) to weaken the standard or, better yet, replace the legally binding regulation with a less burdensome, voluntary standard. But voluntary standards are typically ignored.

Dental and other public-health officials opposed the binding rule because they feared EPA would encourage the antifluoridation camp and hinder the ongoing effort to [fluoridate](#) the entire country. EPA's

plans to regulate fluoride, said [John Daniel](#), a dental official in South Carolina, "served only to stimulate ardent anti-fluoridationists in their fanatic quest to associate fluoride with every disease and unpleasantness known to mankind."

But many members of the medical community are cautiously beginning to question forty years of doctrinaire advocacy of fluoridation. Even Public Health Service officials are noting today that fluoride may not be as effective as they once claimed. "Perhaps we have been too much the crusaders," says Canadian dental official Alan Gray in calling on his colleagues to reconsider the benefits of fluoridation.

State governments opposed the binding regulation for another reason: because defluoridation is expensive and therefore politically unpalatable. According to EPA estimates, for instance, a typical family in a community that installed defluoridation equipment could expect an increase in its water bill of between \$20 and \$100 annually.

Though the Public Health Service has long been the chief Federal advocate of fluoridation -- and therefore a less-than-neutral judge -- EPA in 1981 asked Surgeon General C. Everett Koop, a Public Health Service leader, to convene a panel to advise the agency on the relationship between fluoride in drinking water and dental fluorosis. It was an unusual step; according to Joseph Cotruvo, the EPA official directly responsible for drinking-water standards, EPA had never before asked the Surgeon General to conduct such a review of a chemical, nor has it since.

Koop's office assembled a committee of dental researchers in various branches of the Service. Completed in 1982, their [report](#) concluded that dental fluorosis, though "cosmetically objectionable," is not a health hazard. Summarizing the report, [Koop](#) wrote to EPA: "No sound evidence exists which shows that drinking water...in the U.S. has an adverse effect on dental health."

Public Health Service documents verify that the wording of Koop's letter was intended to hinder EPA plans to set a binding fluoride standard. Unless EPA demonstrates that a contaminant has a "health effect," the agency cannot legally set a binding standard.

"If we send this letter," Koop explained in a memo to Edward Brandt, his superior in the Public Health Service, "it means that [EPA] would not be able to publish [binding] drinking-water regulations." Then he advised, "I think we should go with this letter, in spite of the fact that EPA will not like our response."

Still eager to demonstrate the need to regulate fluoride, the EPA asked the Surgeon General to assemble another panel in 1983, this time to consider the nondental effects of fluoride. A [transcript](#) of the panel's two-day meeting shows that, despite its nondental mandate, the panel was especially disturbed by what it learned about dental fluorosis. "You would have to have [rocks in your head](#) to allow your child much more than two parts per million," said Stanley Wallach, then medical-service chief of the Veterans Administration Medical Center in Albany, New York.

In the final draft of its report, panel chair Jay Shapiro concluded, "There was a consensus that... dental fluorosis per se constitutes an adverse health effect that should be prevented." Shapiro wrote a memo warning that "because the report deals with sensitive political issues which may or may not be acceptable to the PHS, it runs the risk of being modified at a higher level or returned for modification." He attached the memo to his draft and sent them on to John Small, a Public Health Service official. Small, in turn, forwarded the draft to Koop.

The [final report](#), which Koop sent the EPA a month later, included none of the Shapiro draft's conclusions about dental fluorosis. Instead, it concluded that it was "inadvisable" for children to drink water

containing high levels of fluoride to prevent the "uncosmetic effect" of dental fluorosis. Koop had again foiled EPA by repeating his conclusion that dental fluorosis is not an "adverse health effect."

When contacted recently, members of the panel assembled by the Public Health Service expressed surprise at their report's conclusions; they never received copies of the final--altered--version. EPA scientist Edward Ohanian, who observed the panel's deliberations, recalled being "baffled" when the agency received its report. But, he added, "it's what they give us in writing that counts."

But William Ruckelshaus, then the administrator of EPA, wanted to set a binding standard to prevent dental fluorosis, so EPA tried one more time. In 1984, Ruckelshaus asked the [National Institute of Mental Health](#) to assemble a panel to examine the psychological effects of dental fluorosis. This time the request was submitted directly to NIMH rather than through the office of the Surgeon General.

Although there was no body of research on the psychological effects of dental fluorosis per se, the panel was guided by numerous studies of facial attractiveness and the behavioral impacts of other dental impairments, such as cleft lip and palate. Panel members were also impressed by photographs they were shown of the teeth of people suffering from severe dental fluorosis. They concluded that people with moderate or severe cases risked "psychological and behavioral problems or difficulties."

EPA staff members were pleased with the results of this study. "The staff response was: Here is our silver bullet," says Paul Price, then an analyst working on the standard. He recalls that the staff was vacillating between recommending a standard of one ppm or two ppm, to prevent the psychological effects of dental fluorosis.

Ruckelshaus was shown a set of pictures of dental fluorosis at a high-level meeting in July 1984, recalls drinking-water analyst Schnare. Ruckelshaus's comment: "That's an adverse health effect." But he stepped down as EPA administrator in January 1985 and was replaced by Lee Thomas, a man less sympathetic to staff concerns about dental fluorosis.

Recent interviews confirm that the staff was preparing at the time to recommend that Thomas issue a one-ppm standard. "It is legally and scientifically indefensible to set the [standard] at a level other than optimum (e.g., 1 ppm)," reads the draft of a memo prepared for Thomas's approval.

A handwritten note scribbled on this draft, however, says a higher-level office, controlled not by staff scientists but by political appointees, preferred a binding standard of four ppm, justified by the threat of skeletal fluorosis, another effect of fluoride, but a much less common one. The note added, "And they have the final say!"

The final draft, completed a few weeks later, concluded that dental fluorosis is merely a "cosmetic effect" and recommends a binding standard of four ppm, and a voluntary one of two ppm. When issued six months later, the standard followed this recommendation.

One drinking water official believes Thomas succumbed to pressure. A native of South Carolina, a state abundantly endowed with fluoride-rich water, Thomas listened not to his staff but to Republican Senator Strom Thurmond, a relentless opponent of the fluoride standard. Edward Groth of the Consumers Union, who wrote a doctoral dissertation on the fluoridation controversy, surmises that Thomas took "the path of least resistance" in following the lead of the Surgeon General.

The technical staff was "devastated" at the decision to go with a standard of four ppm instead of one, according to Paul Price, who managed the writing of the standard and its official justification issued by the EPA. But, he says, once the decision was made, "there were arguments that could be made to justify it."

Price calls the struggle over fluoride regulation "a clash of two different cultures." The Public Health Service, he says, was guided by a 1950s-era attitude that health problems are solved with medication and that doctors know best; anyone questioning this is a crackpot. The Environmental Protection Agency, in contrast, works on the principle -- and is staffed with scientists who believe -- that nothing should be allowed in drinking water unless its safety can be proven. This conviction dictates stringent regulations justified by conservative analyses with ample margins of safety. In the case of fluoride, these two philosophies collide.

In Colorado Springs, where dental fluorosis was first studied almost a century ago, fluoride levels today reach nearly four ppm. Dentist Terry Rich thinks this level is too high, though he concedes the city couldn't afford a treatment plant even if regulators required it.

And he views the high level of fluoride in his city's water as an opportunity for business. "It could be a money-making thing in my practice," he says, musing about treatment for people suffering from dental fluorosis - "if only I could figure out a way to do it."

APPENDIX B

Hypothyroidism in the USA

The following is from the **American Thyroid Association**
<http://www.thyroid.org/media-main/about-hypothyroidism/>

Prevalence and Impact of Thyroid Disease

More than 12 percent of the U.S. population will develop a thyroid condition during their lifetime.

- An estimated 20 million Americans have some form of thyroid disease.
- Up to 60 percent of those with thyroid disease are unaware of their condition.
- Women are five to eight times more likely than men to have thyroid problems.
- One woman in eight will develop a thyroid disorder during her lifetime.
- Most thyroid cancers respond to treatment, although a small percentage can be very aggressive.
- The causes of thyroid problems are largely unknown.
- Undiagnosed thyroid disease may put patients at risk for certain serious conditions, such as cardiovascular diseases, osteoporosis and infertility.
- Pregnant women with undiagnosed or inadequately treated hypothyroidism have an increased risk of miscarriage, preterm delivery, and severe developmental problems in their children.
- Most thyroid diseases are life-long conditions that can be managed with medical attention.

Facts about the Thyroid Gland and Thyroid Disease

The thyroid is a hormone-producing gland that regulates the body's metabolism—the rate at which the body produces energy from nutrients and oxygen—and affects critical body functions, such as energy level and heart rate.

- The thyroid gland is located in the middle of the lower neck.
- Although the thyroid gland is relatively small, it produces a hormone that influences every cell, tissue and organ in the body.
- Hypothyroidism is a condition where the thyroid gland does not produce enough thyroid hormone. Symptoms include extreme fatigue, depression, forgetfulness, and some weight gain.
- Hyperthyroidism, another form of thyroid disease, is a condition causing the gland to produce too much thyroid hormone. Symptoms include irritability, nervousness, muscle weakness, unexplained weight loss, sleep disturbances, vision problems and eye irritation.
- Graves' disease is a type of hyperthyroidism; it is an autoimmune disorder that is genetic and estimated to affect one percent of the population.

APPENDIX C

Certain Thyroid-Related Diseases May Vary by Race: Study looked at Graves', Hashimoto's thyroiditis among U.S. military personnel.

<http://www.webmd.com/women/news/20140415/certain-thyroid-related-diseases-may-vary-by-race>

Race appears to be a factor in determining a person's risk of developing autoimmune thyroid conditions such as Graves' disease or Hashimoto's thyroiditis, a new study in the *Journal of the American Medical Association* (JAMA) says. African Americans and Asians are much more likely to develop Graves' disease than whites are, according to the study published in the April 16, 2014 issue of *JAMA*. On the other hand, whites have an increased risk of Hashimoto's thyroiditis when compared to other ethnic groups, the researchers found.

The findings are based on analysis of medical records from all United States active duty military personnel aged 20 to 54 from 1997 through 2011. "These stark race differences in the incidence of autoimmune thyroid disease raise the important question of why?" said lead author Donald McLeod, an endocrinologist and researcher at the QIMR Berghofer Medical Research Institute in Queensland, Australia. "If we can work this out, we may unlock the mechanisms of autoimmune thyroid disease, and potentially yield insights into other autoimmune disorders."

The thyroid gland plays a crucial role in regulating the body's metabolism, influencing how quickly a person burns calories, how fast their heart beats, and how alert they feel. Graves' disease occurs when the immune system begins producing an antibody that tricks the thyroid into producing too much hormone. It's the most common cause of hyperthyroidism, and affects about one in every 200 people, according to the U.S. National Institutes of Health (NIH).

Hashimoto's thyroiditis happens when the immune system attacks the thyroid gland itself, causing hormone production to fall and causing hypothyroidism. Hashimoto's affects as many as 5 percent of adults, according to the NIH.

The analysis found that, compared to whites, black women are about twice as likely and black men are about two and a half times more likely to have Graves' disease.

Asian/Pacific Islander women had a 78 percent increased risk of Graves' disease compared to whites, while Asian/Pacific Islander men had a more than threefold increased risk, the study noted. But the risk of Hashimoto's in both blacks and Asian/Pacific Islanders was much lower than the risk among whites, ranging from 67 percent to 78 percent less, the findings showed.

"The findings are striking, that there are so many more African Americans and Asian individuals who are coded as having Graves'," said Dr. James Hennessey, director of clinical endocrinology at Beth Israel Deaconess Medical Center in Boston. He was not involved with the new research.

Study author McLeod demurred when asked about how a person's race could influence their thyroid function. "Our current study can't answer whether racial differences in autoimmune thyroid disease incidence are due to genetics, environmental exposures or a combination of both," McLeod said. "Further work needs to be performed to find the underlying mechanisms of thyroid autoimmunity."

In the paper, the researchers rule out one potential environmental influence -- [smoking](#). Smoking is associated with an increased risk for Graves' and a decreased risk for Hashimoto's. But whites have the highest smoking rates in the U.S. military, which runs counter to their increased risk for Hashimoto's and lower risk for Graves', the study authors added.

APPENDIX D

Fluoride chemical species & Lead: No mention by EPA of lead-fluoride-chlorine interactions

Lead poses a health concern in two ways with the addition of fluoride chemicals to public drinking water, and EPA needs to address the lead-fluoride **interactions** and the lead-fluoride-chlorine **interactions**.

1. First, lead is a known toxic contaminant in the industrial fluoride waste byproduct added to water at levels that may exceed the EPA's 15 ppb maximum level and contributes to lead poisoning.
2. Second, fluoride leaches lead salts from any lead-based plumbing systems in older homes common in poor urban areas heavily populated by low income, minority groups. There is a failure by public health officials to adequately monitor for toxic lead that is being leached from the water piping system and plumbing systems in fluoridated cities over decades, since hexafluorosilicic acid (likely the produced intact silicic acid) causes lead to escape from common materials (brass) used in the water supply system (reported as elevated blood lead levels in children that have been linked to fluoride in water (NRC 2006, Coplan et al. 2007).

Research by Masters and Coplan (1999) and Westendorf (1975) provide evidence that fluoride in drinking water increases blood lead levels and lead is a metal that interferes with acetylcholine esterase activity. Acetylcholine esterase is a key enzyme playing a vital role in neurotransmission throughout the human nervous system and one of the most fundamental enzymes in the body. Masters and Coplan (1999) stated referring to the silicofluorides as "Sifts":

Unfortunately, and as surprising as it may seem, neither of these commercial-grade Sifts have been properly (or officially) tested for safety in fluoridating drinking water. Indeed, their use in water fluoridation has even been called an "ideal solution to a longstanding problem"¹¹ as a way to dispose of a highly toxic by-product that is otherwise an enormous health hazard to the local environment. Meanwhile, our own research has revealed¹² and recently confirmed¹³ a statistically significant association between silicofluoride-treated water and elevated blood lead levels, which, in turn, have disturbing implications in relation to their very unwelcome neurological and sociological consequences.

A recent study in rats found a synergistic effect of significantly higher concentrations of lead in both the blood and calcified tissues of animals that were exposed to both silicofluorides and lead (Sawan et al. 2010).

Masters and Coplan (2001) raised further concerns about silicofluorides interference effects on vital biological enzymes such as acetylcholinesterase.

As pointed out in a recent comprehensive review,¹⁰ among the many different enzymes that initiate, control, and terminate various chemical changes in the body, acetylcholinesterase is one of the most fundamental. Therefore, in view of the extensive use of SiFs for water fluoridation (estimated to be 200,000 tons per year in the United States), Westendorf's seminal findings take on added importance in that they reveal that fluorosilicates are more potent in interfering with acetylcholinesterase activity than uncomplexed fluoride. These SiFs are industrial grade materials derived from HF and SiF₄ emissions that are collected in water as toxic by-products in the manufacture of phosphate fertilizers from fluoride-bearing rock phosphate. During that step concentrated aqueous solutions of fluosilicic acid, H₂SiF₆, are formed containing residual HF and SiF₄, together with variable low concentrations of contaminants like lead, arsenic, cadmium, beryllium, and heavy-metal radionuclides.

Recent analysis in Thunder Bay, Ontario, Canada (see below) shows that all 3 fluoride chemicals (H₂SiF₆ – hexafluorosilicic acid, NaF – sodium fluoride, and Na₂SiF₆ – sodium silicofluoride) used in artificial water fluoridation, increase the lead content in drinking water when lead pipes are used.

Fluoridation Impacts on Water Chemistry P3-4, Report No. 2009.123, (Thunder Bay, Ontario, 2009):

“The drinking water produced from the Bare Point Water Treatment Plant is taken from Lake Superior and then treated. Water quality testing results of this source water have continually shown that the Lake Superior water is of high quality, is soft, and of low alkalinity. Testing has also demonstrated that the water is very low in dissolved major ions and metals. These characteristics mean that the water is of excellent quality and as a result has little buffering capacity – the ability to resist changes in the water chemistry.

The effects on the water chemistry of three fluoridating agents, hydrofluorosilicic acid, sodium silicofluoride and sodium fluoride, were all tested on Bare Point drinking water in a laboratory controlled setting. The impact the water chemistry with fluoride addition was tested to determine whether the addition of fluoride would have a potential to increase the number occurrences of elevated lead levels in the community.

The results of this preliminary study show that all fluoridating agents, when added to the drinking water at a concentration of 0.7 ppm (the optimal fluoride concentration rate as recommended by an expert panel convened by Health Canada in 2007), increased lead leaching from the lead pipe.”

Research by Maas et al. 2007 in the journal *Neurotoxicology* demonstrate that lead in solder and brass metal in the water pipes, connections and other materials is also leached and released by all fluoride chemicals used in urban artificial water fluoridation. Their synergistic effects with chlorine and/or chloramine were demonstrated to increase the lead levels even further and yet the EPA has no discussion of this lead leaching concern. Maas et al. (2007) found levels of lead leaching from brass when coming in contact with fluorosilicic acid and chloramine:

CHLORAMINE, FLUOROSILICIC ACID & LEAD LEACHING FROM BRASS MATERIALS

Chemicals	Median Lead level
Chlorine	145.9 µg/DL (1.5mg/L)
Chloramine *	23.3 orami (0.23mg/L) or 233 ppb
Chlorine & sodium fluoride	185.3 µg/DL (1.85mg/L)
Chloramine* & sodium fluoride	28.1 µg/DL (0.28mg/L)
Chlorine and fluorosilicic acid	362.8 µg/DL (3.63mg/L) doubled
Chloramine* & fluorosilicic acid	42.6 µg/DL (0.43mg/L) doubled
Chloramine** & fluorosilicic acid	83.1 µg/DL (0.83mg/L) quadrupled
* with 100% extra ammonia added, to neutralize effect; note difference of one sample of chloramine without this extra ammonia (at **)	
** without extra ammonia.	

APPENDIX E

119 State Reports on Oral Health

109 of these reports have no mention of dental or enamel fluorosis

10 reports include a mention of dental fluorosis:

2 reports give limited fluorosis statistics: 2009 California and 2014 Idaho

2 reports cite fluorosis only in a reference citation

The Alabama 2010 report presents the most information on fluorosis, albeit very briefly

Out of the 119 reports, five mention “White Spots” which could be dental fluorosis.

- The 2007 Georgia report notes: "20% of 2 to 5 year old Georgia Head Start children surveyed have white spot lesions."
- The 2011 Washington state report gives the rate for White Spot Lesions in Head Start/ECEAP Preschoolers at 20.5%, with African American children having the highest percent.

State	Oral Health Report
Alabama	2007. Dental Screenings by % W/Decay. In order by Dental District and % W/Decay. 2006-2007. http://fluoridealert.org/wp-content/uploads/al-2007.pdf Note: 7,643 students were screened at 103 schools. No mention of dental fluorosis.
Alabama	2012. The Oral Health of Alabama’s Children, 2010-2012. http://fluoridealert.org/wp-content/uploads/al-2012.pdf No mention of dental fluorosis.
Alabama	2013. The Oral Health of Alabama’s Kindergarten and Third Grade Children Compared to the General U.S. Population and Healthy People 2020 Targets. Alabama Department of Public Health Data Brief February. http://fluoridealert.org/wp-content/uploads/al-2013.pdf No mention of dental fluorosis.
Alaska	Undated. 13. Oral Health. Healthy Alaskans 2010 – Volume I. http://www.fluoridealert.org/wp-content/uploads/ak.report.pdf A 2 paragraph description of dental fluorosis is given.
Alaska	2007. Alaska Oral Health Plan: 2008-2012. By BJ Whistler. Women’s, Children’s and Family Health, Division of Public Health, Alaska Department of Health and Social Services. Funding for the State Oral Health Plan was provided by the U.S. Centers for Disease Control and Prevention through the Chronic Disease Prevention and Health Promotion Programs Cooperative Agreement (U58/CCU022905). http://www.fluoridealert.org/wp-content/uploads/ak.2007.pdf No mention of dental fluorosis. ◀ "White Spot Lesions" is mentioned on page 12: “Develop or identify education materials for parental/caregiver recognition of early enamel caries, ‘white spot lesions’, in relation to early childhood caries and prevention efforts.”
Alaska	2012. Alaska Oral Health Plan 2012-2016. Alaska Department of Health and Social Services. July. Funding for the State Oral Health Plan was provided by the U.S. Centers for Disease Control and Prevention through the Chronic Disease Prevention and Health Promotion Programs Cooperative Agreement (U58/CCU022905). http://fluoridealert.org/wp-content/uploads/ak-2012.pdf No mention of dental fluorosis.

	<p>◀ "White Spot Lesions" is mentioned on page 35 using the same language as above.</p>
Alaska	<p>2013. Alaska Oral Health Surveillance System. Oral Health Program, Department of Health and Social Services. November 1. Supported by a cooperative agreement with the U.S. Centers for Disease Control and Prevention. http://fluoridealert.org/wp-content/uploads/ak-2013.pdf * Dental fluorosis mentioned once on page 12: "Rates of dental fluorosis, a cosmetic condition in tooth enamel, may increase if fluoride levels in the drinking water are chronically in excess of optimal fluoride levels."</p>
Arizona	<p>2005. The Oral Health of Arizona's Children. Current status, trends, and disparities. Arizona Department of Health Services - Office of Oral Health. November. http://fluoridealert.org/wp-content/uploads/az.2005.pdf * Dental fluorosis mentioned once on page 18: "Consistent with recommendations developed by the National Institute of Dental and Craniofacial Research, each tooth surface was scored for decay, restorations, sealants, fluorosis, trauma, premature loss, and eruption status. Additional information was gathered to determine treatment urgency and referral needs." However, no statistics were given on dental fluorosis even though "More than 13,000 children received dental screenings." and "each tooth surface was scored for decay, restorations, sealants, fluorosis, trauma, premature loss, and eruption status..."</p>
Arkansas	<p>2002. Too Few Visits to the Dentist? The Impact on Children's Health. A Special Report from Arkansas Advocates for Children & Families. February. http://www.fluoridealert.org/wp-content/uploads/ar-2002.pdf No mention of dental fluorosis.</p>
Arkansas	<p>Undated. Alaska Oral Health Assessment. Summary Report 2004-2005. By the State of Alaska, Department of Health and Social Services, Division of Public Health, Oral Health Program. http://fluoridealert.org/wp-content/uploads/ak-2004-2005.pdf No mention of dental fluorosis.</p>
Arkansas	<p>2007. Oral Health in Arkansas. By Mouden LD, Phillips MM, Sledge R, Evans V. Office of Oral Health. August. http://fluoridealert.org/wp-content/uploads/ar-2007.pdf No mention of dental fluorosis.</p>
Arkansas	<p>2012. Arkansas Oral Health Plan 2012-2015. Arkansas Department of Health, Office of Oral Health. "Recommendation 2.8. Provide funding for public health clinic start up and maintenance grants and other safety net programs including community health centers and not-for-profit volunteer programs. Strategy: 1. On an ongoing basis, pursue funding for community health center dental expansion and volunteer community programs through the Tobacco Master Settlement Agreement and other funding mechanisms." http://fluoridealert.org/wp-content/uploads/ar-2012.pdf No mention of dental fluorosis.</p>
Arkansas	<p>2013. Office of Oral Health Surveillance Plan. Prepared by Abby Holt and Brian Whitaker. Arkansas Department of Health. "Community water fluoridation (CWF) is promoted through a CDC cooperative agreement. Activities include presentations on the benefits and costs of CWF internally within the ADH and externally to various governing bodies, community leaders and lay citizens through the distribution of informational packets and campaigns to include</p>

	<p>print and broadcast media. Internal partners include the ADH Section of Engineering and the Office of Communications and Marketing among others.”</p> <p>http://fluoridealert.org/wp-content/uploads/ar-2013.pdf</p> <p>No mention of dental fluorosis.</p>
California	<p>2006. "Mommy, it hurts to chew." The California Smile Survey. An Oral Health Assessment of California's Kindergarten and 3rd Grade Children. Dental Health Foundation. February.</p> <p>http://fluoridealert.org/wp-content/uploads/ca-2006.pdf</p> <p>"During the 2004-2005 school year we surveyed over 21,000 California children in kindergarten or third grade, in nearly 200 randomly-selected schools spread across the State..."</p> <p>No mention of dental fluorosis.</p>
California	<p>2009. Research and public policy: dental caries and fluoridation. UCSF Dental Public Health Seminar: Part 1. By Howard Pollick. October 6.</p> <p>http://www.fluoridealert.org/wp-content/uploads/pollick-2009.pdf</p> <p>* This is not a report published by the state. However, there is a discussion on dental fluorosis and rates are given for "High Schools" 1993-94. It's difficult to read the small chart in the report for the percent of severity of dental fluorosis.</p> <p>Percent of dental fluorosis given for 10th graders teeth 1993-94:</p> <p>Fluoridated Urban: 9.0%</p> <p>Other Urban: 16.1%</p> <p>Rural 7.9%</p> <p>All Regions (lifetime residents): 11.5%</p>
California	<p>2009. Dental Health Fact Sheet 2009 [for Santa Clara]. By the Santa Clara Public Health Department.</p> <p>http://fluoridealert.org/wp-content/uploads/ca-2009.santa-clara.pdf</p> <p>No mention of dental fluorosis.</p>
California	<p>2014. Sonoma County Smile Survey. An Oral Health Assessment of Sonoma County's Kindergarten and Third Grade Children. Prepared by Jenny Mercado MPH, Epidemiologist, Sonoma County Department of Health Services. November.</p> <p>http://fluoridealert.org/wp-content/uploads/ca-2014.sonoma-county.pdf</p> <p>No mention of dental fluorosis.</p>
Colorado	<p>2000. Addressing the crisis of oral health access for Colorado's children. Colorado Commission Children's Dental Health. A Report to the Honorable Bill Owens Governor, State of Colorado. December 2.</p> <p>"During the Colorado 2000 General Assembly session, through tobacco settlement legislation, funds were designated for the improvement of the Child Health Plan Plus, including the addition of a dental benefit to begin January 1, 2001, providing an 'adequate number of dentists are willing to provide services to eligible children.'"</p> <p>http://www.fluoridealert.org/wp-content/uploads/co-2000.pdf</p> <p>No mention of dental fluorosis.</p>
Colorado	<p>2005. Smart Mouths, Healthy Bodies: An Action Plan to Improve the Oral Health of Coloradans. Prepared for Oral Health Awareness Colorado by the Colorado Department of Public Health and Environment, Oral Health Program. Fall.</p> <p>http://fluoridealert.org/wp-content/uploads/co-2005.pdf</p> <p>No mention of dental fluorosis.</p>
Colorado	<p>2011-2015 Colorado Oral Health Surveillance System Plan. The Colorado Department of Public Health and Environment.</p> <p>http://fluoridealert.org/wp-content/uploads/co-2011.pdf</p> <p>No mention of dental fluorosis.</p>
Colorado	<p>2012. Colorado Oral Health Plan. Developed by Oral Health Colorado.</p>

	<p>http://fluoridealert.org/wp-content/uploads/co-2012.pdf No mention of dental fluorosis.</p>
Connecticut	<p>2007. Oral Health in Connecticut. Connecticut Department of Public Health. http://www.fluoridealert.org/wp-content/uploads/ct.report.2007.pdf * A definition of dental fluorosis is given: "However, excessive fluoride consumption can cause mottled enamel or fluorosis (i.e. whitish or brownish spots on teeth). Dental fluorosis results from the ingestion of high levels of fluoride during tooth development in children less than 8 years old."</p>
Connecticut	<p>2012. The Oral Health of Connecticut's Children. Connecticut Department of Public Health, Office of Oral Health. October. This publication was supported by the Cooperative Agreement Number 5U58DP001534-04 from The Centers for Disease Control and Prevention http://www.fluoridealert.org/wp-content/uploads/ct-2012.pdf Key findings: -- Dental decay continues to be a significant public health problem for CT's children -- There are significant oral health disparities in CT with minority and low-income children having the highest level of dental disease. No mention of dental fluorosis.</p>
Connecticut	<p>2013. Oral Health Improvement Plan for Connecticut 2013-2018. Connecticut Coalition for Oral Health. This publication was supported by the Cooperative Agreement Number 5U58DP001534-05 from the Centers for Disease Control and Prevention. http://www.fluoridealert.org/wp-content/uploads/ct-2013.pdf No mention of dental fluorosis.</p>
Delaware	<p>2002. Delaware Oral Health Assessment of Third Grade Children. Delaware Health and Social Services, Division of Public Health. May. http://www.fluoridealert.org/wp-content/uploads/de-2002.pdf No mention of dental fluorosis.</p>
Delaware	<p>2013. KIDS COUNT in Delaware Issue Brief. Oral Health. By the Center for Community Research, University of Delaware (Newark DE). Spring. This document (oral health issue brief) with funding provided by HRSA # T12HP14660. http://fluoridealert.org/wp-content/uploads/de-2013.pdf No mention of dental fluorosis.</p>
Delaware	<p>2013-b. Delaware Smiles. The Oral Health of Delaware's Children. Delaware Health and Social Services, Bureau of Oral Health and Dental Services. August. PROJECT FUNDING. Title V Block Grant, Delaware Division of Public Health, Maternal and Child Health Bureau. http://fluoridealert.org/wp-content/uploads/de-2013-b.pdf No mention of dental fluorosis.</p>
Delaware	<p>2014. Delaware Oral Health Plan 2014. Goals and Objectives. Delaware Health and Social Services, Bureau of Oral Health and Dental Services. June 5. http://fluoridealert.org/wp-content/uploads/de-2014.pdf No mention of dental fluorosis.</p>
District of Columbia	<p>2006. Behavioral Risk Factor Surveillance System (BRFSS) 2006 Annual Report. Government of the District of Columbia, Department of Health, Center for Policy, Planning and Epidemiology. "The BRFSS is conducted for the District of Columbia Department of Health, with funding and guidance provided by the CDC of the U.S. Public Health Service." http://www.fluoridealert.org/wp-content/uploads/dc.2006.pdf No mention of dental fluorosis.</p>
District of Columbia	<p>2007. Issue Brief: Oral Health is Critical to the School Readiness of Children in Washington, DC. By Altarum Institute and funded by Maternal and Child Health Bureau, Health Resources and Services Administration, U.S. Department of Health and Human</p>

	<p>Services. http://www.fluoridealert.org/wp-content/uploads/dc-2007.pdf No mention of dental fluorosis.</p>
Florida	<p>2013. Florida Oral Health Metrics. A Florida Public Health Institute Report. Report prepared by the Urban Health Solutions Research and Writing Team (Bello L, Dye M, Garces A, Rovira I, McCabe B). This report was made possible with generous support from the DentaQuest Foundation. http://fluoridealert.org/wp-content/uploads/fl-2013.pdf No mention of dental fluorosis.</p>
Florida	<p>Undated (after 2012). Statewide Oral Health Surveillance Program: The Third Grade Basic Screening Survey. By D. Solovan-Gleason, Florida Department of Health. http://fluoridealert.org/wp-content/uploads/fl-statewide-third-graders.pdf No mention of dental fluorosis.</p>
Georgia	<p>2006. Oral Health of Georgia’s Children. Results from the 2005 Third Grade Oral Health Survey. By the Georgia Department of Human Resources. April. Funding was provided through the Health Resources and Services Administration, States Oral Health Collaborative Systems Grant, Georgia’s Access to Dental Services Grant/GADS III http://fluoridealert.org/wp-content/uploads/ga-2006.pdf No mention of dental fluorosis.</p>
Georgia	<p>2007. Status of Oral Health in Georgia, 2007. Summary of Oral Health Data Collected in Georgia. Authors: Levin E, Kanny D, Duval T, Koskela L. Georgia Department of Human Resources. November. Publication Number: DPH07.155WH. http://fluoridealert.org/wp-content/uploads/ga-2007.pdf No mention of dental fluorosis. < WHITE SPOT LESIONS MENTIONED: "20% of 2 to 5 year old Georgia Head Start children surveyed have white spot lesions." "White Spot Lesions (WSL) – Considers only the six maxillary anterior (upper front) teeth and is defined as white spots found only at the cervical 1/3 of the tooth, with or without a break in the enamel surface, and with or without brown staining. The presence of WSL identifies a child as being “at risk for Early Childhood Caries (ECC)”</p>
Georgia	<p>2012. Georgia’s Oral Health Plan. Georgia Oral Health Coalition, Division of Health Promotion, Maternal and Child Health Section, Oral Health Prevention Program. This effort was made possible in part by funding from Centers for Disease Control and Prevention, Division of Oral Health, Oral Health Prevention Infrastructure Cooperative Agreement. http://fluoridealert.org/wp-content/uploads/ga-2012.pdf No mention of dental fluorosis.</p>
Hawaii	<p>2001. Oral Health 2001: A strategic Plan for Oral Health in Hawai’i. Produced by Hawai’i Primary Care Association. The Frear Eleemosynary Trust, the McInerney Foundation, and the G.N. Wilcox Trust, provided funds to support the planning process and production of this document. http://fluoridealert.org/wp-content/uploads/hi-2001.pdf No mention of dental fluorosis.</p>
Hawaii	<p>Undated. Hawaii Community Focus Groups Determine Priorities for Oral Health Research. By Harrigan R, DeCambra H, Easa D, Strauss R, Greer M, Beck J. http://fluoridealert.org/wp-content/uploads/hi-undated.harrigan.et_al_.pdf Acknowledgments: This investigation/manuscript/etc. was supported by a NIDCR R-21 award (DE15020-01) “A Study of Oral Health Disparities in Adult Asian & Pacific Islanders” and a Research Centers in Minority Institutions (NCRR) award, P20 RR11091, from the National Institutes of Health. No mention of dental fluorosis. <i>Note from Fluoride Action Network: Hawaii is a series of volcanic islands. On the Big</i></p>

	Island volcanic smog (VOG) is a major issue. Off-gassing chemicals of greatest concern include hydrogen fluoride, a source for exposure for children to dental fluorosis.
Hawaii	2014. Oral Health Surveillance in Hawaii, 2014. Presented by Donald Hayes, MD, MPH, CDC Assigned Epidemiologist, Hawaii Department of Health, Family Services Division. October 2. http://fluoridealert.org/wp-content/uploads/hi-2014.pdf No mention of dental fluorosis.
Idaho	2008. Idaho Oral Health Plan 2008-2013. The Idaho Department of Health and Welfare. http://fluoridealert.org/wp-content/uploads/id-2008a.pdf No mention of dental fluorosis.
Idaho	2014. Idaho Smile Survey. 2013 Report. Prepared by Ward Ballard, Research Analyst, Principal. Idaho Department of Health & Welfare. This report was supported by the Maternal and Child Health Block Grant and the Cooperative Agreement 1U58DP004914-01 from the Centers for Disease Control and Prevention. http://fluoridealert.org/wp-content/uploads/id-2014.pdf * FLUOROSIS is mentioned on pages 2, 12, 13, 20 • The rate for severe fluorosis (teeth show brown spots or pitting) was 0.1 percent for 2013 for all third-grade students • Percent of Idaho Third-Grade Students with Fluorosis, 2001-2013: 2001: 8.7 % 2005: 11.4% 2009: 7.8% 2013: 5.8%
Illinois	2001 or 2002. Proceedings of the Illinois Oral Health Summit and the Illinois Oral Health Plan. Illinois' response to the U.S. Surgeon General's report: Oral Health in America. Partial funding to support the Illinois Oral Health Summit was provided by The federal Health Resources and Services Administration and The Association of State and Territorial Dental Directors. http://fluoridealert.org/wp-content/uploads/il-2001.pdf No mention of dental fluorosis.
Illinois	2007. CSHCN Oral Health Report. Illinois IFLOSS Coalition. http://fluoridealert.org/wp-content/uploads/il-2007.pdf No mention of dental fluorosis.
Illinois	2007. Oral Health Care in Illinois. The Illinois Oral Health Plan II. Spring. A compendium of information presented to the Illinois public by IFLOSS. http://fluoridealert.org/wp-content/uploads/il-2007-c.pdf No mention of dental fluorosis.
Illinois	2007. Illinois Oral Health Surveillance System (IOHSS). By Sangeeta Wadhavan, BDS, MPH, Oral Health Epidemiologist, Illinois Department of Public Health. NOHC 2007. http://fluoridealert.org/wp-content/uploads/il-2007-b.pdf No mention of dental fluorosis.
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	<p>Fluoride supplements (page 34): "It is recommended that the risk of tooth decay should be weighted before issuing a prescription for these supplements in children younger than 6 years of age because these supplements also increase the risk of enamel fluorosis."</p> <p>Fluoride mouth rinse (page 34)"Children under 6 years old are not recommended to use it without the prescription of a dentist because of the risk of enamel fluorosis as they tend to swallow it more often than adults."</p> <p>Fluoride gel and foam (page 34): "These are usually applied in dental offices and pose less of a threat for fluorosis in children younger than six because of the big intervals in between the applications... Fluoride varnish has a fluoride concentration of 22,600 ppm..."</p>
Louisiana	<p>2011. Bright Smiles for Bright Futures. Basic Screening Survey. By Rishu Garg, MD, MPH, A Report of the Oral Health Status of Louisiana's Third Grade Children. http://fluoridealert.org/wp-content/uploads/la-2011.pdf No mention of dental fluorosis.</p>
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	* ONLY MENTION OF DENTAL FLUOROSIS IS ONE REFERENCE CITATION.
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	<p>http://fluoridealert.org/wp-content/uploads/nd-2005.pdf No mention of dental fluorosis.</p>
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Ohio	<p>2013. Oral Health Section 2013 Plan. Ohio Department of Health. http://fluoridealert.org/wp-content/uploads/oh-2013.pdf No mention of dental fluorosis.</p>
Ohio	<p>2014. Ohio Oral Health Surveillance Plan, 2014-2018. Ohio Department of Health. February 1. http://fluoridealert.org/wp-content/uploads/oh-2014.pdf No mention of dental fluorosis.</p>
Oklahoma	<p>2009. Governors Task Force on Children and Oral Health. August. http://fluoridealert.org/wp-content/uploads/ok-2009.pdf No mention of dental fluorosis.</p>
Oklahoma	<p>2013. Oklahoma Oral Health Needs Assessment 2013. Third Grade Children. By the Oklahoma State Department of Health, Dental Health Service. http://fluoridealert.org/wp-content/uploads/ok-2013.pdf No mention of dental fluorosis.</p>
Oregon	<p>2014. Oregon Oral Health Surveillance System 2002-2014. By the Oregon Health Authority, Public Health Division, Oral Health Program. http://fluoridealert.org/wp-content/uploads/or-2014.pdf No mention of dental fluorosis.</p>
Oregon	<p>2014. Strategic Plan for Oral Health in Oregon: 2014-2020. Oregon Oral Health Coalition, Oregon Health Authority, Oregon Health Funders Collaborative. http://fluoridealert.org/wp-content/uploads/or-2014-b.pdf No mention of dental fluorosis.</p>
Pennsylvania	<p>2002. Oral Health Strategic Plan for Pennsylvania. Commonwealth of Pennsylvania Department of Health. November 2002. http://fluoridealert.org/wp-content/uploads/pa-2002.pdf No mention of dental fluorosis.</p>
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South Carolina	<p>2008. South Carolina State Oral Health Plan. Update May 26, 2008. http://fluoridealert.org/wp-content/uploads/sc-2008.pdf No mention of dental fluorosis.</p>

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Tennessee	<p>2010. Tennessee Smiles: The UT Grassroots Oral Health Outreach Initiative. By Lewis MW, Wasson W, Scarbecz M, Aubertin MA, Woods M, Himel VT. Journal of the Tennessee Dental Association. 91-4. <ul style="list-style-type: none"> • See reference 67 http://fluoridealert.org/wp-content/uploads/tn-2010.pdf No mention of dental fluorosis.</p>
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Utah	<p>2012. Utah's Plan of Action to Promote Oral Health. A Public-Private Partnership, Utah Oral Health Coalition. December 20. http://fluoridealert.org/wp-content/uploads/ut-2012.pdf No mention of dental fluorosis.</p>
Vermont	<p>2014. Vermont Oral Health Plan 2014. By the Vermont Department of Health. http://fluoridealert.org/wp-content/uploads/vt-2014.pdf No mention of dental fluorosis.</p>
Virginia	<p>2011. Oral Health in Northern Virginia. A report commissioned by the Northern Virginia Health Foundation. September 2011. http://fluoridealert.org/wp-content/uploads/va-2011.northern-va.pdf No mention of dental fluorosis.</p>
Washington	<p>2009. Washington State Collaborative Oral Health Improvement Plan 2009-2014. Washington State Oral Health Coalition. November. Acknowledgment: Federal funding from HRSA Grant T12HP10687, CFDA 93.236. http://fluoridealert.org/wp-content/uploads/wa-20091.pdf No mention of dental fluorosis.</p>
Washington	<p>2011. Smile Survey 2010. The Oral Health of Washington's Children. By the Washington State Department of Health; Delta Dental Washington Dental Service Foundation; Washington State Department of Early Learning. March. http://fluoridealert.org/wp-content/uploads/wa-2011.pdf No mention of dental fluorosis.</p> <p>◀ WHITE SPOT Lesions mentioned in Tables 7,8,9,10. WHITE SPOT LESIONS in Head Start/ECEAP Preschoolers is 20.5% WHITE SPOT: Head Start/ECEAP Preschoolers by race: 25.3%, African-American 20.7%, Minority 20.6%, White, Non-Hispanic 17.5%, Hispanic</p>

West Virginia	2010. West Virginia Oral Health Plan 2010-2015. By the West Virginia Department of Health & Human Resources. March 2010. http://fluoridealert.org/wp-content/uploads/wv-2010.pdf No mention of dental fluorosis.
Wisconsin	2012. The Health of Dane County. The Oral Health Crisis. Produced by the Public Health Madison & Dane County and the Oral Health Coalition of Dane County. May. http://fluoridealert.org/wp-content/uploads/wi-2012.dane-county.pdf No mention of dental fluorosis.
Wisconsin	2013 - Healthy Smiles / Healthy Growth. Wisconsin's Third Grade Students. By Olson M, Chaffin J, Chudy N, Yang A. The publication was made possible in part by funding from two grants from the Centers for Disease Control and Prevention. The Division of Oral Health, Cooperative Agreement DP08-802 and the Division of Nutrition, Physical Activity and Obesity Cooperative Agreement 5U58DP001494-05. http://fluoridealert.org/wp-content/uploads/wi-2013.pdf No mention of dental fluorosis.
Wisconsin	2013b. Wisconsin's Roadmap to Improving Oral Health 2013-2018. Wisconsin Oral Health Coalition. This publication was made possible in part by funding from the Centers for Disease Control and Prevention, Division of Oral Health, Cooperative Agreement DP08-802. http://fluoridealert.org/wp-content/uploads/wi-2013b.pdf No mention of dental fluorosis.
Wyoming	2010. Oral Health in Wyoming. Final Report. Wyoming Department of Health. http://fluoridealert.org/wp-content/uploads/wy-2010.pdf No mention of dental fluorosis.

APPENDIX F

Pro-Fluoridation groups have also ignored dental fluorosis

The Pew foundation has probably been the most active foundation in promoting community water fluoridation since 2008 by setting up health care coalitions across the country to vigorously support fluoridation. According to Pew's main fluoridation campaigner, Matt Jacob (2012), Pew's outreach to states for community water fluoridation (CWF) included the following:

- Arkansas: "Funded a poll and offered other assistance to pass a state mandate in 2011."
 - California: "Provided assistance to a successful campaign to secure CWF in San Jose."
 - Kansas: "Assisted oral health advocates in Wichita pass a fluoridation policy."
 - Mississippi: "Provided message training for oral health field staff."
 - Montana: "Assisted successful effort to preserve CWF in the city of Bozeman."
 - New Hampshire: "Helped defeat a statewide ban on CWF."
 - Oregon: "Offering funds and research for a campaign [referendum] in Portland."
 - Wisconsin: "Provided research and technical assistance to preserve CWF in Milwaukee."
- In May 2011, **The Pew Center on the States**, a major funder of pro-fluoridation groups, published **The State of Children's Health: Making Coverage Matter** (Pew, 2011, <http://fluoridealert.org/wp-content/uploads/pew-2011.pdf>). There is no discussion of dental fluorosis in this report.
 - In July 2015, a report titled, **Fluoridation Advocacy: Pew's Contributions and Lessons that Emerge** (http://fluoridealert.org/wp-content/uploads/pew.julye_2015.pdf) contained one citation on fluorosis (page 3) that came from the CDC's "[FAQs for Dental Fluorosis](#)." The Pew Charitable Trusts commissioned the **Children's Dental Health Project (CDHP)** to prepare this report. CDHP funders include the CDC, DHHS, Colgate Palmolive and the W.K. Kellogg Foundation. An individual from the American Dental Association is on its board. There was one citation to African Americans (page 15): "To build this consensus [for working on a referendum for fluoridation], Upstream formed a diverse coalition of Portland organizations called Healthy Kids, Healthy Portland (HKHP). The coalition included the **African Women's Coalition**, the Asian Pacific American Network of Oregon, Familias en Acción, Kaiser Permanente Northwest, Lutheran Community Services and the Oregon Business Association. (See below, *Portland, Oregon: Money given to minority groups to support fluoridation*)
 - On the **Children's Dental Health Project (CDHP)** website (<https://www.cdhp.org/>) a search for "fluorosis" had two hits:
 - April 27, 2015: "... The updated level for fluoride is expected to help reduce enamel fluorosis. Fluorosis is a change in the appearance of tooth enamel that does *not* affect the health or function of the teeth. [In 2006 the NRCn 2006 report stated that severe dental fluorosis was an adverse health effect.] Typically, fluorosis in the U.S. is a mild, cosmetic condition that leaves faint, white spots or streaks on the surface of teeth. The effect is subtle, which is why many people with fluorosis don't even notice it; it often takes a dental professional to recognize it..." https://www.cdhp.org/blog/316e_hhse_updatee_fluoridee_level

- January 10, 2011: Quote from Burton Edelstein, President of CDHP, “In no way does this adjustment mean that public health authorities are backing off of their commitment to fluoridating water” said Edelstein. “In fact, capping water levels at the newly recommended level (0.7 parts per million) is the best way to meet children’s needs while also reducing the chance that a child will develop fluorosis. Edelstein added that “Parents can take steps to limit the chance of fluorosis from toothpaste by supervising tooth brushing.”
https://www.cdhp.org/resources/219e_public_health_official_reconfirm_value_of_water_fluoridation_while_adjusting_recommended_levels

- On Pew’s website (<http://www.pewtrusts.org/en/projects/childrens-dental-policy>)

Children’s Dental Policy, a search for fluorosis gets 2 hits:

-- **Quote from Bill Maas, Advisor, Pew Children's Dental Campaign (and former Director of the Division of Oral Health at the CDC):** “Opponents have also raised concerns about community water fluoridation leading to severe cases of dental fluorosis. Fluorosis is a change in appearance of the tooth’s enamel. Nearly all fluorosis in the U.S. is not harmful and results in white streaks on the teeth that are barely noticeable. Severe fluorosis can cause enamel damage and brown spots, but that problem is rare in our country, afflicting only people on private well water.” -
<http://www.pewtrusts.org/en/research-and-analysis/q-and-a/2011/12/08/bill-maas-water-fluoridation>

-- **FAQ’s:** Q. What is dental fluorosis? Dental fluorosis is a change in the appearance of tooth enamel that occurs when someone is exposed to too much fluoride. In the U.S., fluorosis is typically a minor discoloration of teeth that is usually visible only to a dentist. It does not cause pain, and it does not affect the health or function of the teeth. The new HHS recommendation reflects the fact that Americans today receive fluoride from more sources (toothpaste, mouth rinses, and other products) than they were getting several decades ago. In 2006, the National Research Council examined water sources with a range of naturally occurring fluoride levels and found that severe fluorosis virtually never occurs in levels below 2 parts per million. Public water systems fluoridate at a concentration that’s well below that level. -
<http://www.pewtrusts.org/en/research-and-analysis/q-and-a/2011/11/11/water-fluoridation-frequently-asked-questions>

- In the Pew sponsored **Campaign for Dental Health** website <http://ilikemyteeth.org/> , there were two “hits” for African Americans:

A 2012 citation to a \$9 million grant to the UCLA School of dentistry to give access to the city’s Latino and African American children (birth to 5 years). -
<http://ilikemyteeth.org/million-dollar-grant-aims-increase-dental-care-access-las-youngest/>

-- Another 2012 citation noting, “U.S. National Health Interview Surveys from 1964 to 2010 showed that the once blatant racial gap in kid’s dental care has been eliminated... African-American kids still have higher rates of cavities, and

there are still children of all races who do not have access to dental care.” - <http://ilikemyteeth.org/children-race-dentist/>

There is no mention on the websites of the **Children’s Dental Health Project**, the **Children’s Dental Policy** or Pew’s **Campaign for Dental Health** of another neurotoxin that children are exposed to: **mercury in dental amalgams**. The FDA defines them as, “is a mixture of metals, consisting of liquid (elemental) mercury and a powdered alloy composed of silver, tin, and copper. Approximately 50% of dental amalgam is elemental mercury by weight.” - <http://www.fda.gov/MedicalDevices/ProductsandMedicalProcedures/DentalProducts/DentalAmalgam/ucm171094.htm>

APPENDIX G

Civil Rights Leaders have begun to mobilize to end fluoridation's threat to minority communities

This section contains the following:

May 21, 2015. **Letter from William Owens, Coalition of African American Pastors**, to Rep. Barry Loudermilk, Chairman, House Subcommittee on Oversight / Science, Space, & Technology Committee, Washington, DC.

<http://fluoridealert.org/wp-content/uploads/owens-may.11.2015.pdf>

November 11, 2014. Resolution of the Santa Rosa-Sonoma County NAACP Opposing Fluoridation of Our Public Water Supply.

http://fluoridealert.org/wp-content/uploads/sonoma.calif._naacp._nov-2014.pdf

April 17, 2013. Portland NAACP Opposes fluoridation.

<http://fluoridealert.org/news/portland-naacp-opposes-fluoridation/>

July 1, 2011. **Civil Rights Violation Regarding Forced Medication.** Resolution of the League of United Latin American Citizens.

http://lulac.org/advocacy/resolutions/2011/resolution_Civil_Rights_Violation_Regarding_Forced_Medication/

June 22, 2011. **Another King family member speaks out as Fluoridegate scandal builds in Atlanta.**

<http://fluoridealert.org/news/another-king-family-member-speaks-out-as-fluoridegate-scandal-builds-in-atlanta/>

April 6, 2011. Letter from Matt Young, DDS, President, International Academy of Oral Medicine and Toxicology, to Thomas Frieden, MD, MPH, Director, Centers for Disease Control and Prevention, Atlanta, GA.

<http://fluoridealert.org/wp-content/uploads/iaomt-letter-to-cdc-april.6.2011.pdf>

March 29, 2011. Letter from Andrew Young to Chip Rogers, Senate Majority Leader, Georgia State Capitol, Atlanta, GA.

<http://fluoridealert.org/wp-content/uploads/young-andrew.letter-march.29.2011.pdf>

March 9, 2011. Letter from Dr. Gerald L. Durley, Pastor, Providence Baptist Church, to Senator Chip Rogers, Senate Majority Leader, Georgia State Capital, Atlanta. **Re: Repeal of Georgia's Mandatory Fluoridation Law.**

http://fluoridealert.org/wp-content/uploads/durley_2011.pdf

APPENDIX H

On January 7, 2011, the U.S. Department of Health and Human Services (HHS) announced its recommendation to reduce the level of fluoride added to drinking water based on national survey data showing that 41% of American adolescents (ages 12-15) now have dental fluorosis (a tooth defect caused by excess fluoride consumption during childhood). On January 13, 2011, the HHS published a Federal Register notice proposing to reduce the recommended fluoride level from the existing range of 0.7 to 1.2 parts per million (ppm) to 0.7 ppm. HHS solicited public comments on their recommendation. The Fluoride Action Network's submission to HHS is reproduced in full below. Over 18,000 emails were sent to HHS in support of FAN's submission.

Fluoride Action Network
February 4, 2011

To HHS and Honorable Secretary Sebelius

In response to your request for comments on the recent change in your recommended level of fluoride added to community drinking water, I respectfully submit the following points supporting the stance that a reduction in fluoride levels is not sufficient, and that the United States should follow the approach of western Europe and end water fluoridation completely:

- **Fluoride is not a nutrient, nor is it essential for healthy teeth.** No study has ever revealed a diseased state resulting from lack of fluoride, including dental caries. (1,2) No American is, or ever was, "fluoride deficient."
- **Using the water supply to mass medicate the population is unethical.** The public water supply should not be used as a drug-delivery system without regard for an individual's age, weight, health status, or knowledge of how fluoride will interact with other drugs they are taking. No informed consent is requested or given, and no medical follow-up is offered.
- **The benefit and safety of ingested fluoride has never been proved by accepted medical standards.** The HHS has failed to inform the public that there is not a single randomized controlled trial (the gold standard of medical research) that demonstrates the effectiveness of water fluoridation. (3) HHS has also failed to inform the public that the Food and Drug Administration has never studied, or approved, the safety of fluoride supplements and continues to classify all fluoride supplements as "unapproved new drugs." (4, 5) Lastly, HHS has failed to inform the public that tooth decay rates have declined at the same general rate in all western, industrialized countries, irrespective of water fluoridation status. (6)
- **Any benefits of fluoride are primarily topical, not systemic.** The CDC has acknowledged this for over a decade (7). The Iowa Fluoride Study, funded by HHS, has reported little, if any, relationship between individual fluoride intake and caries experience. According to the study (the largest of its kind): "achieving a caries-free status may have relatively little to do with fluoride intake, while fluorosis is clearly more dependent on fluoride intake." (8)
- **Americans will still be over-exposed to fluoride at 0.7 ppm.** According to EPA's recent documents "it is likely that most children, even those that live in fluoridated communities, can be over-exposed to fluoride at least occasionally. (9) At present, nearly 41% of American adolescents aged 12-15 have some form of dental fluorosis (10), an outwardly visible sign of fluoride toxicity. Reducing the fluoride levels to 0.7 ppm will *not* remedy this problem as national statistics clearly show that dental fluorosis remains significantly elevated at 0.7 ppm. (11)

Drinking water is just one source of ingested fluoride; others include foods, beverages, dental products and supplements, pesticides and pharmaceuticals. For communities that practice artificial water fluoridation, this is the easiest source of fluoride to remove.

- **Infants will not be protected.** Infants fed formula made with fluoridated tap water—at the reduced level of 0.7 ppm—will still receive up to 175 times more fluoride than a breast-fed infant. In their supporting documents, EPA has not calculated the risks to the bottle-fed infant. In fact, infants from birth to six months of age were completely excluded from any consideration by EPA, despite HHS’s own admission that “The period of possible risk for fluorosis in the permanent teeth...extends from about birth through 8 years of age.” (12) As the most susceptible subpopulation, the potential for long-term, irreparable damage to developing infants must be seriously considered, and should extend beyond just their teeth.
- **African-American children and low-income children will not be protected.** HHS’s reference (p. 2386) to the study by Sohn et al. (13) failed to mention that African-American and low-income children were found to consume significantly more total fluids and plain water, and thus receive more fluoride from drinking water, than white or higher-income children. African-Americans have been shown to have an increased risk of developing dental fluorosis, and are at higher risk for suffering from the more severe forms of this condition. (14) Despite receiving high intakes of fluoride, low-income and minority children living in fluoridated communities continue to suffer from rampant and severe dental decay (15-18)—undermining the common premise that fluoridation will prevent these problems. Additionally, low-income children have a greater risk for suffering from all forms of fluoride toxicity, as poor diet exacerbates the detrimental effects of fluoride. This is clearly, therefore, an environmental justice issue.
- **HHS has failed to consider fluoride’s impact on the brain.** Over 100 animal studies have observed fluoride-induced brain damage (19), 24 human studies have reported lowered IQ in children exposed to various levels of fluoride (20), and at least 6 other studies have found non-IQ neurological effects such as impaired visuo-spatial organization. (21-26) One study of 500 children in China observed reduced IQ at a water fluoride level of 1.9 ppm (27, 28) and another reported a reduction in IQ at even lower (mean=1.3 ppm) water fluoride levels. (29) HHS’s new recommendation of 0.7 ppm offers no adequate margin of safety to protect all of our children, including those with iodine deficiencies (30-32), from experiencing similar neurological damage.
- **HHS has failed to consider fluoride as an endocrine disruptor.** The 2006 NRC report (33) states that fluoride is an endocrine disruptor, and even at low levels can be detrimental to the thyroid gland. Pre- and post-natal babies, people with kidney disease, and above-average water drinkers (including diabetics and lactating women) are especially susceptible to the endocrine disrupting effects of fluoride in drinking water.
- **HHS has failed to consider or investigate current rates of skeletal fluorosis in the U.S.** According to EPA’s supporting document (34), there is a general lack of information on the prevalence of stage II skeletal fluorosis in the U.S. Yet, many of the symptoms of stage II skeletal fluorosis (e.g. sporadic pain, stiffness of the joints) are identical to arthritis (35-40), which affects at least 46 million Americans. People with renal insufficiency are known to be at an elevated risk for developing skeletal fluorosis (33), as crippling stage III skeletal fluorosis with renal deficiency has been documented in the U.S. at water fluoride levels as low as 1.7 ppm. (41) Since skeletal fluorosis in kidney patients has been detected in small case studies, it is likely that systematic studies would detect skeletal fluorosis at even lower fluoride levels.
- **HHS has failed to consider fluoride as a potential carcinogen.** Bassin et al. (42) reported a significantly elevated risk of osteosarcoma in boys living in fluoridated communities, and thus

fluoride may be a carcinogen. Chester Douglass, who has serious conflicts-of-interest concerning fluoride research, has stated that a subsequent study will refute these findings (43), but no publication has appeared in the five years since he made this claim. As EPA has still not completed carcinogenicity testing for fluoride, HHS should not support the addition of a potential carcinogen to our drinking water.

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- **HHS has failed to confirm the safety of silicofluorides.** Despite being used in more than 90% of artificial water fluoridation schemes, no chronic toxicity testing of silicofluorides has ever been completed: "No short-term or subchronic exposure, chronic exposure, cytotoxicity, reproductive toxicity, teratology, carcinogenicity, or initiation/promotion studies were available" for the toxicological summary for silicofluorides, as prepared for the National Institute of Environmental Health Sciences. (44) However, recent epidemiological research has found an association between the use of silicofluoride-treated community water and increased blood lead concentrations in children (45) – a link that is consistent with recent laboratory findings. (46) HHS has failed to inform the American public that the fluoridating agent used in drinking water is a hazardous waste product from the phosphate fertilizer industry, and can be laced with arsenic and radionuclides, (47, 48) which are known carcinogens. HHS should not support the addition of a non-tested substance to our drinking water.

Most of the arguments listed above are covered in far more detail in the recently published book "The Case Against Fluoride" by Connett, Beck and Micklem (Chelsea Green, 2010). We urge director Sebelius to appoint a group of experts from HHS, who have not been involved in promoting fluoridation, to provide a fully documented scientific response to the arguments and evidence presented in this book. Were director Sebelius to do this we strongly believe that neither she nor these experts will want to see the practice of water fluoridation continue. The practice is unnecessary, unethical and hitherto the benefits have been wildly exaggerated and the risks minimized. A scientific response to this book from a HHS team would allow the public to judge the cases both for and against fluoridation on their scientific and ethical merits.

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APPENDIX I

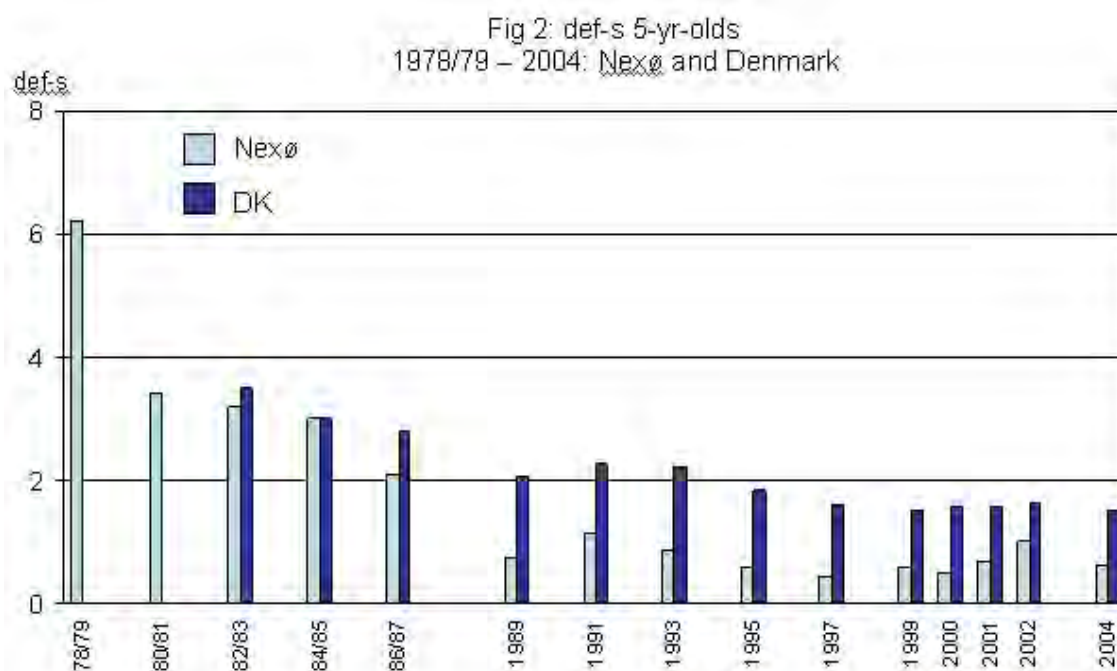
The Nexø Method

Some information from:

<http://www.nexodent.com>

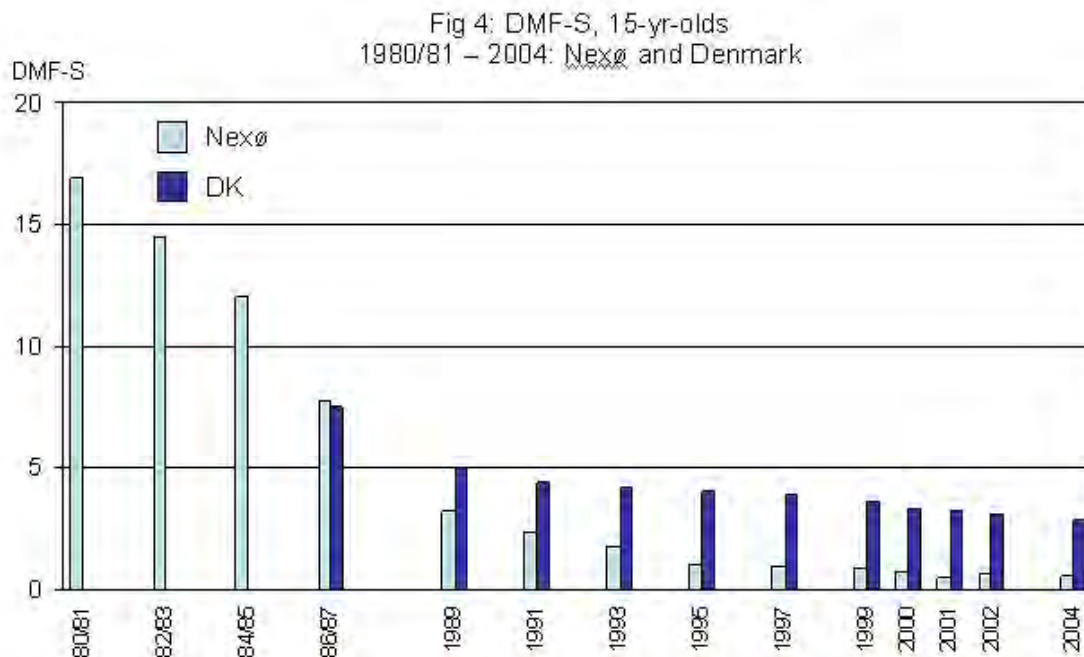
This public health dental program is based on similar principles as the ChildSmile system in Scotland, but is more comprehensive. It was developed in Denmark, with the initial trial in a community named Nexø. The results were so dramatic in rapidly lowering caries rates that the method has been extended to other communities in Denmark and other countries. Today, Denmark has the lowest childhood caries rates in the developed world according to WHO data [WHO 2015], and Denmark has never been fluoridated.

The caries rates over time in Nexø compared to those in the rest of Denmark which was not using Nexø Method, are shown in the graphs below. The first period 1978-1979 was the baseline period before the Nexø program began. The first graph is for primary teeth, dmfs:



<http://www.nexodent.com/2a.jpg>

For permanent teeth in 15 year olds, DMFS:



<http://www.nexodent.com/4.jpg>

When compared to the primary teeth, the permanent teeth took several years before the reduction in caries caught up to the Denmark level. Nexø started out as a high caries area, because it had relatively low SES compared to the rest of Denmark. The slower rate of improvement is likely because the children were already almost 15 years old when the program started. However, by 1995, by which time the 15 year olds had continuous exposure to the method since infancy, the benefit was already very dramatic. The DMFS rate was only 1.03 in Nexø compared to 4.01 in Denmark, for a 400% lowering. The largest difference ever claimed by water fluoridation has been about 70%, and today the claim is typically a 25% lowering of DMFS rates. By 2004 the rate in Nexø was just 0.56 compared to 2.85 in the rest of Denmark, a 500% reduction. These rates are all measures of decay by tooth surface (“S” for surfaces), not “T” for entire tooth, so they are higher than a tooth score.

The success of the Nexø Method has been documented in peer-reviewed scientific papers, both in Denmark and in other countries where it has been tried [Ekstrand 2005].

Here is the brief summary of the Nexø method itself:

A dental health care program based on individualized non-operative caries treatment of children and adolescents aged 0-18. The aim of the program is to maintain sound teeth using the fewest resources possible.

The treatment program is based on 3 principles - dosed at individually assessed recalls according to diagnosis and risk assessment:

1. Education of parents, children and adolescents in understanding Dental caries as a localized disease.
2. Intensive training in home-based plaque control.
3. Early professional non-operative intervention.

All parents and children in a community are given free oral hygiene training starting at 8 months age and continuing frequently through age 18. Parents and children are shown how to do proper oral hygiene and are checked to see how they are doing at each visit. If oral hygiene is not adequate or any caries starts developing, the next visit is scheduled sooner. Topical fluoride is given only if oral hygiene is not adequate or caries starts developing. Systemic fluorides are never considered. Even sealants are avoided because they are considered less effective than proper oral hygiene.

If any fillings or dental work is required, they are provided in a timely manner.

The program gets parents and children receiving frequent oral health visits throughout childhood. Dental auxiliaries perform most of the work rather than dentists to save expense.

The economics of the Nexø Method have also been examined using careful scientific and economic analyses [Ekstrand 2005, Vermaire 2013]. They found that the dramatic reduction in caries requiring treatment outweighs any additional cost for more frequent prevention visits. This net economic long-term benefit was found even in the context of an area like Denmark that has relatively low caries rate. For areas with high caries rates, due to low socio-economic status for example, the economic benefit would likely be higher.

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LEAGUE *of* UNITED LATIN
AMERICAN CITIZENS

Civil Rights Violation Regarding Forced Medication

WHEREAS, the League of United Latin American Citizens is this nation's oldest and largest Latino organization, founded in Corpus Christi, Texas on February 17, 1929; and

WHEREAS, LULAC throughout its history has committed itself to the principles that Latinos have equal access to opportunities in employment, education, housing and healthcare; and

WHEREAS, LULAC advocates for the well-being of, but not exclusively of, Hispanics throughout our country; and

WHEREAS, safe drinking water is a necessity for life; and

WHEREAS, the purpose of a public water supply is to supply water to the entire community which is composed of people with varying health conditions, in varying stages of life, and of varying economic status; not to forcibly mass medicate the population which is a civil rights violation; and

WHEREAS, fluoridation is mass medication of the public through the public water supply; and

WHEREAS, current science shows that fluoridation chemicals pose increased risk to sensitive subpopulations, including infants, the elderly, diabetics, kidney patients, and people with poor nutritional status; and

WHEREAS, minority communities are more highly impacted by fluorides as they historically experience more diabetes and kidney disease; and

WHEREAS, minorities are disproportionately harmed by fluorides as documented by increased rates of dental fluorosis (disfiguration and discoloration of the teeth); and

WHEREAS, the National Research Council in 2006 established that there are large gaps in the research on fluoride's effects on the whole body; a fact that contradicts previous assurances made by public health officials and by elected officials, that fluorides and fluoridation have been exhaustively researched; and

WHEREAS, a growing number of cities and health professionals have rejected fluoridation based on current science and the recognition of a person's right to choose what goes into his/her body; and

WHEREAS, the CDC now recommends that non-fluoridated water be used for infant formula (if parents want to avoid dental fluorosis – a permanent mottling and staining of teeth), which creates an economic hardship for large numbers of families, minority and otherwise; and

WHEREAS, the League of United Latin American Citizens (LULAC), founded in 1929, has historically been a champion of the disenfranchised and a leader in the fight for social and environmental justice; and

WHEREAS, City Council Districts I-6 of San Antonio (predominantly minority districts) voted overwhelmingly that the public water supply should not be contaminated with fluoridation chemicals; and

WHEREAS, the election to fluoridate the water, essentially disenfranchised the right of these minority Districts to safe drinking water for all; and

WHEREAS, the U.S. Health and Human Services and the EPA (January 2011) have recently affirmed the NRC Study results that citizens may be ingesting too much fluoride and that the exposure is primarily from drinking water; and

WHEREAS, the proponents of fluoridation promised a safe and effective dental health additive, but the San Antonio Water System's (SAWS) contract for fluoridation chemicals proves a "bait and switch"; as SAWS is adding the toxic waste by-product of the phosphate fertilizer industry, that has no warranty for its safety and effectiveness for any purpose from the supplier (PENCCO, Inc.) or the source (Mosaic Chemical); and

THEREFORE, BE IT RESOLVED, that LULAC commends efforts by organizations that oppose forced mass medication of the public drinking supplies using fluorides that are industrial grade, toxic waste by-products which contain contaminants (arsenic, lead, mercury) which further endanger life; and

BE IT FURTHER RESOLVED, that LULAC supports efforts by all citizens working to stop forced medication through the public water system because it violates civil rights; and

BE IT FURTHER RESOLVED, that LULAC opposes the public policy of fluoridation because it fails to meet legislative intent; and

BE IT FURTHER RESOLVED, that LULAC demands to know why government agencies entrusted with protecting the public health are more protective of the policy of fluoridation than they are of public health.

Approved this 1st day of July 2011.

Margaret Moran
LULAC National President

Good evening. I am John Mueller, activist, and retired public works engineer, now living in Guthrie, Oklahoma, and with respect to these public meetings, as they say, “this is not my first rodeo”. (But it really is for this hybrid meeting.) So, thank you again, NEJAC, WHEJAC and Richard Moore if you’re still there, and EPA for this ongoing opportunity to share more insight and perspective for a rare and time-sensitive challenge and opportunity. And thank you Matt and Marianne for your dynamic and motivating service. You are truly an inspiration in these transformative times.

My argument again today is about water fluoridation, a well-documented environmental justice problem, and that ending the practice is a challenge that falls well within the scope of the just released report, EPA’s Fiscal Year 2023 Top Management Challenges, by the Office of Inspector General. The challenge is how to end water fluoridation and manage the widespread pushback from the special interest stakeholders; pushback from the ADA and traditional dentistry; pushback from the fluoridation chemical suppliers; and the pushback from dentists of a pro-fluoridation consortium with narratives that typically include false statements about the science, and in a press release just last week, even denigrating the esteemed authority and integrity of the National Toxicology Program for NTP’s review of fluoride science; a virtual ad hominem attack on our eminently respected NTP.

But by the divine blessings of these virtual public meetings and President Biden’s executive orders and initiatives for scientific integrity and EJ, you are receiving the information you need about the harmful effects of fluoride ingestion and its environmental injustice. I’ll be submitting additional materials directly to the docket, as I know others are doing to support this solution, so I’ll go now to my main point:

EPA and CDC, the time is now, and the opportunity is glaring at you, to do what the taxpayers pay you to do to protect public health. Administrator Regan must turn EPA’s support away from fluoridation and to supporting public health. The most readily available next step is to grant the petition in the current TSCA lawsuit to ban the addition of fluoridation chemicals to public water supplies because fluoride is confirmed to be a developmental neurotoxin.

Finally, it is a fact, that the ADA, HHS and CDC have acknowledged that the beneficial effect of fluoride for preventing tooth decay is principally from topical application of sufficient solution strength, not from ingestion, drinking, as previously believed. We don’t drink mosquito repellent. And we don’t drink sunscreen. They are applied topically to protect the skin. Fluoride use, when strong enough to have the beneficial effect, must also be restricted to being applied topically.

Thank you again for this opportunity.

443 words, about 3-1/2 minutes.

To NDWAC members and relevant EPA and CDC officials:

This statement is my basis for a condensed 3-minute oral presentation for EPA's National Drinking Water Advisory Council (NDWAC) public meeting, Wednesday November 30, 2022

Thank you for this opportunity to share important material for a rare and time-sensitive challenge. I am John Mueller, a licensed civil engineer, having practiced in the broad field of water resources engineering. I am retired after a professional career that included 25+ years with water utilities in the public sector, including wastewater and drinking water treatment plant operations and maintenance. My college degree is in geophysical engineering from the Colorado School of Mines, one of the world's premier research universities for science and engineering for developing Earth's mineral resources.

While this is my first time attending a NDWAC public meeting, I have been attending NEJAC and WHEJAC public meetings and have spoken at more than a few of them beginning with WHEJAC's inaugural meeting in March last year. Those meetings have created an unprecedented and rare opportunity under President Biden's initiatives. At those meetings I presented statements that argue the need to end water fluoridation. The time is ripe to further share the argument with EPA's decision-makers through the NDWAC. I know that other activists aspiring to help end fluoridation have also addressed the issue with the NEJAC and WHEJAC, some of them personally suffering painful physical, mental, family, and economic hardships from sensitivities to their respective fluoride exposures. Since I have some knowledge of what others may be submitting for this meeting, I'll forego references to the overwhelming science presented by others and go straight to the essence of my argument, which is the following:

EPA Administrator Michael Regan, with full authorization and justification from the initiatives created by and with Presidential EOs #13990 and #14008, can and must concede in the current TSCA lawsuit pending in the court of Judge Edward M. Chen in San Francisco, Federal District Court of the Northern District of California. The lawsuit, filed in April 2017 by plaintiffs "pursuant to TSCA, 15 U.S.C. § 2620(b)(4)," petitions EPA to institute rulemaking that will ban the addition of fluoridation chemicals to public water supplies. During the ongoing trial, the original petition, filed in November 2016, has been supplemented with additional high-quality, peer reviewed science published in reputable journals since the petition's original 2016 filing, including sources cited here in this quoted excerpt from a court filing:

"1) the trial record together with Plaintiffs' admitted exhibits and summary of the record; 2) the MIREC and ELEMENT studies; 3) the pooled BMD analysis of the MIREC and ELEMENT data; 4) the National Toxicology Program's [NTP's] revised draft monograph containing a systematic review of the fluoride literature; 5) a published statement from former NTP director Dr. Linda Birnbaum, about the 'consequential' findings of the NTP's revised monograph; 6) the facts to which the parties stipulated at trial; and 7) several orders of this Court which reject legal positions that EPA relied upon in its denial of the initial petition."

EPA declined to review the supplemental information for the plaintiffs and the court, claiming lack of resources due to other priorities.

We know the petition was initially denied by Administrator Scott Pruitt during the Trump Administration. Now, respecting President Biden's initiatives and the rare opportunities to right many wrongs, the denial under the Trump administration in 2017 can and must be reversed. Detailed justification for a proposed rulemaking

to be published in the Federal Register can be essentially bulletproofed as it is readily available in the evidence, the overwhelming weight of evidence, and expert testimony presented in the case. EPA's resource requirements to settle the case by concession would be the least of any other alternatives, especially if, in case EPA continues its scientific opposition, a ruling for the plaintiffs is left to Judge Chen with automatic opportunity for appeal, which would further delay protection of public health and would do so at significant additional cost. In that case, EPA might again claim absence of resources, and then the case goes, and on, and on, and on . . .

The most immediate issues needing acknowledgement and attention include but are not limited to the following:

THE UNFORTUNATE

- Community Water Fluoridation (CWF) had its beginnings as a scientific study in 1945 in Grand Rapids, Michigan - its purpose ostensibly to help prevent tooth decay (also known as dental caries) in children. Data in public health reports reveal it has failed miserably in achieving that objective, and instead has contributed to the problems of environmental justice issues. Attached to this email are documents acknowledging fluoridation as an environmental injustice.
- The public health issue of childhood dental caries is also reported to be at epidemic levels and rampant in the inner cities, on Tribal lands and in other areas lacking adequate professional dental care, and in populations living with poor diet and nutrition in neighborhood areas identified as grocery deserts.
- The CWF program wastefully attempts to treat everyone against tooth decay, whether needed or not, rich or poor, Black or White or in between; it claims to have achieved quantified but unverifiable rates of success that vary largely depending on who makes the claim and under what circumstances. So a dramatic paradigm shift is in order and desperately needed if the CDC hopes to achieve the longstanding and well-intentioned objective of preventing childhood tooth decay, which CWF has failed to accomplish.

THE MOST DAUNTING CONUNDRUM, INDEED!

- The functional relationship or interface of the EPA's regulatory authority with CWF is subject to the reality that the CWF program of the CDC's Division of Oral Health will come to an abrupt halt, surprising and disturbing to many, when EPA initiates rulemaking that will ban the addition of fluoridation chemicals to public water supplies, with predictable pushback from the special interests on a grand scale. Furthermore, CWF has been seen as the life-blood program of that division in the CDC. Interagency cooperation will be necessary and can be facilitated by the White House Environmental Justice Interagency Council (IAC), created by EO #14008.
- Despite the obstacles created and cultivated by the history of fealty to special interests, the EPA has this rare opportunity to take a giant leap and show more credibility of its leadership's morality, responsibility, and effectiveness in safeguarding public health. It must stop allowing fluoridation and begin the necessary rulemaking, and relegate CWF to the history books as a program which has for too long gone against the spirit and intent of the SDWA and as an egregious violation of the public trust among the exponentially growing population segment of the well-informed.

THE PATH-FORWARD SOLUTION

- After decades of promoting fluoridation as being "safe and effective" and "one of the ten greatest public health achievements of the twentieth century," the CDC and HHS will

need an out. The most effective out can be in the form of a PR strategy that shields public opinion from the guilt of contaminating our water, and forwardly channels it to the future positives of new programs that are guaranteed to be more effective at treating childhood tooth decay, with programs that can be achieved with the more technologically advanced, individualized treatment services, and with more scientifically advanced dental industry policies, practices and localized, targeted programs where needed most, along with increased Medicaid reimbursements for practicing dentistry professionals.

- The general public does not read the FR, so they will only see the positives of the newer, much more effective programs to the credit of the dental industry (ADA). But water utility managers and specialists at the AWWA do pay attention to the FR as a matter of course to ensure they stay current with regulations and recommendations. They and the other special interests will have to develop their own PR strategies similarly to advance and embolden the public trust.
- Dentistry's considerable advancements over seven decades, in knowledge and understanding of how oral health impacts a person's overall general health, should be applied where it is now needed most, as it has been with those who can afford regular check-ups and have reasonable and regular access to good diet and nutrition. Highly successful programs like Scotland's Childsmile can serve as models for CDC to develop and support with grant funding as the latest and greatest alternative to fluoridation.
- The Division of Oral Health will have an all new mission with its effectiveness having a much brighter future with staff having far greater job satisfaction from boots on the ground progress in promoting oral health. Such targeted and focused community service programs can have multiple, positive ripple effects in community economic development through improved school attendance and less time off from work needed by parents to care for sick children, along with their overall public health improvements.
- The evidence presented in the original TSCA citizens petition filed in November 2017, and additionally the scientific studies published since then, and the pending release of the NTP's report on fluoride's developmental neurotoxicity, provide all the science needed to fully justify on scientific grounds the EPA conceding in the TSCA trial and initiating the necessary rulemaking process.
- Answering the need for additional research, as was concluded in the NRC's 2006 report on fluoride in drinking water, now sixteen years later there is plenty of published scientific data necessary to inform and process the long overdue revisions to fluoride's MCLG and MCL.

Again, thank you for this opportunity to provide comment. EPA's integrity and public trust are at stake, and granting the petition to ban fluoridation can be a milestone in history to the credit of our current administration for the nation and the EPA.

Sincerely,

John Mueller
Guthrie, Oklahoma

To whom it may concern

Yonkers, New York is the third largest city in New York State with a population of over 200,000 people. It shares its border with New York City and has the dubious distinction of being the only City in America with a double desegregation order, housing and busing. The median income is \$35,000 and the city is majority minority, Hispanic and African American. It is also a melting pot with approximately 6.5 % Asian and many newly arrived immigrants from all over the world. The Municipal Housing Authority for the City of Yonkers (MHACY) own and or manages over 1700 units and administers over 5000 section 8 vouchers making it the fourth largest housing authority in New York State. MHACY properties spread across approximately 60 acres throughout Yonkers, ranging from high rise to townhomes.

Groundwork Hudson Valley is working with the Municipal Housing Authority for the City of Yonkers to address Climate change/climate resiliency at the City's municipal housing sites. Groundwork Hudson Valley and the MHACY received funds from New York State environmental facilities corporation which was leveraged to get more grant funds from the Bezos Earth Fund and Bank of America for the purpose of addressing climate resiliency at 10 of the MHACY's 17 sites.

Flooding, although not in flood zones, heat island effect and other issues have been documented and studied by Groundworks through grants from NOAA. The heat differential from the east side of Yonkers to the west side is two degrees. Southwest Yonkers has traditionally been the area where indigent families reside and the neighborhoods that are generally hotter. Groundwork was able to lay a heat map over the traditionally redlined areas and document the correlation between heat island effect and redlining. Together Groundwork and MHACY have spoken nationally at housing conferences and parks conferences on the connection between heat, health, and standardized test scores. They have also spoken about white roofs, bioswales, rain gardens and tree canopies to mitigate heat island effect and address Environmental Justice (EJ).

We have been asking anyone who is interested to reach out to us so that we may provide them with a model of what teamwork among community partners can achieve in areas with climate resiliency and EJ. As of now, we have partnered with Mayor Mike Spano, Iona University, workforce development (the green team, comprised of MHACY residents), the business council of Westchester community college and others. We urge any and everyone to please reach out to us.

Jorge Roman

Hello,

Please see the attached written comment and enclosure in connection with the National Environmental Justice Advisory Council public meeting, Docket ID EPA-HQ-OA-2022-0053. Please reach out if you have any questions.

Kara Goad

December 13, 2022

Via e-mail to nejac@epa.gov

George QE Ward, Program Manager
National Environmental Justice Advisory Council
1200 Pennsylvania Avenue, NW
Washington, DC 20406

**Re: Comments for the Public Meeting of the National Environmental Justice
Advisory Council, Docket ID EPA-HQ-OA-2022-0053**

Dear Mr. Ward,

I write in response to the National Environmental Justice Advisory Council’s request for public comments on addressing harmful air, soil, and water pollution in the United States. I urge the Council to advise the Environmental Protection Agency (“EPA”) to address pollution from concentrated animal feeding operations (“CAFOs”)—which disproportionately burdens environmental justice communities—by granting the enclosed rulemaking petition, which is aimed at increasing oversight of the largest and most-polluting CAFOs.

CAFOs are industrial operations that hold hundreds, thousands, or tens of thousands of animals in close confinement. For example, according to EPA’s regulations, a Large dairy CAFO confines at least 700 mature dairy cows, and a Large swine CAFO confines at least 2,500 pigs weighing 55 pounds or more. CAFOs generate a staggering quantity of urine and feces. In fact, a single Large CAFO can produce more waste than an entire human city. But unlike cities, CAFOs typically do not treat their waste before disposing of it, usually by spreading it on fields.

CAFOs cause extensive pollution that harms human health and the environment. CAFO waste contains numerous pollutants—including nitrogen, phosphorus, disease-causing pathogens, and pharmaceuticals—and this waste commonly enters surface water, groundwater, and drinking wells. CAFO pollution in drinking water can cause birth defects and a potentially fatal blood condition, called “blue baby syndrome,” in infants under six months of age. It can also increase risks for hyperthyroidism, insulin-dependent diabetes, bladder cancer, and ovarian cancer. CAFO water pollution also impairs opportunities for fishing, boating, and other forms of recreation.

In addition to contaminating waterways, CAFOs generate harmful air pollution. Exposure to CAFO air pollution can cause nausea, headaches, dizziness, runny nose, scratchy throat, burning eyes, coughing, wheezing, and shortness of breath. Odors from CAFO pollutants can cause tension, depression, anger, confusion, and fatigue. CAFO air pollutants and the odors they generate diminish communities’ quality of life, as they prevent families from socializing, working, and playing outdoors.

CAFOs also harbor and spread dangerous pathogens, including antibiotic-resistant bacteria, which can infect community members. And they attract pests like flies, buzzards, and coyotes.

Across the country, CAFOs disproportionately harm environmental justice communities. Indeed, decades of well-established evidence show that CAFOs are located disproportionately in communities of color, low-income communities, and rural communities. A new report, which is included as an exhibit to the rulemaking petition, builds on this evidence. The report found that in North Carolina and California's Central Valley, Large CAFOs are located disproportionately in communities of color and low-income communities. In Iowa, CAFOs burden the state's most rural areas, which are characterized by a lack of easy access to grocery stores, physicians, and hospitals. As just one example of the environmental injustice documented in the report: if Hispanic people in the Central Valley were exposed to Large dairy CAFOs at the same rate as White non-Hispanic people, then approximately 227,600 fewer Hispanic people would live within three miles of a Large dairy CAFO.

Despite causing extensive water pollution and additional harms, most Large CAFOs do not operate under Clean Water Act permits, which are required for CAFOs that discharge water pollution. EPA itself has acknowledged that many CAFOs discharge water pollution without Clean Water Act permits in violation of the Act and that CAFO pollution causes grave harms that disproportionately burden environmental justice communities. Yet, EPA and state agencies lack the resources necessary to ensure that each discharging CAFO has the required permit.

To help address this problem, Earthjustice and over 50 additional organizations submitted the enclosed rulemaking petition to EPA, asking it to adopt a rebuttable presumption that Large CAFOs using wet manure management systems—which are a particularly significant source of water pollution—actually discharge pollution and, thus, must apply for Clean Water Act permits. If granted, the presumption would require all of those Large CAFOs either to obtain permits under the Clean Water Act or to prove that they've successfully implemented protections to prevent pollution.

Not only would the petition improve compliance with the Clean Water Act, but it would also strengthen protections for water quality, increase opportunities for public participation in CAFO permitting, and improve transparency around CAFOs. As explained in detail in the petition, all of these changes would help advance the environmental justice objectives in Executive Orders 12,898 and 14,008. And they would benefit the environmental justice communities that bear the brunt of CAFO pollution. For these reasons, I urge the Council to advise EPA to grant the rulemaking petition.

Sincerely,



Kara Goad

(continued)

Earthjustice
1001 G St. NW, Suite 1000
Washington, DC 20001
(212) 823-4979
kgoad@earthjustice.org

Enclosure

December 13, 2022

George QE Ward, Program Manager
National Environmental Justice Advisory Council
1200 Pennsylvania Avenue, NW
Washington, DC 20406

**Re: Comments for the Public Meeting of the National Environmental Justice
Advisory Council, Docket ID EPA-HQ-OA-2022-0053**

Dear Mr. Ward,

I write in response to the National Environmental Justice Advisory Council's request for public comments on addressing harmful air, soil, and water pollution in the United States. I urge the Council to advise the Environmental Protection Agency ("EPA") to address pollution from concentrated animal feeding operations ("CAFOs" or "confinements") by granting a rulemaking petition aimed at increasing oversight of the largest and most-polluting CAFOs, submitted to EPA in October 2022.¹

I live in southeast Iowa between two small towns, Yarmouth and Mt. Union, which are four miles apart. Both communities are very poor and very rural. There are 15 hog confinements around our communities, which together hold about 40,000 hogs that produce enough waste to equal a city of approximately 140,000 people. But unlike cities, the confinements do not have a sewer system or wastewater treatment plant to manage their waste. Instead, they store the untreated waste in pits under the confinement buildings and get rid of it by spreading it on fields, some of which are right near my home. These practices have polluted our water. I have taken water samples from creeks in the area and found that nitrate levels increased after the CAFOs spread waste on nearby fields. I have also monitored my drinking well and found that ammonia levels have increased since the CAFOs came to the area. My doctor once told me that no one in Iowa should be drinking their well water because contamination is so widespread.

The CAFOs also generate air pollution and harbor pathogens, which cause health problems for the sick and elderly. Within 6 months of the CAFOs near my home receiving their hogs, I became congested and cleared my throat continually. Soon I developed vascular venous dermatitis because my heart was not strong enough. Then I developed eczema after 60 years of age, which is rare. Then, for the first time in my life, I developed a staph infection. Recently I developed pancreatitis. My doctor has told me that the bacteria and fungi associated with CAFOs are horrible. The medical establishment has told me to move, but on my last visit to the sinus and throat doctor, I was told that the University of Iowa doctors can't tell people to move

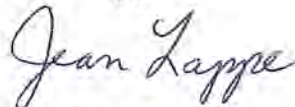
¹ *See Petition to Adopt a Rebuttable Presumption that Large CAFOs Using Wet Manure Management Systems Actually Discharge Pollutants Under the Clean Water Act* (2022), https://earthjustice.org/sites/default/files/files/cafo_presumptionpetition_witexhibits_oct2022_.pdf.

now; instead, they have to tell us to practice avoidance behavior. But staying inside to avoid the pollution makes me feel like a prisoner in my own home. This industry is dirty in many ways.

My husband and I hope to one day pass our home along to our son, but the CAFOs and their pollution threaten this dream. Our son has fond memories of growing up in our home, and he once hoped to move back here. But because of the CAFOs, the reality of living here is nothing like his memories. Now, there is an almost constant smell of hog manure, and the house is often covered in flies. We worry that it's only a matter of time until CAFOs cause these harms across all of Iowa.

In my experience, EPA and the state environmental agency are not doing enough to prevent pollution from CAFOs. Accordingly, I support the rulemaking petition asking EPA to adopt a rebuttable presumption that Large CAFOs using wet manure management systems—which are a particularly significant source of water pollution—actually discharge water pollution and, thus, must apply for Clean Water Act permits. If granted, the petition would strengthen protections for water quality, increase opportunities for public participation in CAFO permitting, and improve transparency around CAFOs. EPA should start the clean-up in southeast Iowa before it's too late.

Sincerely,

A handwritten signature in cursive script that reads "Jean Lappe". The signature is written in dark ink and is positioned above the printed name.

Jean Lappe

BEFORE THE U.S. ENVIRONMENTAL PROTECTION AGENCY

**PETITION TO ADOPT A REBUTTABLE
PRESUMPTION THAT LARGE CAFOs USING
WET MANURE MANAGEMENT SYSTEMS
ACTUALLY DISCHARGE POLLUTANTS
UNDER THE CLEAN WATER ACT**

Alabama State Association of Cooperatives, Alianza Nacional de Campesinas, Alliance for the Great Lakes, American Indian Movement Interpretive Center, American Rivers, Anthropocene Alliance, Assateague Coastkeeper, Black Warrior Riverkeeper, California Coastkeeper Alliance, Cape Fear River Watch, Catskill Mountainkeeper, Central California Environmental Justice Network, Clean Water Action, Coachella Valley Waterkeeper, Community Water Center, Concerned Citizens of Tillery, Conservation Law Center, Cortland-Onondaga Federation of Kettle Lake Associations, Earthjustice, Endangered Habitats League, Environment America, Environmental Law and Policy Center, Environmental Working Group, FLOW (For Love Of Water), Friends of the Earth, Friends of Toppenish Creek, GreenLatinos, Healthy Gulf, Hoosier Environmental Council, Humane Society of the United States, Illinois Environmental Council, Inland Empire Waterkeeper, Leadership Counsel for Justice and Accountability, Milwaukee Riverkeeper, Missouri Coalition for the Environment, Missouri Confluence Waterkeeper, Natural Resources Defense Council, North Carolina Conservation Network, Ohio Environmental Council, Orange County Coastkeeper, Our Children's Earth Foundation, Our Santa Fe River, Rural Coalition, Rural Empowerment Association for Community Help, San Francisco Baykeeper, Sierra Club, Snake River Waterkeeper, Three Fires Spiritual and Cultural Education Society, Waterkeeper Alliance, Waterkeepers Chesapeake, Waterway Advocates, Yadkin Riverkeeper

PETITIONERS

October 2022

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EXECUTIVE SUMMARY

Concentrated animal feeding operations (“CAFOs”)—industrial meat, dairy, and poultry production facilities that hold many hundreds or thousands of animals in close confinement—pollute the nation’s water, contaminate its air, generate and spread dangerous pathogens, and exacerbate climate change. As a result, CAFOs cause serious, well-documented harm to humans, wildlife, and the environment. The burdens of CAFO pollution fall disproportionately on communities of color, low-income communities, and under-resourced rural communities. Yet, despite causing serious and disproportionate harm, the CAFO industry largely escapes regulation under the nation’s key environmental statutes. This petition urges the U.S. Environmental Protection Agency (“EPA” or “Agency”) to take a critical first step toward improving oversight of CAFOs, reducing harmful pollution, and correcting CAFOs’ widespread failure to comply with the clear requirements of the Clean Water Act (“CWA” or “Act”) by adopting a rebuttable presumption that Large CAFOs using wet manure management systems actually discharge water pollution and, thus, must apply for permits under the CWA.¹

EPA admits that many CAFOs currently discharge water pollution without permits issued under the CWA, in violation of federal law.² CWA permits are key to “advanc[ing] the Act’s objectives[,] including the ambitious goal that water pollution be not only reduced, but eliminated,” because they “place important restrictions on the quality and character” of authorized water pollution.³ And Congress plainly required CAFOs to obtain CWA permits before discharging water pollution to the nation’s navigable waters.⁴ However, although there are at least 21,237 Large CAFOs across the country, only about 6,200 CAFOs hold CWA permits.⁵ The majority of Large CAFOs thus lack water pollution permits altogether or operate under state laws and permits that, as compared with permits issued under the CWA, typically are

¹ This request is distinct from the requests in a separate petition submitted to EPA by a different group of petitioners on March 8, 2017. As such, this petition is not a supplement to the March 8, 2017 petition.

² See EPA, *EPA Legal Tools to Advance Environmental Justice* 75 (2022), <https://www.epa.gov/system/files/documents/2022-05/EJ%20Legal%20Tools%20May%202022%20FINAL.pdf>.

³ *Waterkeeper All., Inc. v. EPA*, 399 F.3d 486, 491 (2d Cir. 2005).

⁴ See 33 U.S.C. §§ 1311(a), 1342(a), 1362(12), 1362(14).

⁵ See EPA, *NPDES CAFO Permitting Status Report: National Summary, Endyear 2021, completed 07/20/22*, <https://www.epa.gov/system/files/documents/2022-07/CAFO%20Status%20Report%202021.pdf>. Although EPA’s permitting status report is somewhat unclear, Petitioners conclude that EPA’s estimate reflects the total number of Large CAFOs in the country, rather than the total number of CAFOs of any size, based on footnote one of the report, as well as records received from EPA in response to a Freedom of Information Act request. However, EPA’s estimate is likely low. A review of EPA’s CAFO data, along with publicly available CAFO data, found that EPA undercounted the number of CAFOs in at least nine states. See Jon Devine & Valerie Baron, *CAFOs: What We Don’t Know Is Hurting Us*, Nat. Res. Def. Council at 11–12 (2019), <https://www.nrdc.org/sites/default/files/cafos-dont-know-hurting-us-report.pdf>. The reviewers thus concluded that “EPA may have significantly underestimated the number of CAFOs” in the country. *Id.* at 5.

less protective of water quality, offer less transparency, and provide fewer opportunities for public participation.

As EPA emphasized in a May 2022 report, CAFOs cause grave harms that disproportionately burden environmental justice communities, and existing regulations fail to achieve necessary protections.⁶ This report is a recent entry in the large, well-established, and growing body of evidence showing that CAFOs cause serious harm to human health, degrade the environment, and disproportionately burden communities of color and low-income communities. To combat these long-standing and pervasive problems, EPA proposed “explor[ing] its authority to improve the effectiveness of [its] CAFO regulations.”⁷ This petition does just that, and it identifies a clear first step. Based on EPA’s authority—and responsibility—under the CWA and executive orders aimed at advancing environmental justice, the petition proposes a significant improvement to EPA’s CAFO regulations that will expand protections against water pollution, increase transparency and public participation in CAFO permitting, and support enforcement of permit violations.

Petitioners—a nationwide coalition of citizens’ groups and community advocacy, environmental justice, and environmental advocacy organizations—are pleased to submit this petition asking EPA to establish a rebuttable presumption that Large CAFOs using wet manure management systems actually discharge water pollution and, thus, must apply for CWA permits.⁸ In support of this request, Petitioners summarize decades of well-established scientific research;⁹ present a new report on disparities in exposure to CAFO pollution, which, to Petitioners’ knowledge, is the first to describe the disproportionate burdens that CAFOs impose on environmental justice communities in California’s Central Valley; and include declarations from individuals who live near CAFOs, along with environmental and community advocates who have extensive experience with the harms CAFOs cause. These declarants tell a story that is common in communities across the country where CAFOs are concentrated—CAFOs “create

⁶ See EPA, *EPA Legal Tools to Advance Environmental Justice*, *supra* note 2, at 75.

⁷ *Id.*

⁸ Petitioners use EPA’s regulatory definition of a “Large CAFO.” See 40 C.F.R. § 122.23(b)(4). CAFOs using wet manure management systems, also called “liquid manure handling systems,” are “operation[s] [where] animals are raised outside with swimming areas or ponds, or with a stream running through an open lot, or in confinement buildings where water is used to flush the manure to a lagoon, pond, or some other liquid storage structure.” EPA, *NPDES Permit Writers’ Manual for Concentrated Animal Feeding Operations* at Glossary-10 (2012), https://www.epa.gov/sites/default/files/2015-10/documents/cafo_permitmanual_entire.pdf.

⁹ Examples of this scientific research are summarized in the annotated bibliography attached as Exhibit 1.

serious water contamination problems,”¹⁰ produce “a very sharp and pungent industrial-type odor,”¹¹ “destroy[] small farms,”¹² and “break[] up communities.”¹³

Although CAFOs of all types and sizes pollute the nation’s waters, Large CAFOs using wet manure management systems—that is, predominately Large CAFOs that confine swine and dairy cows¹⁴—are an especially significant source of water pollution. Nationwide, relatively few Large CAFOs confine the majority of swine and dairy cows produced in the country, and these facilities generate an outsize share of manure. For instance, according to data collected by the U.S. Department of Agriculture (“USDA”), only five percent of swine facilities confine more than 5,000 swine each.¹⁵ But together, those operations confine 73 percent of all swine produced in the country.¹⁶ As for dairy cow facilities, only four percent confine more than 1,000 dairy cows, but those operations account for 50 percent of all dairy cows.¹⁷ **As of 2012, Large CAFOs alone generated 404 million tons of manure¹⁸—that is, over 20 times the amount of**

¹⁰ Decl. of Sonja Trom Eayrs ¶ 12, attached as Exhibit 2.

¹¹ Decl. of David Carter ¶ 7, attached as Exhibit 3.

¹² Decl. of Kathy Tyler ¶ 8, attached as Exhibit 4.

¹³ *Id.*

¹⁴ A swine operation is a Large CAFO if it confines 2,500 or more swine weighing 55 pounds or more or if it confines 10,000 or more swine weighing less than 55 pounds. *See* 40 C.F.R. § 122.23(b)(4). A dairy cow operation is a Large CAFO if it confines 700 or more mature dairy cows. *Id.*

¹⁵ *See* U.S. Dep’t Agric., *2017 Census of Agriculture* 23, Tbl. 19 (2019), https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Volume_1_Chapter_1_US/usv1.pdf. Because EPA does not provide publicly available data on the number of Large CAFOs by animal type or individual CAFO size, Petitioners use data from the USDA Census of Agriculture. USDA does not use EPA’s thresholds for Large CAFOs when it collects data for the Census of Agriculture. As relevant here, USDA collects data on swine operations with 2,000 to 4,999 swine and 5,000 or more swine. *Id.* Operations in the latter range are most likely to meet EPA’s definition of a Large swine CAFO, which includes operations that confine 2,500 or more swine weighing 55 pounds or 10,000 or more swine weighing less than 55 pounds. 40 C.F.R. § 122.23(b)(4). However, for operations that confine 2,000 or more swine, it is also the case that they make up a small percentage of all swine operations but confine the majority of swine raised for food production. As of 2017, only 12 percent of all swine operations (8,324 operations) confined more than 2,000 swine, but those operations confined 94 percent of all swine on farms. *See* USDA, *2017 Census of Agriculture* 23, Tbl. 19 (2019).

¹⁶ *See id.*

¹⁷ *See* USDA, *2017 Census of Agriculture* 23, Tbl. 17 (2019). As relevant here, USDA collects data on dairy cow operations that confine 500 to 999 cows and 1,000 or more cows. *Id.* EPA defines a Large dairy cow CAFO as one that confines 700 or more mature dairy cows. 40 C.F.R. § 122.23(b)(4). For dairy operations that confine 500 or more cows, those operations made up only 6.4 percent (3,464 operations) of all dairy farms, but they accounted for 66 percent of all dairy cows on farms. *See* USDA, *2017 Census of Agriculture* 23, Tbl. 17 (2019).

¹⁸ *See* Noel R. Gollehon et al., USDA, *Estimates of Recoverable and Non-Recoverable Manure Nutrients Based on the Census of Agriculture—2012 Results*, at 9, Tbl. 2 (2016). This number does not include the manure produced by pastured livestock on Large CAFOs.

fecal wet mass produced by all humans in the United States.¹⁹ Storing, transporting, and disposing of this waste using wet manure management systems routinely and predictably results in water pollution.

EPA’s current approach to permitting Large CAFOs using wet manure management systems, which depends on self-reporting by polluters, falls short of what is required to protect communities and the environment in at least two significant ways. **First, EPA’s approach violates the CWA.** The CWA makes clear that CAFOs are subject to the Act’s prohibition on discharges of pollutants from point sources to the nation’s navigable waters, except as authorized by a permit.²⁰ This prohibition means that EPA must “either [] issue a permit for [a CAFO’s] discharge of the pollutant or [] enforce the total proscription on discharge[s].”²¹ However, EPA and state agencies are failing to accomplish either directive. Indeed, in four of the top five swine-producing states and two of the top five dairy cow-confining states, fewer than ten percent of CAFOs have CWA permits.²² Yet, ample evidence shows that CAFOs in these states and across the country are causing extensive water pollution.²³

Second, EPA’s approach fails to implement executive orders dedicated to advancing environmental justice. Executive Order 12,898 requires EPA to collect data on environmental justice problems, address those problems, and ensure that environmental justice communities are able to participate in its activities.²⁴ Executive Order 14,008 requires EPA to strengthen enforcement of environmental violations that disproportionately harm environmental justice communities.²⁵ EPA recently reiterated that these Executive Orders require federal, state, and local environmental permitting programs to “integrate environmental justice . . . into relevant environmental permitting processes.”²⁶ Nonetheless, EPA acknowledges that its current approach to CAFO permitting allows many CAFOs that discharge water pollution to operate without permits altogether or according to state laws and permits that fail to collect standardized

¹⁹ This figure assumes roughly 149 grams/person/day fecal wet mass (0.06 tons/person/year) and a U.S. population of 332,917,628. See C. Rose et al., *The Characterization of Feces and Urine: A Review of the Literature to Inform Advanced Treatment Technology*, 45 Critical Revs. Env’t Sci. & Tech 1827 (2015); See *U.S. and World Population Clock*, U.S. Census Bureau, <https://www.census.gov/popclock/>, for current population (accessed Nov. 2021).

²⁰ See 33 U.S.C. §§ 1311(a), 1342(a), 1362(12), 1362(14).

²¹ *L.A. Waterkeeper v. Pruitt*, 320 F. Supp. 3d 1115, 1122 (C.D. Cal. 2018); see *Nat. Res. Def. Council v. Costle*, 568 F.2d 1369, 1375 (D.C. Cir. 1977); see also *Nw. Env’t Advocs. v. EPA*, 537 F.3d 1006, 1021–22 (9th Cir. 2008).

²² See *infra* Section III.A.1.

²³ See *infra* Section III.A.3.

²⁴ See Exec. Order No. 12,898.

²⁵ See Exec. Order No. 14,008.

²⁶ EPA, *Interim Environmental Justice and Civil Rights in Permitting Frequently Asked Questions 1* (2022), <https://www.epa.gov/system/files/documents/2022-08/EJ%20and%20CR%20in%20PERMITTING%20FAQs%20508%20compliant.pdf>.

information, protect water quality, allow for meaningful public participation, or provide for citizen suits, which enable CAFO neighbors and other advocates to enforce permit violations.²⁷

Due in part to EPA’s failure to implement these executive orders, longstanding disparities in exposure to CAFO pollution persist. According to a recent study, in North Carolina, the percentage of Black, Hispanic, and American Indian residents living within three miles of a Large swine CAFO is 1.42, 1.57, and 2.20 times higher, respectively, than the percentage of non-Hispanic Whites.²⁸ **If people of all races and ethnicities in the North Carolina study area were exposed to Large swine CAFOs at the same rate, then approximately 53,000 fewer Black residents, 29,400 fewer Hispanic residents, and 16,000 fewer American Indian residents would live within three miles of a Large swine CAFO in North Carolina.**²⁹ Similarly, in California’s Central Valley, the percentage of Hispanic residents living within three miles of a Large dairy cow CAFO is 1.54 times higher than the percentage of non-Hispanic Whites.³⁰ **If Hispanic people were exposed to Large dairy cow CAFOs at the same rate as White non-Hispanic people, then approximately 227,600 fewer Hispanic people would live within three miles of a Large dairy cow CAFO in California’s Central Valley.**³¹ And in Iowa, 99.48 percent of all Large swine CAFOs are located in the most rural census tracts, which have the least access to grocery stores, physicians, and hospitals—meaning that people living in those communities might be more susceptible to harm from CAFO pollution and less able to seek help.³²

To comply with the CWA and environmental justice executive orders, EPA should adopt a rebuttable presumption that Large CAFOs using wet manure management systems actually discharge pollutants. It is well settled that administrative agencies may establish presumptions,³³ and an agency’s presumption is lawful if there is “a sound and rational connection” between the proved facts, which trigger the presumption, and the inferred facts, which follow.³⁴ A sound and rational connection is present “when ‘proof of one fact renders the existence of another fact so probable that it is sensible and timesaving to assume the truth of [the inferred] fact . . . until the adversary disproves it.’”³⁵

²⁷ See *infra* Sections III.B.2 & III.B.3.

²⁸ See Arbor J.L. Quist et al., *Disparities of Industrial Animal Operations in California, Iowa, and North Carolina* 5 (2022) (“Quist Report”), attached as Exhibit 5.

²⁹ *Id.*

³⁰ *Id.*

³¹ *Id.*

³² *Id.* at 18, Tbl. 4.

³³ See *Chemical Mfrs. Ass’n v. Dep’t of Transp.*, 105 F.3d 702, 705 (D.C. Cir. 1997); see also *Cole v. U.S. Dep’t of Agric.*, 33 F.3d 1263, 1267 (11th Cir. 1994) (“The law is well established that presumptions may be established by administrative agencies[.]”).

³⁴ *Chemical Mfrs. Ass’n*, 105 F.3d at 705.

³⁵ *Id.* (quoting *NLRB v. Curtin Matheson Sci., Inc.*, 494 U.S. 775, 788–79 (1990)) (some internal quotation marks omitted).

As described in detail in this petition, there is a sound and rational connection between Large CAFOs using wet manure management systems and actual discharges. CAFOs using wet manure management systems store urine, feces, and other waste in liquid form in vast pits or large tanks. These CAFOs often use pipes to transport the liquid waste from one location to another, and they typically dispose of the waste by applying it to fields. Using these practices to store, transport, and dispose of massive quantities of waste predictably causes discharges, and these discharges are likely to occur with increasing frequency due to climate change. Large CAFOs using wet manure management systems are an especially significant source of discharges from waste storage, transport, and disposal. **Indeed, a USDA study shows that the majority of Large CAFOs generate more manure nutrients than they can feasibly apply to fields at USDA-recommended rates meant to prevent discharges of water pollution.**³⁶ In other words, the most convenient, affordable strategy for waste disposal available to Large CAFOs likely causes discharges. In addition, the requested presumption is a sensible and timesaving device in light of the difficulty EPA and state agencies face in proving actual discharges on a CAFO-by-CAFO basis and the fact that Large CAFO operators are well-positioned to rebut the presumption in the rare instances in which no discharges occur.

Adopting the requested presumption will protect human health and the environment, while advancing the objectives of the CWA and environmental justice executive orders. The presumption will require Large CAFOs using wet manure management systems to apply for CWA permits or present evidence showing that they do not actually discharge pollutants. It would ensure that discharging CAFOs obtain CWA permits, an important outcome in light of the demonstrated failure of EPA and state governments to control water pollution from CAFOs. And, because CWA permits typically offer increased protections, transparency, and opportunities for public participation, the presumption will benefit people living near CAFOs and help EPA implement the environmental justice goals in Executive Orders 12,898 and 14,008.

Not only does the requested presumption meet the legal requirements for agency presumptions, but it also comports with case law clarifying the circumstances in which EPA may require a CAFO to apply for a CWA permit. Indeed, in 2005, the U.S. Court of Appeals for the Second Circuit expressly raised the prospect of a presumption that Large CAFOs actually discharge, stating that “such a prophylactic measure may be necessary to effectively regulate water pollution from Large CAFOs.”³⁷ As this petition shows, in the nearly 20 years since the Second Circuit’s decision, evidence has continued to grow, leaving little question that Large CAFOs using wet manure management systems actually discharge and that a presumption of discharge is necessary to regulate their discharges.

In sum, EPA’s current approach to CAFO permitting exposes millions of people to harm, in violation of the CWA and executive orders aimed at advancing environmental justice. By contrast, the requested presumption is fair, legally sound, and protective of communities.

³⁶ See Gollehon et al., *Estimates of Recoverable and Non-Recoverable Manure Nutrients Based on the Census of Agriculture—2012 Results* 19, Tbl. 7 (2016).

³⁷ *Waterkeeper All., Inc.*, 399 F.3d at 506, n.22.

Indeed, the requested presumption does nothing more than ensure that discharging CAFOs comply with existing requirements under the CWA. Petitioners urge EPA to act swiftly to adopt this presumption, advance environmental justice, and fulfill the CWA's promise to restore and maintain the nation's waters.

INTRODUCTION

Across the country, CAFOs generate staggering quantities of pollution that cause serious harm to humans, wildlife, and the environment. The burdens of this pollution fall disproportionately on communities of color, low-income communities, and under-resourced rural communities. EPA has known of these problems for decades. Indeed, EPA recently reiterated that “many waters are affected by pollutants from CAFOs,” and these pollutants cause environmental injustice.³⁸ Nonetheless, as described below, EPA is failing to fulfill its legal responsibilities to regulate CAFOs that discharge water pollution. Because of EPA’s failure, CAFOs continue to pollute the nation’s waters, evade government and public oversight, and largely escape consequences for the harms they cause. Petitioners’ members and supporters, along with millions of other people in the United States, suffer as a result. In their words, “CAFOs are industrial facilities, and they pollute on an industrial scale.”³⁹ CAFOs “threaten every ecosystem in [a] watershed,”⁴⁰ “put many small farms . . . out of business,”⁴¹ and cause “irreparable rift[s] in the community.”⁴² For the reasons that follow, Petitioners urge EPA to establish a rebuttable presumption that Large CAFOs using wet manure management systems actually discharge water pollution and, thus, must apply for CWA permits.

I. FACTUAL BACKGROUND

Meat and dairy production in the United States today looks very different than it did just 40 years ago.⁴³ While most animals were once raised on small, diversified, and independent farms, they are now primarily produced in massive, industrial CAFOs. For example, according to USDA, in 1987, only eight percent of swine were held in facilities with 5,000 or more swine.⁴⁴ By 2017, that percentage had increased ninefold; 73 percent of swine were held in facilities with 5,000 or more swine.⁴⁵ Likewise, the percentage of dairy cows held in facilities with 500 or more cows has grown dramatically, increasing from nine percent in 1987 to 61 percent in 2017.⁴⁶

³⁸ See EPA, *EPA Legal Tools to Advance Environmental Justice*, *supra* note 2, at 75.

³⁹ Decl. of Larry Baldwin ¶ 7, attached as Exhibit 6.

⁴⁰ Decl. of Kathryn Bartholomew ¶ 3, attached as Exhibit 7.

⁴¹ Decl. of Edith Haenel ¶ 11, attached as Exhibit 8.

⁴² Decl. of Jean Lappe ¶ 14, attached as Exhibit 9.

⁴³ See James M. MacDonald & William D. McBride, U.S. Dep’t of Agric., *The Transformation of U.S. Livestock Agriculture: Scale, Efficiency, and Risks* at 1, 5 (2009), https://www.ers.usda.gov/webdocs/publications/44292/10992_eib43.pdf?v=0; see also James M. MacDonald, *Tracking the Consolidation of U.S. Agriculture*, 42 *Applied Econ. Persps. & Pol’y* 361, 370, Tbl. 3 (2020).

⁴⁴ See U.S. Dep’t of Commerce, *1987 Census of Agriculture* 30, Tbl. 32 (1989), https://agcensus.library.cornell.edu/wp-content/uploads/1987-United_States-1987-01-full.pdf.

⁴⁵ See USDA, *2017 Census of Agriculture* 23, Tbl. 19 (2019).

⁴⁶ See U.S. Dep’t of Commerce, *1987 Census of Agriculture* 30, Tbl. 30 (1989); see also USDA, *2017 Census of Agriculture* 23, Tbl. 17 (2019). Because EPA does not provide publicly available data on the number of Large CAFOs by animal type or individual CAFO size, Petitioners use data from the USDA Census of Agriculture. USDA does not use EPA’s thresholds for Large CAFOs when it collects data for the Census of Agriculture; instead, it collects data on swine operations with 2,000 to 4,999 swine and 5,000 or more swine, and dairy cow operations with 500 or more cows.

As detailed in this petition, environmental regulations have not kept pace with the transformation of the meat and dairy industry, leaving a significant number of industrial facilities largely unregulated. Without adequate regulation, CAFOs cause a tremendous amount of pollution that harms humans, wildlife, and the environment.

There are now at least 21,237 Large CAFOs across the country.⁴⁷ These CAFOs generate a staggering amount of urine and feces. As of 2012, Large CAFOs alone generated over 20 times the amount of fecal wet mass produced by humans in the United States,⁴⁸ totaling 404 million tons of manure.⁴⁹ Given that meat and dairy production has continued to shift toward large facilities since 2012,⁵⁰ the amount of manure produced at Large CAFOs has almost certainly increased. A single CAFO can generate more waste than an entire city. For example, according to the U.S. Government Accountability Office, a dairy CAFO “meeting EPA’s large CAFO threshold of 700 dairy cows can create about 17,800 tons of manure annually, which is more than the about 16,000 tons of sanitary waste per year generated by the almost 24,000 residents of Lake Tahoe, California.”⁵¹ And, as of 2007, all of the breeding and market swine in North Carolina together generated over 17 million tons of manure annually,⁵² which is more than the amount of sanitary waste generated each year by the residents of New York and South Carolina combined.⁵³ Unlike human waste, however, CAFO waste generally is not treated or disinfected prior to disposal.

⁴⁷ See EPA, *NPDES CAFO Permitting Status Report: National Summary, Endyear 2021, completed 07/20/22*, *supra* note 5.

⁴⁸ See sources cited *supra* note 19.

⁴⁹ See Gollehon et al., *supra* note 18 at 9, Tbl. 2.

⁵⁰ For example, between 2012 and 2017, the total number of swine held in facilities with 5,000 or more swine increased from 44.7 million to 52.7 million, and the percentage of all swine held in facilities of that size increased from 68 percent to 73 percent. See USDA, *2017 Census of Agriculture* 23, Tbl. 19 (2019). Similarly, between 2012 and 2017, the total number of dairy cows held in facilities with 1,000 or more cows increased from 7.7 million to 8.95 million, and the percentage of all dairy cows held in facilities of that size increased from 44 percent to 50 percent. See USDA, *2012 Census of Agriculture* 21, Tbl. 17 (2014); USDA, *2017 Census of Agriculture* 23, Tbl. 17 (2019).

⁵¹ U.S. Gov’t Accountability Office, *Concentrated Animal Feeding Operations: EPA Needs More Information and a Clearly Defined Strategy to Protect Air and Water Quality from Pollutants of Concern* 19 (2008), <https://www.gao.gov/assets/gao-08-944.pdf>.

⁵² See EPA, *Literature Review of Contaminants in Livestock and Poultry Manure and Implications for Water Quality*, at 114, Tbl. A-5 (2013), <https://nepis.epa.gov/Exe/ZyPDF.cgi/P100H2NI.PDF?Dockey=P100H2NI.PDF>.

⁵³ According to the U.S. Government Accountability Office, a person generates 3.72 pounds of sanitary waste per day. See U.S. Gov’t Accountability Office, *Concentrated Animal Feeding Operations: EPA Needs More Information and a Clearly Defined Strategy to Protect Air and Water Quality from Pollutants of Concern* 58 (2008), <https://www.gao.gov/assets/gao-08-944.pdf>. The population of New York is 19,835,913, and the population of South Carolina is 5,190,705. See U.S. Census Bureau, *Quick Facts*, <https://www.census.gov/quickfacts/fact/table/US/PST045219> (enter “New York” and “South Carolina” in the search bar).

As described below, the manure and other pollutants generated at CAFOs across the country pollute the nation's water, contaminate its air, generate and spread dangerous pathogens, and exacerbate climate change. Each of these harms contributes to the burden that CAFOs impose on communities, particularly communities of color, low-income communities, and rural communities. EPA and other agencies consistently have allowed CAFOs to escape regulation necessary to curb each of these harms, which heightens the importance of EPA taking prompt action now. Although the requested presumption will not address every harm that CAFOs cause, it is a necessary first step toward reducing their water pollution and ensuring that communities have a voice in the proper regulation of CAFOs under the CWA.

A. CAFOs Cause Water Pollution and Threaten Access to Water.

As detailed below, CAFOs cause water pollution that threatens surface water, groundwater, and drinking water. In addition, CAFO water pollution harms wildlife. And CAFO water use threatens communities' access to water. Although CAFOs of all types cause these harms, CAFOs using wet manure management systems pose a particular threat because they handle urine, feces, and other waste in liquid form; this waste typically contains numerous pollutants, including nitrogen, phosphorus, disease-causing pathogens, salts, heavy metals, trace elements, pharmaceuticals, pesticides, hormones, and ions such as magnesium, sodium, potassium, and chloride.⁵⁴ According to a leading soil scientist with USDA's Natural Resources Conservation Service, liquid waste "behaves like water;" that is, the waste and associated pollutants easily flow into surface water and groundwater.⁵⁵

1. CAFO Water Pollution Threatens Surface Water, Groundwater, and Drinking Water.

CAFOs using wet manure management systems threaten surface water, groundwater, and drinking water in at least three ways. *First*, these CAFOs typically store liquid waste in vast pits or large tanks. But storage pits and tanks can breach, fail, and overflow, releasing large quantities of waste into surface water,⁵⁶ and waste seeps out of storage pits into groundwater.⁵⁷ *Second*, CAFOs using wet manure management systems often use pipes to transport liquid waste; these pipes can clog or rupture, releasing waste into surface water and groundwater.

⁵⁴ See JoAnn Burkholder et al., *Impacts of Waste from Concentrated Animal Feeding Operations on Water Quality*, 115 *Env't Health Persps.* 308 (2007).

⁵⁵ David Green, *Frank Gibbs: Liquid Manure is Too Wet*, *State Line Observer* (Aug. 20, 2006), attached as Exhibit 10.

⁵⁶ Burkholder et al., *supra* note 54, at 308.

⁵⁷ See R.L. Huffman & Phillip W. Westerman, *Estimated Seepage Losses from Established Swine Waste Lagoons in the Lower Coastal Plain of North Carolina*, 38 *Transactions Am. Soc'y Agric. Eng'rs* 449 (1995); see also Michael A. Mallin, *Impacts of Industrial Animal Production on Rivers and Estuaries*, 88 *Am. Scientist* 26, 31 (2000).

Third, CAFOs using wet manure management systems typically dispose of liquid waste by spreading it on fields, and land-applied waste commonly runs off fields into surface water or seeps into subsurface tile drains or groundwater.⁵⁸ Indeed, water pollution predictably results from numerous industry-standard, government-authorized waste disposal practices, such as spreading waste on fields during the winter, when soil is unlikely to absorb the waste and crops do not utilize the nutrients it contains. And climate change is worsening CAFO water pollution, leading to increased precipitation and stronger, more frequent storms that cause waste to run off fields and storage pits to breach and overflow.⁵⁹ Thus, as demonstrated in more detail below,⁶⁰ waste storage, transport, and disposal routinely cause discharges that pollute waterbodies.

Once CAFO waste enters surface water and groundwater, it can contaminate drinking water. Indeed, numerous studies have found CAFO pollutants in drinking wells near CAFOs,⁶¹ and these pollutants can harm human health. For instance, “[o]ne pollution event by a CAFO could become a lingering source of viral contamination for groundwater,” posing “a serious threat to drinking water.”⁶² In addition to dangerous pathogens, CAFO waste is a source of nitrate pollution, and nitrates in drinking water are associated with birth defects and cases of the potentially fatal blood condition methemoglobinemia, or “blue baby syndrome,” in infants under six months of age.⁶³ Exposure to nitrates in drinking water is also associated with an increased risk for hyperthyroidism,⁶⁴ insulin-dependent diabetes,⁶⁵ bladder cancer,⁶⁶ ovarian cancer,⁶⁷ and colorectal cancer.⁶⁸

Threats to drinking wells are a serious concern for community members. According to a resident of Worth County, Iowa, where there are 14 CAFOs: “The potential contamination of groundwater is especially worrisome . . . because, like nearly everyone in our community, my

⁵⁸ *Id.*

⁵⁹ *See infra* Section IV.B.4.

⁶⁰ *See infra* Section IV.B.

⁶¹ *See* Burkholder et al., *supra* note 54, at 310; *see also* Kenneth C. Stone et al., *Impact of Swine Waste Application on Ground and Stream Water Quality in an Eastern Coastal Plain Watershed*, 41 *Transactions Am. Society Agric. & Biological Eng’rs* 1665, 1670 (1998).

⁶² Carrie Hribar, Nat’l Ass’n of Local Bds. of Health, *Understanding Concentrated Animal Feeding Operations and Their Impact on Communities* 4 (2010), https://www.cdc.gov/nceh/ehs/docs/understanding_cafos_nalboh.pdf.

⁶³ *See* Burkholder et al., *supra* note 54, at 310.

⁶⁴ *Id.*

⁶⁵ *Id.*

⁶⁶ *See* Rena R. Jones et al., *Nitrate from Drinking Water and Diet and Bladder Cancer Among Postmenopausal Women in Iowa*, 124 *Env’t Health Persps.* 1751 (2016).

⁶⁷ *See* Maki Inoue-Choi et al., *Nitrate and Nitrite Ingestion and Risk of Ovarian Cancer Among Postmenopausal Women in Iowa*, 137 *Int’l J. Cancer* 173 (2014).

⁶⁸ *See* Alexis Temkin et al., *Exposure-Based Assessment and Economic Valuation of Adverse Birth Outcomes and Cancer Risk Due to Nitrate in United States Drinking Water*, 176 *Env’t Rsch.* 108442 (2019).

husband and I get our drinking water from a well.”⁶⁹ The resident is concerned that she “might learn of groundwater contamination only after people in our community start to get sick.”⁷⁰ Because of these threats, many people who live near CAFOs have stopped using their wells for drinking water.⁷¹ A resident of Boone County, Iowa, where there are 42 CAFOs, explains: “My husband and I used to drink water from our well, until agricultural pollution made our well water unsafe. Now, we get our drinking water from [a rural water system], which is quite expensive compared to well water.”⁷² Moreover, public drinking water suppliers have had to build extremely costly water treatment plants. In Haviland, Kansas, for example, a town of 700 people was forced to spend \$2.4 million on a treatment plant to address high nitrate levels, which were driven in part by runoff from CAFOs.⁷³ To cover the cost, water bills in Haviland almost tripled.⁷⁴ Similarly, the Boone County, Iowa resident relates that “Des Moines has had to develop one of the most sophisticated water treatment plants in the country, because it treats water that is heavily polluted by CAFOs and other industrial agriculture facilities.”⁷⁵

CAFO pollutants in surface water also can harm human health, prevent people from enjoying an area’s waterways, and damage local economies. For example, a study of publicly accessible surface waters adjacent to swine CAFOs in North Carolina found multiple pathogens of public health concern, including hepatitis E virus.⁷⁶ Ingesting hepatitis E virus can cause acute hepatitis, a potentially fatal condition that, in turn, causes jaundice, anorexia, nausea, and vomiting.⁷⁷ In addition, the nitrogen and phosphorus in CAFO waste can cause harmful algal blooms in surface water.⁷⁸ Contact with these algal blooms can lead to gastrointestinal tract distress and skin, eye, and ear infections.⁷⁹ According to the Executive Director of Lake Erie Waterkeeper, “annual toxic algal blooms in Lake Erie have serious consequences each year,”⁸⁰

⁶⁹ Exhibit 8 ¶ 7.

⁷⁰ *Id.*

⁷¹ See Decl. of Devon Hall ¶ 11, attached as Exhibit 11; see also Exhibit 2 ¶ 10; Exhibit 9 ¶ 7; Exhibit 15 ¶ 8.

⁷² Decl. of Danielle Wirth ¶ 7, attached as Exhibit 12.

⁷³ See David Condos, *As Fertilizer Pollutes Tap Water in Small Towns, Rural Kansans Pay the Price*, Kansas Pub. Radio (Mar. 28, 2022), <https://kansaspublicradio.org/kpr-news/fertilizer-pollutes-tap-water-small-towns-rural-kansans-pay-price>.

⁷⁴ *Id.*

⁷⁵ Exhibit 12 ¶ 7.

⁷⁶ Jennifer Gentry-Shields et al., *Hepatitis E Virus and Coliphages in Waters Proximal to Swine Concentrated Animal Feeding Operations*, 505 *Sci. Total Env’t* 487, 487 (2015).

⁷⁷ See Julie A. Kase et al., *Detection and Molecular Characterization of Swine Hepatitis E Virus in North Carolina Swine Herds and Their Faecal Wastes*, 347 *J. Water & Health* 344 (2009) (finding hepatitis E virus in swine feces and swine CAFO waste pits); see also Jennifer Gentry-Shields et al., *Hepatitis E Virus and Coliphages in Waters Proximal to Swine Concentrated Animal Feeding Operations*, 505 *Sci. Total Env’t* 487, 487 (2015).

⁷⁸ See JoAnn M. Burkholder et al., *Impacts to a Coastal River and Estuary from Rupture of a Large Swine Waste Holding Lagoon*, 26 *J. Env’t Quality* 1451 (1997).

⁷⁹ See Burkholder et al., *supra* note 54, at 310.

⁸⁰ Decl. of Sandy Bihn ¶ 10, attached as Exhibit 13.

including causing severe diarrhea and skin infections in people and killing dogs that have come into contact with the water.⁸¹

In light of these harms, many people who live near CAFOs are no longer able to enjoy local waterways.⁸² A resident of Jefferson County, Iowa—where there are approximately 80 CAFOs—explains that she used to take her children swimming in a local lake, but “[a]s the number of CAFOs grew, nutrient and sediment pollution in the lake increased and eventually rendered it unusable.”⁸³ Even after the state spent millions of dollars to restore the lake, residents are still frequently advised that it is not safe for swimming.⁸⁴ Nationwide, harmful algal blooms cost the tourism industry nearly \$1 billion each year, and they raise the cost of treating drinking water.⁸⁵ The EPA Office of Inspector General recently declared that “the prevalence, severity, and frequency of [harmful algal bloom] occurrences in recreational waters . . . will increase as excess nutrients flow into these waters, temperatures rise, and extreme weather events increase with a changing climate.”⁸⁶ As a result, “EPA needs an agencywide strategic action plan for protecting human health and the environment from this continuing threat.”⁸⁷

2. CAFO Water Pollution Threatens Wildlife.

The pollutants in CAFO waste also threaten wildlife. Harmful algal blooms can deplete dissolved oxygen levels and fuel the growth of toxic organisms,⁸⁸ sometimes leading to major fish kills.⁸⁹ For example, an analysis by the *Chicago Tribune* found that between 2005 and 2014, swine waste impaired 67 miles of Illinois’s waterways and caused the deaths of nearly 500,000

⁸¹ *Id.* ¶ 14.

⁸² *See id.* ¶ 13 (describing how algal blooms in Maumee Bay turned the water green and prevented people from swimming and recreating in the Bay); *see also* Decl. of Kemp Burdette ¶ 14, attached as Exhibit 14 (“I don’t let my daughters swim in the river [near our home] very often, because I’m concerned that the CAFO pollutants will make them sick.”).

⁸³ Decl. of Diane Rosenberg ¶ 7, attached as Exhibit 15.

⁸⁴ *Id.*

⁸⁵ *See The Effects: Economy*, EPA, <https://www.epa.gov/nutrientpollution/effects-economy> (Last accessed Apr. 19, 2022); *see also* All. for the Great Lakes, *Western Lake Erie Basin Drinking Water Systems: Harmful Algal Bloom Cost of Intervention* (2022), <https://greatlakes.org/wp-content/uploads/2022/05/FINAL-COI-Report-051622.pdf> (finding that a family of five in Toledo, Ohio is paying close to an additional \$100 per year to cover the costs of monitoring and treatment for harmful algal blooms).

⁸⁶ Office of Inspector Gen., EPA, *EPA Needs an Agencywide Strategic Action Plan to Address Harmful Algal Blooms*, Report No. 21-E-0264, at 17 (2021), https://www.epa.gov/system/files/documents/2021-09/epa_oig_20210929-21-e-0264.pdf.

⁸⁷ *Id.*

⁸⁸ *See* Burkholder et al., *Impacts to a Coastal River and Estuary from Rupture of a Large Swine Waste Holding Lagoon*, *supra* note 78, at 1462.

⁸⁹ *Id.* at 1451.

fish—that is, approximately half the total number of fish killed by water pollution in the state.⁹⁰ CAFO pollutants also harm the endocrine and reproductive systems of wild fish, reducing the diversity of fish species in a waterbody.⁹¹

Community members in areas where CAFOs are concentrated have observed harm to fish and other wildlife. For example, a resident of Yakima County, Washington shares that the increasing concentration of CAFOs in the county has coincided with declining salmon populations.⁹² Eating fresh, local salmon “was one of the joys of [her] life,” but “locally caught fish is harder to find” and “[m]any salmon species in the region are now endangered.”⁹³ Since CAFOs came to Boone County, Iowa, a resident has noticed that “turtles used to climb up from the creek that runs through [her] land to try nesting in [her] yard, but [she has] not seen some of [her] favorite turtle species for many years.”⁹⁴ And a resident of Duplin County, North Carolina—where there are more than 520 swine CAFOs—was once an avid fisher, but he stopped fishing after he began to catch fish with open sores, which he believes are caused by bacteria and other pollutants from the many CAFOs in the county.⁹⁵

Among the wildlife at risk from CAFO water pollution are threatened and endangered species. Indeed, multiple federal agencies have specifically identified CAFOs as threats to such species. In North Carolina, the U.S. Fish and Wildlife Service (“FWS”) has named CAFOs as threats to the Neuse River waterdog,⁹⁶ Atlantic pigtoe,⁹⁷ Dwarf wedgemussel,⁹⁸ and Carolina madtom,⁹⁹ which are all threatened or endangered and depend on clean water. FWS explained that CAFOs threaten these species because “CAFO wastes contain nutrients, pharmaceuticals, and hormones, and cause eutrophication of waterways, toxic blooms of algae and dinoflagellates,

⁹⁰ See David Jackson & Gary Marx, *Spills of Pig Waste Kill Hundreds of Thousands of Fish in Illinois*, Chicago Trib. (Aug. 5, 2016), <https://www.chicagotribune.com/investigations/ct-pig-farms-pollution-met-20160802-story.html>.

⁹¹ See Edward P. Kolodziej et al., *Dairy Wastewater, Aquaculture, and Spawning Fish as Sources of Steroid Hormones in the Aquatic Environment*, 38 Env’t Sci. & Tech. 6377 (2004); see also Jessica K. Leet et al., *Assessing Impacts of Land-Applied Manure from Concentrated Animal Feeding Operations on Fish Populations and Communities*, 46 Env’t Sci. & Tech. 13440 (2012); Edward F. Orlando et al., *Endocrine-Disrupting Effects of Cattle Feedlot Effluent on an Aquatic Sentinel Species, the Fathead Minnow*, 112 Env’t Health Persps. 353 (2004).

⁹² Decl. of Jean Mendoza ¶ 12, attached as Exhibit 16.

⁹³ *Id.*

⁹⁴ Exhibit 12 ¶ 9.

⁹⁵ See Exhibit 11 ¶ 10.

⁹⁶ See FWS, Species Status Assessment Report for the Neuse River Waterdog (*Necturus lewisi*) Version 1.2, at 39–40 (2021), <https://ecos.fws.gov/ServCat/DownloadFile/195540>.

⁹⁷ See FWS, Species Status Assessment Report for the Atlantic Pigtoe (*Fusconaia masoni*) Version 1.4, at 53–54 (2021), <https://ecos.fws.gov/ServCat/DownloadFile/201267>.

⁹⁸ See FWS, Dwarf Wedgemussel *Alasmidonta heterodon* 5-Year Review: Summary and Evaluation, at App’x A (2019), https://ecos.fws.gov/docs/tess/species_nonpublish/2774.pdf.

⁹⁹ See FWS, Species Status Assessment Report for the Carolina Madtom (*Noturus furiosus*) Version 1.2, at 35–36 (2021), <https://ecos.fws.gov/ServCat/DownloadFile/195532>.

and endocrine disruption in downstream wildlife.”¹⁰⁰ As shown below in Figure One, these species’ North Carolina habitat ranges significantly overlap with the locations of CAFOs, including many Large CAFOs. The Neuse River waterdog’s North Carolina range has at least 288 Large swine CAFOs, the Atlantic pigtoe’s range has at least 125 Large swine CAFOs, the Dwarf wedgemussel’s range has at least 43 Large swine CAFOs, and the Carolina madtom’s range has at least 254 Large swine CAFOs.¹⁰¹ Of all these Large CAFOs, only 10 have CWA permits.¹⁰² As discussed below, Large CAFOs are a significant source of water pollution.¹⁰³ Thus, these species are especially at risk of harm from CAFOs.

Similarly, the National Oceanic and Atmospheric Administration (“NOAA”) has specifically identified CAFOs as a threat to endangered population segments of the Atlantic sturgeon in North Carolina.¹⁰⁴ NOAA explained that CAFOs “contribute[] to both atmospheric and aquatic inputs of nitrogenous contamination, possibly causing [dissolved oxygen] levels to regularly fall below the 5 mg/L state standard.”¹⁰⁵ As shown in Figure Two, the Atlantic sturgeon’s habitat significantly overlaps with the locations of CAFOs in North Carolina.

In Iowa, FWS has specifically identified CAFOs as a threat to the endangered pallid sturgeon. FWS found that “observed concentrations of nutrients and indicators of nutrient pollution were above benchmark levels throughout the pallid sturgeon’s range.”¹⁰⁶ It determined that “run-off from agricultural lands and confined animal feeding operations (CAFOs) are the most likely sources.”¹⁰⁷ Almost 96 percent of CAFOs in Iowa operate without CWA permits.¹⁰⁸

¹⁰⁰ FWS, Species Status Assessment Report for the Neuse River Waterdog (*Necturus lewisi*) Version 1.2, *supra* note 96, at 39.

¹⁰¹ See N.C. Dep’t of Env’t Quality, *List of Permitted Animal Facilities – 4-1-2020*, <https://deq.nc.gov/cafo-map> (providing CAFO locations); see also FWS, *Environmental Conservation Online System*, <https://ecos.fws.gov/ecp/report/species-listings-by-tax-group?statusCategory=Listed&groupName=All%20Animals> (enter the species name in the search bar) (providing habitat ranges).

¹⁰² See N.C. Dep’t of Env’t Quality, *List of Permitted Animal Facilities – 4-1-2020*, <https://deq.nc.gov/cafo-map> (providing CAFO locations and permit types).

¹⁰³ See *infra* Section IV.B.5.

¹⁰⁴ See Endangered and Threatened Wildlife and Plants; Final Listing Determinations for Two Distinct Population Segments of Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*) in the Southeast, 77 Fed. Reg. 5,914, 5,969–70 (Feb. 6, 2012).

¹⁰⁵ *Id.* at 5,969.

¹⁰⁶ See Molly Webb et al., *Pallid Sturgeon Basin Wide Contaminants Assessment 3*, FWS, Missouri Dep’t of Conservation (2019), <http://www.pallidsturgeon.org/wp-content/uploads/2019/12/FINAL-Pallid-Sturgeon-Contaminants-Assessment-8-March-2019.pdf>.

¹⁰⁷ *Id.* at 28.

¹⁰⁸ See EPA, *NPDES CAFO Permitting Status Report: National Summary, Endyear 2021, completed 07/20/22*, *supra* note 5.

Instead, they operate under state laws that are generally less protective of water quality¹⁰⁹ and, thus, are insufficient to protect threatened and endangered species.

Even where CAFOs are not specifically named as threats, CAFO water pollution almost certainly harms threatened and endangered species, including in Michigan, Iowa, California, and Oregon, where CAFOs are concentrated and CAFO location data are publicly available. In Michigan, the piping plover is sensitive to pollutants from CAFOs, and its range overlaps significantly with areas where CAFOs are concentrated.¹¹⁰ In Iowa, the Spectaclecaea mussel, Higgins eye pearl mussel, Topeka shiner, and Sheepsnose mussel are sensitive to CAFO pollutants,¹¹¹ and as shown in Figure Three, their ranges also overlap significantly with areas where CAFOs are concentrated.¹¹² In California, the California tiger salamander, Conservancy fairy shrimp, Vernal pool fairy shrimp, and Vernal pool tadpole shrimp are sensitive to CAFO pollutants and found in areas where CAFOs are concentrated, as demonstrated in Figure Four.¹¹³ And, as shown in Figure Five, in Oregon, swine and dairy CAFOs are concentrated along critical habitat streams for Chinook salmon, coho salmon, and steelhead. Given the concentration of CAFOs in these species' habitats, along with the water pollution CAFOs cause, CAFOs likely harm these species and numerous other threatened and endangered species across the country.

¹⁰⁹ See *infra* Section III.A.3.

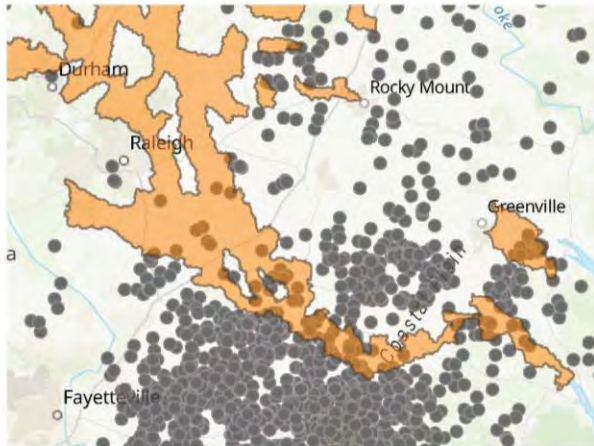
¹¹⁰ See Sierra Club Mich. Chapter, *A Watershed Moment: Michigan CAFO Mapping Report*, <https://www.sierraclub.org/michigan/michigan-cafo-mapping-report> (showing CAFO locations); see also FWS, *Environmental Conservation Online System*, *supra* note 101 (providing habitat ranges).

¹¹¹ See Tyler Lark & Ian Schelly, *Potential Impacts of Cropland Expansion on Threatened and Endangered Species in the United States* (2018), http://www.gibbs-lab.com/wp-content/uploads/2019/01/Endangered_Species_extended_brief.pdf; see also Ira R. Adelman et al., *Acute And Chronic Toxicity Of Ammonia, Nitrite, And Nitrate To The Endangered Topeka Shiner (Notropis Topeka) And Fathead Minnows (Pimephales Promelas)*, 28 *Env't Toxicology & Chemistry* 2216 (2009); Rory T. Mott et al., *Use of Non-Lethal Endpoints to Establish Water Quality Requirements and Optima of the Endangered Topeka Shiner (Notropis topeka)*, 104 *Env't Biology of Fishes* 1215 (2021).

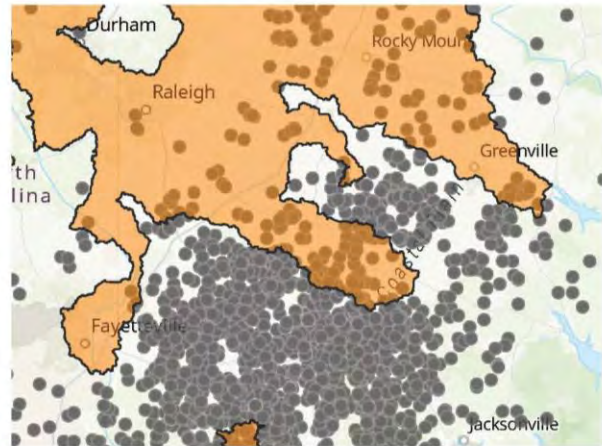
¹¹² See Iowa Dep't of Nat. Res., *Animal Feeding Operations Databases*, <https://programs.iowadnr.gov/animalfeedingoperations/Default.aspx> (providing CAFO locations); see also FWS, *Environmental Conservation Online System*, *supra* note 101 (providing habitat ranges).

¹¹³ See Ca. Env't Protection Agency, *Regulated Facility Report (Detail)*, <https://ciwqs.waterboards.ca.gov/ciwqs/readOnly/CiwqsReportServlet?reportID=8210359&inCommand=drilldown&reportName=RegulatedFacilityDetail&program=ANIMALWASTE> (providing CAFO locations); see also FWS, *Environmental Conservation Online System*, *supra* note 101 (providing habitat ranges).

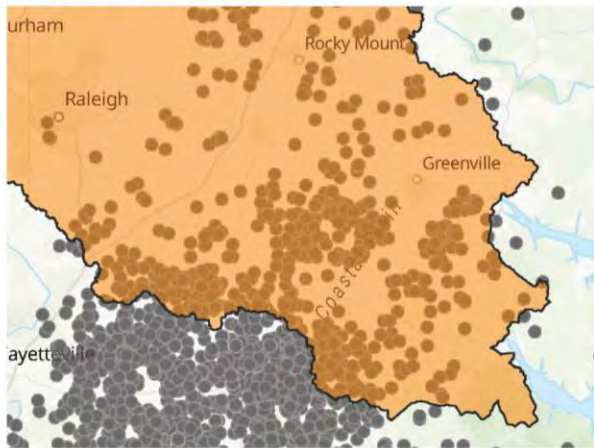
Dwarf wedgemussel (*Alasmidonta heterodon*)



Atlantic pigtoe (*Fusconaia masoni*)



Neuse river waterdog (*Necturus lewisi*)



Carolina madtom (*Noturus furiosus*)

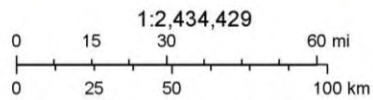
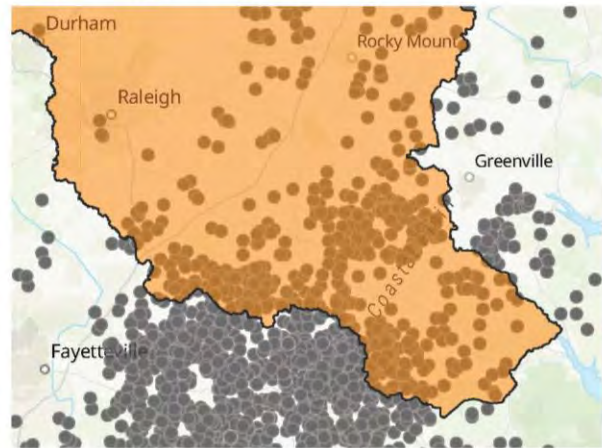


Figure One. Habitat ranges of the Dwarf wedgemussel, Atlantic pigtoe, Neuse River waterdog, and Carolina madtom, along with locations of CAFOs in North Carolina.¹¹⁴

¹¹⁴ See sources cited *supra* note 101.

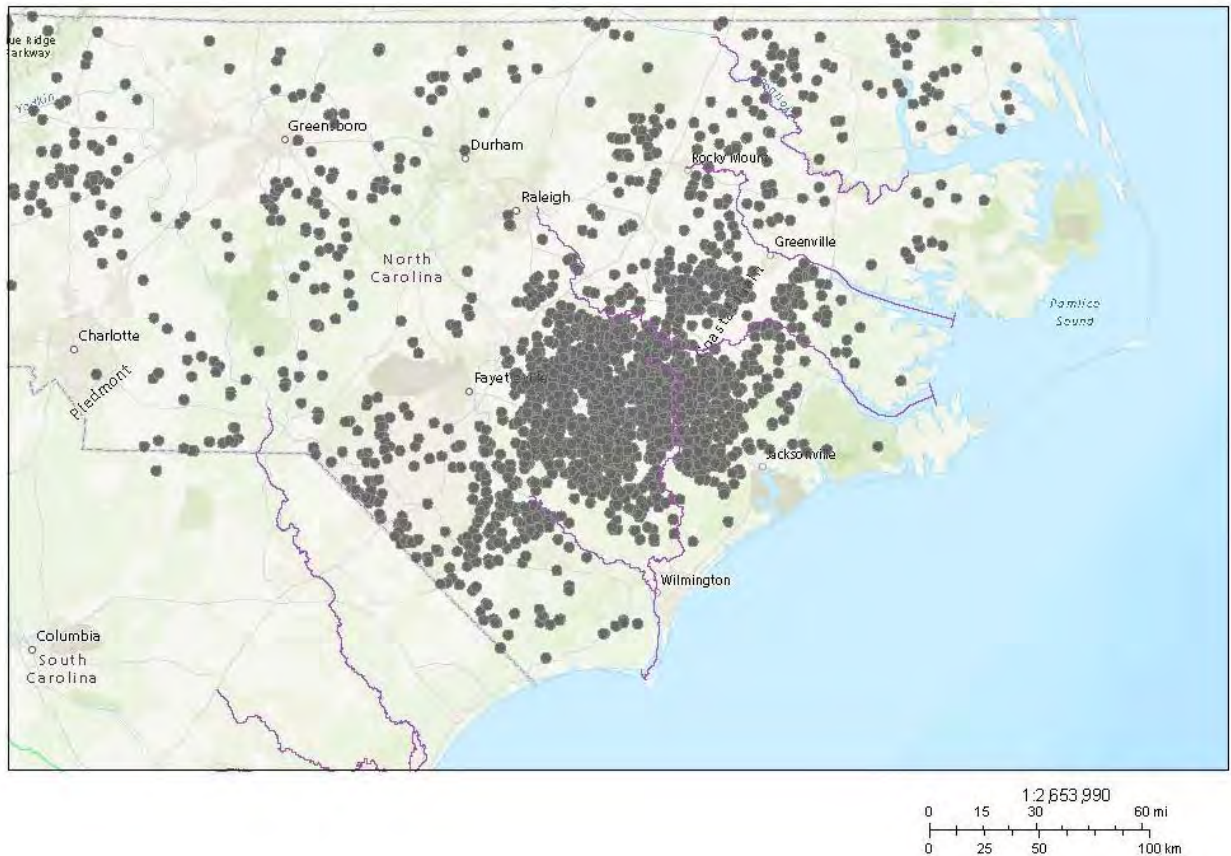
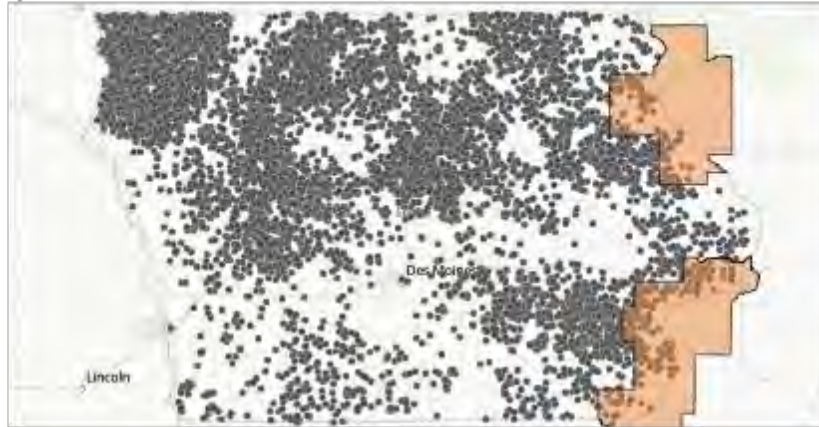


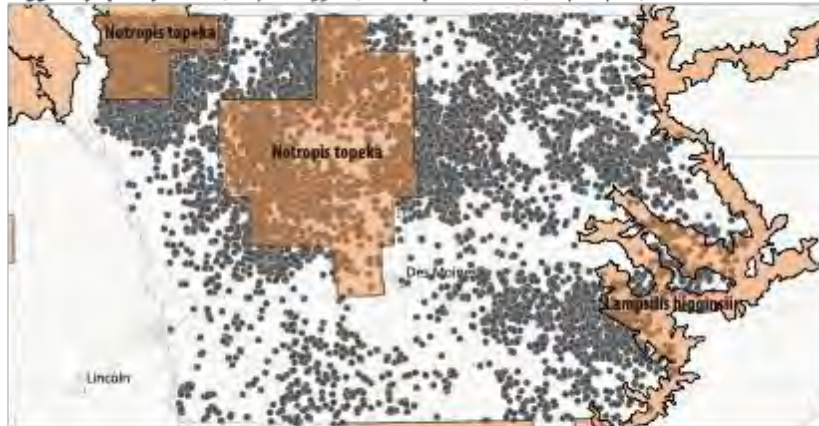
Figure Two. Habitat of the Atlantic sturgeon (shown in purple), along with locations of CAFOs in North Carolina.¹¹⁵

¹¹⁵ See N.C. Dep’t of Env’t Quality, *List of Permitted Animal Facilities – 4-1-2020*, *supra* note 101 (providing CAFO locations); see also NOAA, *Atlantic Sturgeon Critical Habitat Map and GIS Data*, <https://www.fisheries.noaa.gov/resource/map/atlantic-sturgeon-critical-habitat-map-and-gis-data> (providing habitat ranges).

Spectaclecase mussel (*Cumberlandia monodonta*)



Higgins eye pearlymussel (*Lampsilis higginsii*) and **Topeka shiner** (*Notropis topeka*)



Sheepnose mussel (*Plethobasus cyphus*)

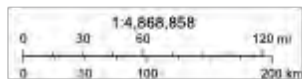
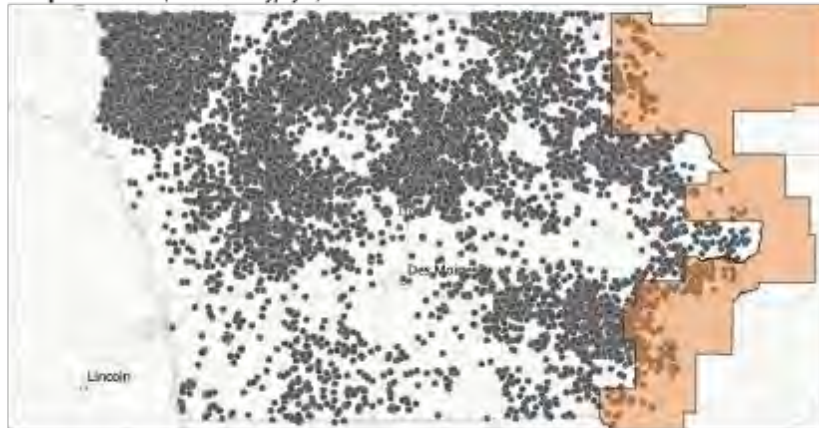


Figure Three. Habitat ranges of the Spectaclecase mussel, Higgins eye pearlymussel, Topeka shiner, and Sheepnose mussel, along with locations of CAFOs in Iowa.¹¹⁶

¹¹⁶ See sources cited *supra* note 112.

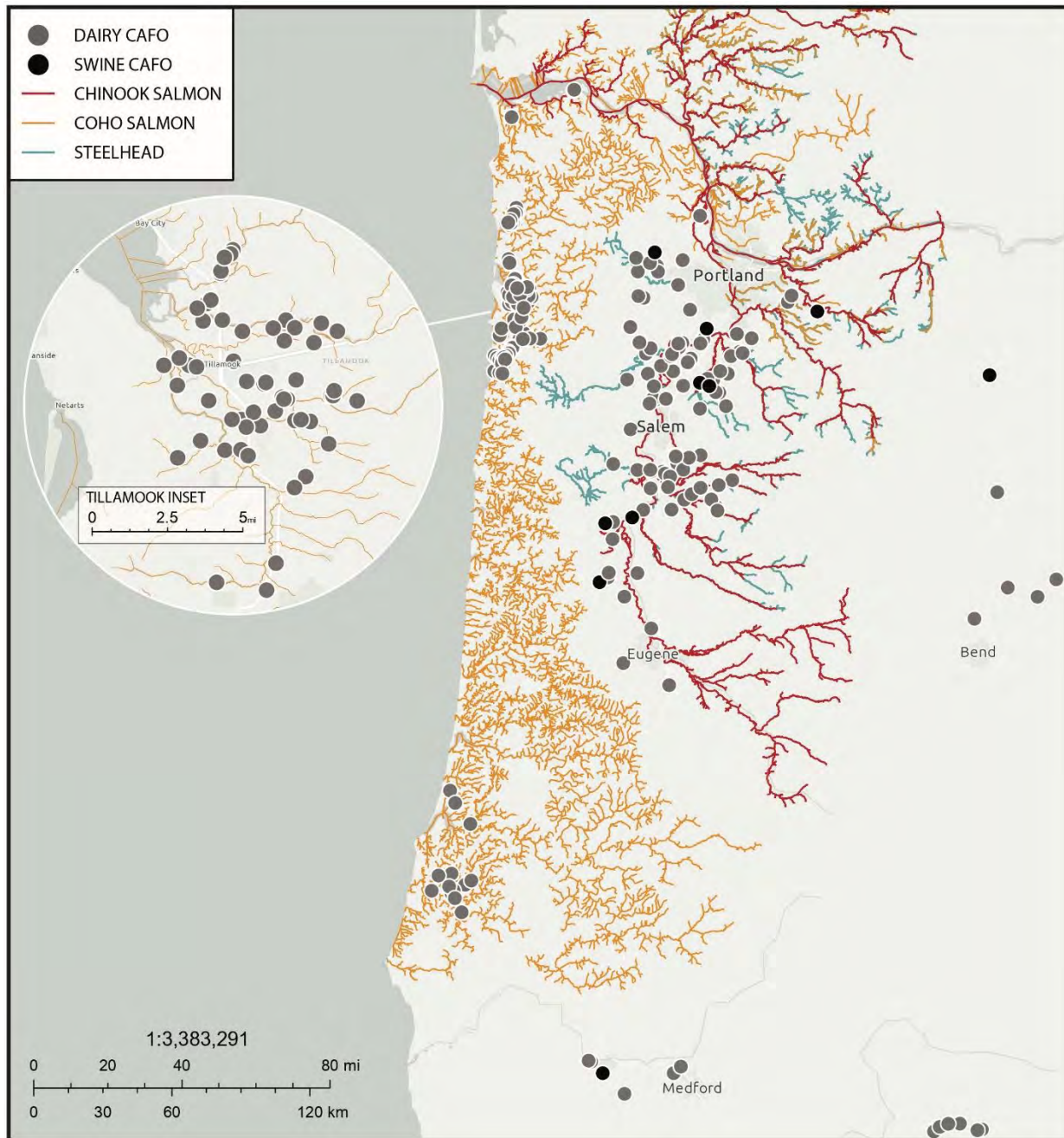


Figure Five. Critical habitat streams of Chinook salmon (shown in red), coho salmon (shown in orange), and steelhead (shown in blue), along with locations of swine and dairy CAFOs in Oregon.¹¹⁸

¹¹⁸ See Nat'l Marine Fisheries Serv., WCR/NMFS_WCR_ESA_Critical Habitat (MapServer) (2021), https://www.webapps.nwfsc.noaa.gov/server7/rest/services/WCR/NMFS_WCR_ESA_Critical_Habitat/MapServer (providing critical habitat streams). CAFO locations were obtained from the Oregon Department of Agriculture.

3. CAFOs Threaten Access to Water.

In addition to threatening water quality, CAFOs can imperil communities' access to water. CAFOs use large amounts of water to maintain animals, clean confinement buildings, and wash urine and feces into waste pits. For example, 448 CAFOs in Minnesota reported using a total of 2.3 billion gallons of water in 2017.¹¹⁹ This is enough water to meet the basic needs of at least 238,356 people for one year.¹²⁰ And by one estimate, California's dairy CAFOs use 142 million gallons of water per day to maintain cows and clean the confinement buildings.¹²¹ This is enough water to meet the daily recommended water usage for all the residents of San Jose and San Diego combined.¹²² In California and other areas where drought is common, community members fear that CAFO water use will prevent them from having access to the water they need. Indeed, a resident of Yakima County, Washington explains that CAFOs in the area "withdraw millions of gallons of pure water from deep aquifers every day."¹²³ She worries that "[u]nless CAFOs are monitored more closely, . . . there might not be much water left for future generations."¹²⁴

* * *

EPA acknowledges that "many waters are affected by pollution from CAFOs"¹²⁵ and that "all or virtually all large CAFOs have had a discharge [of water pollution] in the past, [or] have a current discharge."¹²⁶ Nonetheless, as discussed more fully below,¹²⁷ the Agency has struggled to increase its oversight of this pollution, in part because "CAFOs often claim that they do not discharge [water pollution], and EPA and state permitting agencies lack the resources to regularly inspect these facilities to assess these claims."¹²⁸ Though courts have struck down

¹¹⁹ See Dara Meredith Fedrow, *Water Use in Confined Animal Feeding Operations (CAFOs) in Minnesota: Who's Keeping Track?*, Univ. of Montana, at 44 (2019), <https://scholarworks.umt.edu/cgi/viewcontent.cgi?article=12430&context=etd#:~:text=The%20water%20appropriation%20permit%20program,different%20amounts%20of%20water%20use>.

¹²⁰ This calculation is based on the World Health Organization's conclusion that a person needs 50 to 100 liters of water per day to meet their basic needs. See UN-Water Decade Programme on Advocacy & Commc'n & Water Supply & Sanitation Collaborative Council, *The Human Right to Water and Sanitation 2*, https://www.un.org/waterforlifedecade/pdf/human_right_to_water_and_sanitation_media_brief.pdf.

¹²¹ See Food & Water Watch, *Big Ag, Big Oil and California's Big Water Problem* 6–7 (2021), <https://www.foodandwaterwatch.org/wp-content/uploads/2021/10/CA-Water-White-Paper.pdf>.

¹²² *Id.* at 6.

¹²³ Exhibit 16 ¶ 7.

¹²⁴ *Id.*

¹²⁵ EPA, *EPA Legal Tools to Advance Environmental Justice*, *supra* note 2, at 75.

¹²⁶ National Pollutant Discharge Elimination System Permit Regulation and Effluent Limitations Guidelines and Standards for Concentrated Animal Feeding Operations, 66 Fed. Reg. 2,960, 3,007 (Jan. 12, 2001).

¹²⁷ See *infra* Section III.A.1.

¹²⁸ EPA, *EPA Legal Tools to Advance Environmental Justice*, *supra* note 2, at 75.

certain aspects of EPA’s past regulations pertaining to water pollution from CAFOs,¹²⁹ this petition presents a first step toward adequate oversight that both comports with all legal requirements¹³⁰ and targets an especially significant source of CAFO water pollution.¹³¹

B. In Addition to Polluting Water, CAFOs Cause Other Harm to Human Health and the Environment.

1. CAFOs Cause Air Pollution.

Not only do CAFOs pollute surface water, groundwater, and well water, but they also generate pollutants that contaminate the air and harm human health and well-being. When CAFO waste decomposes, it releases hydrogen sulfide, ammonia, and hundreds of volatile organic compounds.¹³² As of 2017, livestock waste was the largest source of ammonia emissions in the United States.¹³³ Waste pits, animal confinement buildings, and waste applied to fields emit these gasses and compounds into the air.¹³⁴ In addition, the large fans that CAFOs use to ventilate confinement buildings blow animal feed, skin cells, and feces into the air.¹³⁵ These gasses, compounds, and particles produce strong odors that are characteristic of CAFOs.¹³⁶ People who live near CAFOs describe these odors as “putrid,”¹³⁷ “horrifying,”¹³⁸ and “unbearable,”¹³⁹ and they agree that CAFO odors are nothing like odors from smaller farms.¹⁴⁰ Numerous studies show that air pollutants and odors from CAFOs travel into nearby communities,¹⁴¹ and the experiences of community members corroborate these studies.

¹²⁹ See *infra* Section IV.F.1.

¹³⁰ See *infra* Section IV.F.2.

¹³¹ See *infra* Section IV.B.5.

¹³² See Virginia T. Guidry et al., *Hydrogen Sulfide Concentrations at Three Middle Schools Near Industrial Livestock Facilities*, 27 J. Exposure Sci. & Env’t Epidemiology 167 (2017).

¹³³ See EPA, *2017 National Emissions Inventory (NEI) Data*, <https://www.epa.gov/air-emissions-inventories/2017-national-emissions-inventory-nei-data#dataq> (In the “Data Queries” section, select “Ammonia – NH3” in the “Pollutant” selection box).

¹³⁴ See Guidry et al., *supra* note 132, at 167.

¹³⁵ *Id.*

¹³⁶ *Id.*

¹³⁷ Exhibit 2 ¶ 6.

¹³⁸ *Id.* ¶ 12.

¹³⁹ Exhibit 3 ¶ 7.

¹⁴⁰ See Decl. of Ronald J. Wyse ¶ 6, attached as Exhibit 17; see also Exhibit 3 ¶ 7, Exhibit 8 ¶ 9; Exhibit 7 ¶ 4.

¹⁴¹ See Dana Cole et al., *Concentrated Swine Feeding Operations and Public Health: A Review of Occupational and Community Health Effects*, 108 Env’t Health Persps. 685, 693 (2000) (explaining that gasses, dusts, and odors from CAFOs can travel long distances and cause health concerns in neighboring communities); see also Burkholder et al., *supra* note 54, at 309 (citing studies showing that ammonia from swine CAFOs commonly moves off-site to contaminate the overlying air); Kelley J. Donham et al., *Community Health and Socioeconomic Issues Surrounding Concentrated Animal Feeding Operations*,

Exposure to CAFO air pollutants can cause serious health problems and even death. A recent study found that ammonia emissions from CAFO waste management practices cause at least 6,900 deaths per year.¹⁴² Exposure to CAFO air pollutants can also cause nausea, headaches, dizziness, runny nose, scratchy throat, burning eyes, coughing, wheezing, and shortness of breath.¹⁴³ One study found that people living up to two miles from a CAFO experienced increased rates of these symptoms,¹⁴⁴ and another found that children attending schools up to three miles from CAFOs, who were thus estimated to be exposed to CAFO air pollutants, experienced asthma symptoms, including wheezing.¹⁴⁵ In addition, residents living near CAFOs share stories of themselves or family members suffering from hydrogen sulfide poisoning, which caused headaches, dizziness, and nausea.¹⁴⁶ Beyond causing these health problems, exposure to pollutants associated with CAFOs is linked to high rates of COVID-19 infection and severity.¹⁴⁷

Odors from CAFOs can also cause psychological harm. Researchers have found that CAFO neighbors regularly subjected to livestock odors experience significantly higher rates of tension, depression, anger, confusion, and fatigue, as compared with otherwise similar people who do not live near CAFOs.¹⁴⁸ These negative moods are concerning not only in their own right, but also because “mood has been found to play a role in immunity . . . and can potentially affect subsequent disease.”¹⁴⁹

In addition to harming physical and psychological health, air pollutants and odors from CAFOs can significantly diminish neighbors’ quality of life. For instance, children who suffer from asthma symptoms, which can result from exposure to CAFO air pollution, miss

115 Env’t Health Persps. 317, 318 (2007) (noting that air quality assessments in communities near CAFOs show concentrations of hydrogen sulfide and ammonia); Yelena Ogneva-Himmelberger et al., *CALPUFF and CAFOs: Air Pollution Modeling and Environmental Justice Analysis in the North Carolina Hog Industry*, 4 Int’l J. Geo-Information 150 (2015) (finding that ammonia concentrations in areas downwind of swine CAFOs were up to three times higher than the average concentration in the watershed, exposing approximately 3,500 people to ammonia concentrations higher than the minimal risk level).

¹⁴² See Nina G.G. Domingo et al., *Air Quality-Related Health Damages of Food*, 118 Proceedings Nat’l Acad. Scis., at 1, 2, Fig. 1 (2021).

¹⁴³ See Kendall M. Thu et al., *A Control Study of the Physical and Mental Health of Residents Living Near a Large-Scale Swine Operation*, 3 J. Agric. Safety & Health 13, 16–18 (1997).

¹⁴⁴ *Id.*

¹⁴⁵ See Maria C. Mirabelli et al., *Asthma Symptoms Among Adolescents Who Attend Public Schools that are Located Near Confined Swine Feeding Operations*, 118 Pediatrics e66, e70 (2006).

¹⁴⁶ See Exhibit 2 ¶ 12; Exhibit 15 ¶ 10.

¹⁴⁷ See Biswaranjan Paital & Pawan Kumar Agrawal, *Air Pollution by NO₂ and PM_{2.5} Explains COVID-19 Infection and Severity by Overexpression of Angiotensin-Converting Enzyme 2 in Respiratory Cells: A Review*, 19 Env’t Chemistry Letters 25 (2021).

¹⁴⁸ See Susan S. Schiffman et al., *The Effect of Environmental Odors Emanating from Commercial Swine Operations on the Mood of Nearby Residents*, 37 Brain Rsch. Bull. 369 (1995).

¹⁴⁹ *Id.* at 370.

opportunities to engage in social, recreational, and physical activities.¹⁵⁰ Similarly, studies show that odor from swine CAFOs prevents neighbors from participating in activities like “barbequing, . . . socializing with neighbors [and family], gardening, working outside, playing, drying laundry outside, opening doors and windows for fresh air and to conserve energy, . . . growing vegetables,” and even sleeping through the night.¹⁵¹ A resident of Dodge County, Minnesota—whose home is surrounded by 12 CAFOs—says, “While our farm traditionally served as a gathering place for multiple generations, children, grandchildren, and great-grandchildren have not been able to gather at our farm for years. The risk that a family gathering will be ruined by the overwhelming stench from area CAFOs is just too great.”¹⁵²

Although EPA and other federal agencies have long been aware of the substantial and well-documented harms associated with exposure to air pollution from CAFOs, they have allowed CAFOs to escape regulation necessary to protect public health. In 1998, a group of nearly 50 scientists participating in an expert workshop convened in part by EPA agreed that “odorous emissions from animal operations . . . have an impact on physical health.”¹⁵³ That same year, air quality experts at a workshop organized by the Centers for Disease Control concluded that “adequate evidence currently exists to indicate airborne emissions from large-scale swine facilities constitute a public health problem.”¹⁵⁴ Despite these findings, after years of negotiations with the animal agriculture industry, EPA agreed in 2005 to *excuse* approximately 13,900 industrial animal agriculture facilities from any obligations under the Clean Air Act (“CAA”);¹⁵⁵ the Comprehensive Environmental Response, Compensation, and Liability Act (“CERCLA”);¹⁵⁶ and the Emergency Planning and Community Right-to-Know Act

¹⁵⁰ See Mirabelli et al., *supra* note 145, at e71.

¹⁵¹ M. Tajik et al., *Impact of Odor from Industrial Hog Operations on Daily Living Activities*, 18 *New Solutions* 193, 201 (2008); see Exhibit 11 ¶ 14; see also Exhibit 4 ¶ 7; Exhibit 2 ¶ 14, Exhibit 17 ¶ 8; Exhibit 9 ¶ 5; Exhibit 3 ¶ 8; Exhibit 7 ¶ 4.

¹⁵² Exhibit 2 ¶ 15.

¹⁵³ Kendall M. Thu, *Public Health Concerns for Neighbors of Large-Scale Swine Production*, 8 *J. Agric. Safety & Health* 175, 179 (2002).

¹⁵⁴ *Id.* at 180.

¹⁵⁵ Stationary sources, potentially including CAFOs, which emit air pollutants in sufficient quantities can trigger CAA permit requirements. See 42 U.S.C. § 7661a. However, for over a decade, Congress has passed an appropriations rider that prohibits EPA from using appropriated funds “to promulgate or implement any regulation requiring the issuance of permits under title V of the Clean Air Act (42 U.S.C. 7661 et seq.) for carbon dioxide, nitrous oxide, water vapor, or methane emissions resulting from biological processes associated with livestock production.” See H.R. 2471, 117th Cong. § 436 (2022).

¹⁵⁶ CERCLA imposes various reporting requirements for releases of hazardous substances, such as ammonia and hydrogen sulfide, including a duty for facility operators to notify EPA when hazardous substances are released. See 42 U.S.C. § 9603(a); 40 C.F.R. § 302.4(a).

(“EPCRA”),¹⁵⁷ pending the development of metrics for measuring air pollution, known as emissions estimating methodologies (“EEMs”).¹⁵⁸

EPA originally estimated that it would begin publishing EEMs by 2009 and industrial animal agriculture facilities would obtain necessary permits and install emissions controls by 2010,¹⁵⁹ but these dates have come and gone without adequate federal oversight of air pollution from CAFOs. Though EPA published draft EEMs in August 2022, it does not plan to finalize the EEMs until the end of 2023, to say nothing of its plans for requiring facilities to obtain permits and install emissions controls, which remain uncertain.¹⁶⁰ Similarly, EPA has not required CAFOs to report dangerous air emissions under CERCLA and EPCRA. In 2017, the U.S. Court of Appeals for the District of Columbia concluded that EPA lacked authority to exempt CAFOs from these reporting requirements—in part, because EPA conceded that it could respond to emissions reports by requiring CAFO operators to “eliminate the risk” of death or serious injury through improving their management of liquid waste.¹⁶¹ However, in 2018, Congress exempted CAFOs from reporting dangerous air emissions under CERCLA.¹⁶² And, in 2019, EPA issued a rule exempting CAFOs from reporting emissions under EPCRA, leaving the public with few protections against dangerous CAFO air pollution.¹⁶³

2. CAFOs Generate and Spread Pathogens, Including Antibiotic-Resistant Bacteria.

In addition to the pollutants described above, CAFOs harbor and spread harmful pathogens, including influenza viruses, *Salmonella*, *Leptospira*, and *E. coli*, which cause illness

¹⁵⁷ EPCRA requires facilities to notify state, tribal, and local authorities of any areas likely to be affected by releases of hazardous and extremely hazardous substances, including ammonia and hydrogen sulfide. See 42 U.S.C. § 11004; 40 C.F.R. § 355 App. A.

¹⁵⁸ See EPA, Off. of Inspector Gen., *Eleven Years After Agreement, EPA Has Not Developed Reliable Emission Estimation Methods to Determine Whether Animal Feeding Operations Comply with Clean Air Act and Other Statutes Report* (2017), https://www.epa.gov/sites/default/files/2017-09/documents/epaig_20170919-17-p-0396.pdf.

¹⁵⁹ *Id.* at 5.

¹⁶⁰ See EPA, *National Air Emissions Monitoring Study*, EPA, <https://www.epa.gov/afos-air/national-air-emissions-monitoring-study> (last visited August 7, 2022).

¹⁶¹ *Waterkeeper All. v. EPA*, 853 F.3d 527, 536 (D.C. Cir. 2017).

¹⁶² See Consolidated Appropriations Act of 2018, H.R. 1625, 115th Cong. § 1102 (2018).

¹⁶³ See Amendment to Emergency Release Notification Regulations on Reporting Exemption for Air Emissions from Animal Waste at Farms; Emergency Planning and Community Right-to-Know Act, 84 Fed. Reg. 27,533-01 (June 13, 2019). On February 14, 2022, a federal district court granted EPA’s motion to remand this rule without vacatur because EPA had admitted a need to “revise or rescind” the rule in light of Executive Order 13,990, which directs federal agencies to review and address rules that fail to improve public health and protect the environment. See *Rural Empowerment Ass’n for Cmty. Help v. EPA*, Civ. Action No. 18-2260 (D.D.C. Feb. 14, 2022). As of September 2022, the exemption—which, as EPA essentially has admitted, fails to improve public health and protect the environment—remains in place.

in humans.¹⁶⁴ Holding large numbers of animals in crowded confinement buildings—where accumulated manure attracts disease-carrying insects—facilitates the spread and mutation of pathogens, putting the health of CAFO workers and community members at risk.¹⁶⁵ Numerous studies demonstrate that pathogens at CAFOs can pass to humans through exposure to contaminated animal tissues, feed, and waste, as well as through surface water, groundwater, and the air.¹⁶⁶ For example, one recent study found that bacteria passed from swine to CAFO workers and neighbors.¹⁶⁷ The same study also found evidence of household-level transmission between CAFO workers and their children.¹⁶⁸

CAFO operators commonly administer antibiotics at low doses over long periods of time in order to prevent disease, even among healthy animals.¹⁶⁹ Consistent exposure to antibiotics encourages bacteria to develop antibiotic resistance genes,¹⁷⁰ and as a result, many pathogens associated with CAFOs are resistant to common antibiotics.¹⁷¹ The development and spread of resistance genes and antibiotic-resistant bacteria harm human health. Infections caused by antibiotic-resistant bacteria are difficult and sometimes impossible to treat, leading to prolonged infections, high medical costs, increased spread of resistant infections, and increased death

¹⁶⁴ See Cole et al., *supra* note 141, at 691–93.

¹⁶⁵ See Bonnie M. Ballard, *COVID and CAFOs: How a Federal Livestock Welfare Statute May Prevent the Next Pandemic*, 100 N.C. L. Rev. 281, 286–287 (2021), <https://scholarship.law.unc.edu/cgi/viewcontent.cgi?article=6861&context=nclr>.

¹⁶⁶ See Cole et al., *supra* note 141, at 688 (noting that contact with infected urine or tissues can transmit pathogens from animals to humans); see also Shawn G. Gibbs et al., *Isolation of Antibiotic-Resistant Bacteria from the Air Plume Downwind of a Swine Confined or Concentrated Animal Feeding Operation*, 114 *Env't Health Persps.* 1032, 1036 (2006) (finding antibiotic-resistant bacteria in air plumes 150 meters downwind from a swine CAFO); Michael Greger & Gowri Koneswaran, *The Public Health Impacts of Concentrated Animal Feeding Operations on Local Communities*, 33 *Family & Cmty. Health* 373, 375 (2010) (linking overflowing waste pits, runoff from land application, and the spread of pathogens in the environment); Bridgett M. West et al., *Antibiotic Resistance, Gene Transfer, and Water Quality Patterns Observed in Waterways Near CAFO Farms and Wastewater Treatment Facilities*, 217 *Water, Air, & Soil Pollution* 473 (2011) (finding that CAFOs may increase the prevalence of multi-drug-resistant bacteria in waterways).

¹⁶⁷ See Pranay R. Randad et al., *Transmission of Antimicrobial-Resistant Staphylococcus aureus Clonal Complex 9 Between Pigs and Humans, United States*, 27 *Emerging Infectious Diseases* 740, 742–44 (2021).

¹⁶⁸ *Id.* at 744.

¹⁶⁹ See Amy Chapin et al., *Airborne Multidrug-Resistant Bacteria Isolated from a Concentrated Swine Feeding Operation*, 113 *Env't Health Persps.* 137 (2005).

¹⁷⁰ *Id.*; see also Cole et al., *supra* note 141, at 692 (reviewing studies showing that antimicrobial resistance increases “with increasing antimicrobial use on farms”).

¹⁷¹ See, e.g., Engeline van Duijkeren et al., *Transmission of Methicillin-Resistant Staphylococcus Aureus Strains Between Different Kinds of Pig Farms*, 126 *Veterinary Microbiology* 383, 387–88 (2008); Tushar Khanna et al., *Methicillin Resistant Staphylococcus Aureus Colonization in Pigs and Pig Farmers*, 128 *Veterinary Microbiology* 298, 301 (2008); Chapin et al., *supra* note 169, at 139–41.

rates.¹⁷² In the United States, Methicillin-Resistant *Staphylococcus aureus* (“MRSA”), which causes skin, urinary tract, and wound infections, along with more serious and potentially fatal health problems, including bacteremia, endocarditis, and necrotizing pneumonia,¹⁷³ is a major antibiotic resistance threat.¹⁷⁴ Multiple studies have linked CAFOs to the spread of MRSA.¹⁷⁵

Like CAFO water and air pollution, CAFO antibiotic use escapes regulation necessary to protect public health. The U.S. Food and Drug Administration (“FDA”) has acknowledged that animals exposed to antimicrobials, a category of substances that includes antibiotics, “can contribute to the development and proliferation of antimicrobial resistant bacteria,” and “antimicrobial resistance poses [a risk] to public health.”¹⁷⁶ The World Health Organization recommends that regulatory agencies support “reductions in the overall use of medically important antimicrobials in food-producing animals, including complete restriction of use of antimicrobials for growth promotion and for disease prevention (i.e., in healthy animals considered at risk of infection.)”¹⁷⁷ Nonetheless, in 2021, FDA denied a citizen petition asking the agency to withdraw approval for the preventative and growth-promoting uses of certain antibiotics in livestock and poultry.¹⁷⁸ Since the petition was filed, approval for growth-promoting uses was withdrawn at the request of drug manufacturers, but disease-prevention uses are still allowed. As a result, FDA continues to allow the widespread, long-term use of antibiotics among CAFO animals, despite evidence that medically important antibiotics now are more widely sold for use in swine and cattle production than they are for use in human beings.¹⁷⁹ The threats to human health posed by CAFOs’ reliance on antibiotics largely remain unchecked.

¹⁷² See Gibbs et al., *supra* 166, at 1032.

¹⁷³ See Miranda M. L. van Rijen et al., *Livestock-Associated MRSA Carriage in Patients Without Direct Contact with Livestock*, 9 PLoS ONE e100294, e100294–95 (2014).

¹⁷⁴ See Ctrs. for Disease Control & Prevention, *Antibiotic Resistance Threats in the United States, 2013* 77 (2013), <https://www.cdc.gov/drugresistance/threat-report-2013/pdf/ar-threats-2013-508.pdf> (noting that MRSA infected over 80,000 people and killed 11,285 in 2011).

¹⁷⁵ See Gibbs et al., *supra* note 166, at 1,036; see also van Duijkeren et al., *supra* note #, at 387; see also Noah Rosenblatt-Farrell, *The Landscape of Antibiotic Resistance*, 117 *Env’t Health Persps.* A244, A247 (2009); Joan A. Casey et al., *High-Density Livestock Production and Molecularly Characterized MRSA Infections in Pennsylvania*, 122 *Env’t Health Persps.* 464 (2014).

¹⁷⁶ Letter from Steven M. Solomon, Director, Ctr. For Veterinary Med., U.S. Food & Drug Admin., to Allison Johnson & Avinash Kar, Nat. Res. Def. Council, at 2, 4 (Feb. 25, 2021).

¹⁷⁷ See Awa Aidara-Kane et al., *World Health Organization (WHO) Guidelines on Use of Medically Important Antimicrobials in Food-Producing Animals*, 7 *Antimicrobial Resistance & Infection Control* 1 (2018).

¹⁷⁸ See Letter from Steven M. Solomon, *supra* note 176.

¹⁷⁹ See David Wallinga et al., Nat. Res. Def. Council, *U.S. Livestock Antibiotic Use Is Rising, Medical Use Falls* (Nov. 18, 2021), <https://www.nrdc.org/experts/david-wallinga-md/us-livestock-antibiotic-use-rising-medical-use-falls-0> (explaining that “[s]ales of medically important antibiotics for pigs and cattle combined are 55% higher than sales of those medicines for human patients”).

3. CAFOs Exacerbate Climate Change.

In addition to polluting the water and air, CAFOs emit vast quantities of methane and nitrous oxide, two potent greenhouse gasses that contribute to climate change.¹⁸⁰ Manure management and enteric fermentation—a digestive process in cows and other ruminant animals that produces methane as a by-product—are the primary sources of greenhouse gas emissions from CAFOs.¹⁸¹ Manure primarily emits methane and nitrous oxide when it decomposes anaerobically in waste pits and when CAFO operators dispose of it on fields.¹⁸² The quantity of greenhouse gasses emitted from manure management is growing, with methane emissions increasing by 66 percent from 1990 to 2017 and nitrous oxide emissions increasing by 34 percent over the same time period.¹⁸³ As of 2020, manure management was both the fourth-largest source of methane emissions and the fourth-largest source of nitrous oxide emissions in the United States.¹⁸⁴ Wet manure management systems cause particular harm, generating many times more methane than systems that store manure in dry form.¹⁸⁵ Indeed, EPA recently recognized that “[i]n many cases, manure management systems with the most substantial methane emissions are those associated with confined animal management operations where manure is handled in liquid-based systems” and that “the shift toward larger dairy cattle and swine facilities since 1990 has translated into an increasing use of liquid manure management systems, which have higher potential [methane] emissions than dry systems.”¹⁸⁶

Despite CAFOs’ substantial contributions to climate change, lawmakers have shielded the CAFO industry from public scrutiny. For over a decade, Congress has prohibited EPA from using its appropriated funds “to implement any provision in a rule, if that provision requires mandatory reporting of greenhouse gas emissions from manure management systems.”¹⁸⁷ In addition, a statutory provision known as Section 1619, introduced in the 2008 Farm Bill, prohibits USDA from disclosing certain information about CAFOs and other agricultural operations.¹⁸⁸ Section 1619 has impeded USDA’s efforts to conduct scientific research,¹⁸⁹ and it

¹⁸⁰ See Patricia M. Glibert, *From Hogs to HABS: Impacts of Industrial Farming in the US on Nitrogen and Phosphorus and Greenhouse Gas Pollution*, 150 *Biogeochemistry* 139, 165 (2020).

¹⁸¹ See EPA, *Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2020*, 2-29, Tbl. 2-10 (2022), <https://www.epa.gov/system/files/documents/2022-04/us-ghg-inventory-2022-main-text.pdf>.

¹⁸² See Glibert, *supra* note 180, at 157.

¹⁸³ *Id.* at 139.

¹⁸⁴ See EPA, *Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2020*, *supra* note 181, at ES-13, ES-14.

¹⁸⁵ See Olga Gavrilova et al., *Emissions From Livestock and Manure Management*, in 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, at 67, Tbl. 10.17 (2019), https://www.ipcc-nggip.iges.or.jp/public/2019rf/pdf/4_Volume4/19R_V4_Ch10_Livestock.pdf.

¹⁸⁶ EPA, *Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2020*, *supra* note 181, at 5-12.

¹⁸⁷ H.R. 2471, 117th Cong. § 437 (2022).

¹⁸⁸ See 7 U.S.C. § 8791.

¹⁸⁹ See, e.g., Adena R. Rissman et al., *Public Access to Spatial Data on Private-Land Conservation*, 22 *Ecology & Soc’y* 24 (2017) (explaining that Section 1619 “makes it impossible to assess the efficacy of

has increased inefficiencies between federal and state conservation programs, preventing action to reduce greenhouse gas emissions from CAFOs.¹⁹⁰

Not only has the CAFO industry largely escaped accountability for its greenhouse gas emissions, but industry actors also have made misleading claims and offered false solutions that exacerbate CAFOs' climate harm. Although multiple meat and dairy industry leaders claim that they will achieve "net zero" emissions targets within the next couple of decades, these claims depend on *ignoring* greenhouse gas emissions from CAFOs, including "enteric and manure emissions from live animal operations."¹⁹¹ In another act of obfuscation, the industry has advocated for the expansion of biodigesters, which capture methane from CAFO manure to produce biogas, also known as biofuel. Proponents characterize biogas as a "renewable" energy source,¹⁹² but by making methane profitable, the biogas industry eliminates any incentive for CAFO owners and operators to reduce methane emissions through responsible manure management.¹⁹³ Indeed, evidence indicates that states already are "overcounting the climate benefits of manure biofuel as a mechanism to reach . . . greenhouse gas reduction targets—a miscount that will only grow as the industry expands."¹⁹⁴ And, as explained in more detail below, early evidence indicates that biogas operations exacerbate the environmental injustice associated with CAFO pollution.¹⁹⁵

the hundreds of millions of dollars that the U.S. taxpayer spends on conservation"); Laurie Ristino & Gabriela Steier, *Losing Ground: A Clarion Call for Farm Bill Reform to Ensure a Food Secure Future*, 42 Colum. J. Env't L. 79 (2016) (noting that, because of Section 1619, "[s]cientists are thwarted from, among other things, carrying out research on conservation practices to assess their effectiveness in achieving improved environmental outcomes").

¹⁹⁰ See Jess R. Phelps, *Conservation, Regionality, and the Farm Bill*, 71 Me. L. Rev. 293, 339 (2019) (observing that Section 1619 "makes integrated [conservation] project planning . . . more difficult and less effective than would otherwise be the case").

¹⁹¹ See, e.g., *Environment: Energy and Emissions*, JBS USA, <https://sustainability.jbsfoodsgroup.com/chapters/environment/energy-emissions/> (last visited Mar. 30, 2022).

¹⁹² See Phoebe Gittleson et al., *The False Promises of Biogas: Why Biogas Is an Environmental Justice Issue*, Env't Just. (2021), <https://www.liebertpub.com/doi/pdf/10.1089/env.2021.0025>.

¹⁹³ See, e.g., Markus Lauer et al., *Making Money from Waste: The Economic Viability of Producing Biogas and Biomethane in the Idaho Dairy Industry*, 222 Applied Energy 621 (2018); Cal. Climate & Agric. Network, *Diversified Strategies for Reducing Methane Emissions from Dairy Operations*, at 5 (2015), <https://calclimateag.org/wp-content/uploads/2015/11/Diversified-Strategies-for-Methane-in-Dairies-Oct.-2015.pdf> ("Another challenge posed by too great a focus on incentivizing dairy digesters is that, rather than avoiding methane generation altogether, these technologies can actually create incentives to generate methane from manure.").

¹⁹⁴ Tracy Tullis, *Big Oil Wants New York's Cow Manure*, N.Y. Focus (May 25, 2022), <https://www.nysfocus.com/2022/05/25/big-oil-wants-new-yorks-cow-manure/>.

¹⁹⁵ See *infra* Section III.B.1.b.

C. Large CAFOs Are a Small Percentage of All Animal Operations but a Significant Source of Pollution.

Large CAFOs comprise a small percentage of farms in the United States, but they confine a huge number of animals, which together produce enormous quantities of manure. As shown below in Figure Six, as of 2012, only 0.6 percent of U.S. farms were Large CAFOs.¹⁹⁶ However, Large CAFOs accounted for 32 percent of all animal units on farms¹⁹⁷ and 33 percent of all farm manure.¹⁹⁸ Even in the context of industrial-scale facilities, Large CAFOs confine strikingly high numbers of animals and generate an outsize share of manure; as of 2012, Large CAFOs made up only seven percent of animal feeding operations—that is, facilities that hold any number of animals in confinement¹⁹⁹—but they accounted for 63 percent of all animal units confined in animal feeding operations and 59 percent of all manure produced at animal feeding operations.²⁰⁰

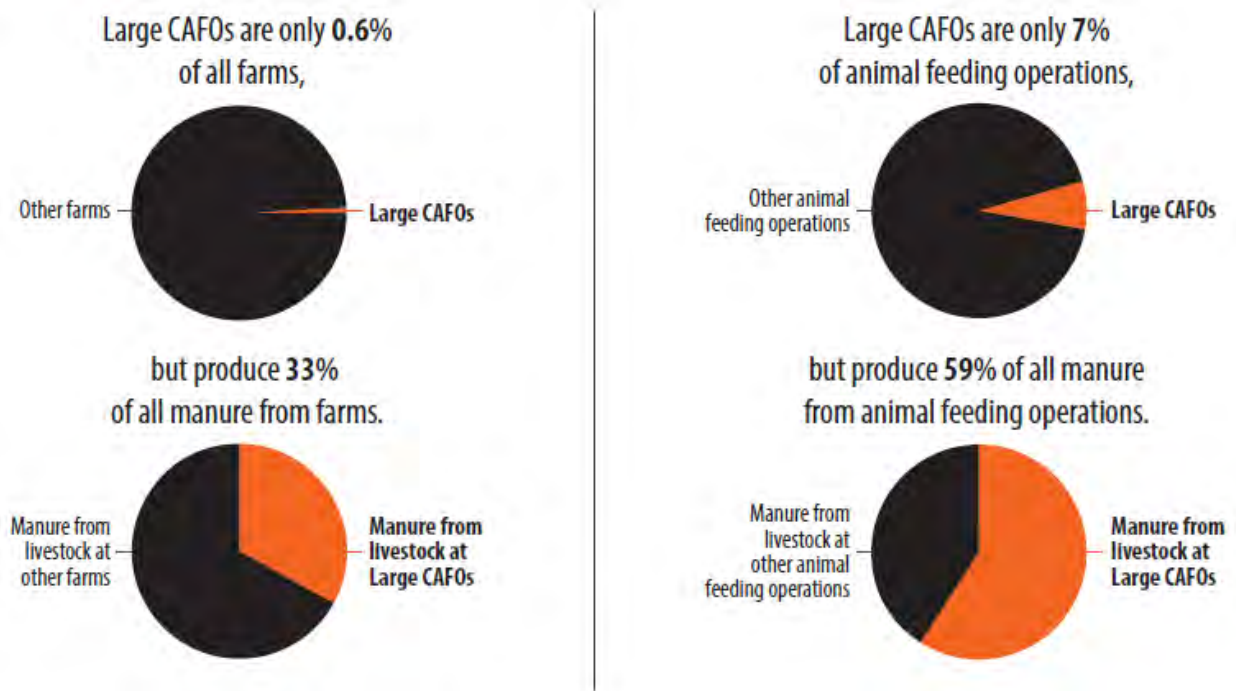


Figure Six. Percentage of manure from farms and all manure from animal feeding operations generated by Large CAFOs.

¹⁹⁶ See Gollehon et al., *supra* note 18 at 4, Tbl. 1.

¹⁹⁷ See *id.* An “animal unit” represents 1,000 pounds of live animal weight. See Robert L. Kellogg et al., U.S. Dep’t of Agric., Natural Res. Conservation Serv., *Manure Nutrients Relative to the Capacity of Cropland and Pastureland to Assimilate Nutrients: Spatial and Temporal Trends for the United States 2* (2000). The measure serves as a common unit for comparing different types of animals. *Id.*

¹⁹⁸ See *id.* at 9, Tbl. 2.

¹⁹⁹ See 40 C.F.R. § 122.23(b)(1).

²⁰⁰ See *id.* at 9, Tbl. 2.

Looking to swine and dairy production in particular, Large CAFOs similarly make up a very small percentage of all swine and dairy facilities but confine a huge number of animals. According to the 2017 Census of Agriculture, only five percent of all swine facilities (3,600 operations) confined more than 5,000 swine.²⁰¹ Yet, that five percent of facilities confined 73 percent of all swine produced in the United States.²⁰² And, as for dairy cow facilities, only four percent (1,953 operations) confined more than 1,000 dairy cows, but those facilities accounted for 50 percent of all dairy cows produced in the country.²⁰³ Because the amount of manure produced closely corresponds to the number of animals confined, relatively few Large swine and dairy cow CAFOs produce the majority of swine and dairy cow manure. Given the serious and extensive water pollution that results from this manure,²⁰⁴ increasing oversight of these few Large CAFOs will achieve significant benefits for humans, wildlife, and the environment.

II. LEGAL BACKGROUND

A. The CWA Specifically Identifies CAFOs as Point Sources Subject to the Act's Requirements.

The CWA expressly states that CAFOs are subject to the Act's requirements. Designed to “restore and maintain the chemical, physical, and biological integrity of the Nation’s waters,”²⁰⁵ the CWA prohibits all discharges of pollutants from point sources to “navigable waters,”²⁰⁶ except as authorized by permit.²⁰⁷ The Act defines “point sources” primarily by

²⁰¹ See USDA, *2017 Census of Agriculture* 23, Tbl. 19 (2019). As previously noted, USDA does not use EPA’s thresholds for Large CAFOs when it collects data for the Census of Agriculture. As relevant here, USDA collects data on swine operations with 2,000 to 4,999 swine and 5,000 or more swine. *Id.* Operations in the latter range are most likely to meet EPA’s definition of a Large swine CAFO, which includes operations that confine 2,500 or more swine weighing 55 pounds or 10,000 or more swine weighing less than 55 pounds. See 40 C.F.R. § 122.23(b)(4). However, for operations that confine 2,000 or more swine, it is also the case that they make up a small percentage of all swine operations but confine the majority of swine raised for food production. As of 2017, only 12 percent of all swine operations (8,324 operations) confined more than 2,000 swine, but those operations confined 94 percent of all swine on farms. See USDA, *2017 Census of Agriculture* 23, Tbl. 19 (2019).

²⁰² See *id.*

²⁰³ See USDA, *2017 Census of Agriculture* 23, Tbl. 17 (2019). As relevant here, USDA collects data on dairy cow operations that confine 500 to 999 cows and 1,000 or more cows. See *id.* EPA defines a Large dairy cow CAFO as one that confines 700 or more mature dairy cows. See 40 C.F.R. § 122.23(b)(4). For dairy operations that confine 500 or more cows, those operations made up only 6.3 percent (3,464 operations) of all dairy farms, but they accounted for 61 percent of all dairy cows on farms. See USDA, *2017 Census of Agriculture* 23, Tbl. 17 (2019).

²⁰⁴ See *infra* Section IV.B.

²⁰⁵ 33 U.S.C. § 1251(a).

²⁰⁶ “Navigable waters” means the “waters of the United States, including the territorial seas.” *Id.* § 1362(7).

²⁰⁷ See *id.* §§ 1311(a), 1342(a), 1362(12).

reference to various types of “conveyance[s],” such as pipes, ditches, and channels.²⁰⁸ Importantly, the definition also includes one—and only one—industrial category by name: CAFOs.²⁰⁹

The CWA’s prohibition on unpermitted discharges extends to intermittent, sporadic, and occasionally, groundwater discharges. “[A]n intermittent polluter—one who [discharges] one month out of every three—is just as much ‘in violation’ of the Act as a continuous violator.”²¹⁰ In addition, a polluter is liable for discharges of “pollutants that reach navigable waters after traveling through groundwater if [those] discharge[s] [are] the functional equivalent of a direct discharge from the point source into navigable waters.”²¹¹ Thus, operations that meet EPA’s regulatory definition of a CAFO²¹² must obtain CWA permits if they discharge pollutants to the nation’s navigable waters, even if their discharges are intermittent, sporadic, or in certain circumstances, allowed to leach through groundwater into a river or stream.²¹³

Congress’s express inclusion of CAFOs in the definition of “point source” reflects its understanding that CAFOs are significant—and growing—sources of water pollution.²¹⁴ In a Senate committee report on the Federal Water Pollution Control Act Amendments of 1971, which became the CWA, Senator Robert Dole remarked that “[a] major new thrust of this bill is in the field of agricultural pollution.”²¹⁵ Pollution from CAFO waste was of particular concern. As Senator Dole explained:

Animal and poultry waste, until recent years, has not been considered a major pollutant. Until the past ten or fifteen years few problems existed, because animals were relatively wide-spread on pasture and rangeland and their manure was

²⁰⁸ See 33 U.S.C. § 1362(14).

²⁰⁹ *Id.* A CAFO’s “manure spreading vehicles, as well as manure storing fields, and ditches used to store or transfer the waste” all constitute CAFO point sources under the CWA. *Cnty. Ass’n for Restoration of the Env’t v. Henry Bosma Dairy*, 305 F.3d 943, 955 (9th Cir. 2002) (“*CARE I*”).

²¹⁰ *Gwaltney of Smithfield, Ltd. v. Chesapeake Bay Found.*, 484 U.S. 49, 63 (1987); see also *CARE II*, 305 F.3d at 953; *Nat. Res. Def. Council, Inc. v. Texaco Refin. & Mktg, Inc.*, 2 F.3d 493, 501 (39d Cir. 1993); *Carr v. Alta Verde Indus., Inc.*, 931 F.2d 1055, 1062 (5th Cir. 1991); *Atl. States Legal Found., Inc. v. Tyson Foods, Inc.*, 897 F.2d 1128, 1133 (11th Cir. 1990).

²¹¹ *Cnty. of Maui v. Hawaii Wildlife Fund*, 140 S. Ct. 1462, 1477 (2020).

²¹² See 40 C.F.R. § 122.23(b)(2).

²¹³ See Comments on Ohio’s Preliminary Modeling Results for the Maumee Watershed Nutrient TMDL 4 (2022), attached as Exhibit 18 (applying *County of Maui v. Hawaii Wildlife Fund* to discharges from CAFOs).

²¹⁴ See *CARE II*, 305 F.3d at 955 (“The very nature of a CAFO and the amount of animal wastes generated constitute a large threat to the quality of the waters of the nation. Therefore, Congress empowered the EPA to regulate CAFOs as point sources.”); see also *Cnty. Ass’n for Restoration of the Env’t v. Sid Koopman Dairy*, 54 F. Supp. 2d 976, 981 (E.D. Wash. 1999) (“*CARE I*”) (“Congress and the EPA were concerned with the amount of animal wastes generated by a CAFO and the threat those wastes pose to the waters of the United States.”).

²¹⁵ S. Rep. No. 92-414, at 98 (1971).

deposited on the ground to be naturally recycled through the soil and plant cover.

...

The picture has changed dramatically, however, as development of intensive livestock and poultry production on feedlots and in modern buildings has created massive concentrations of manure in small areas. The recycling capacity of the soil and plant cover has been surpassed. In these modern facilities the use of bedding and litter has been greatly reduced; consequently, the manure which is produced remains essentially in the liquid state and is much more difficult to handle without odor and pollution problems. Precipitation runoff from these areas picks up high concentrations of pollutants which reduce oxygen levels in receiving streams and lakes and accelerate the eutrophication process.²¹⁶

As discussed above, the problem identified in this legislative history—industrial animal production that generates “massive concentrations of manure in small areas,” causing “odor and pollution problems”²¹⁷—has grown exponentially since 1971. Indeed, a recent federal bill proposing a moratorium on all Large CAFOs reflects the continuing and worsening problems that Large CAFOs pose.²¹⁸

1. CAFOs Operating Under NPDES Permits Are Subject to Specific and Enforceable Effluent Limitations.

To restrict pollutant discharges from CAFOs and other point sources, the CWA established the National Pollutant Discharge Elimination System (“NPDES”), a permitting scheme managed by EPA in partnership with state environmental agencies.²¹⁹ NPDES permits include “effluent limitations,” which are “restriction[s] established by a State or the [EPA] Administrator on quantities, rates, and concentrations” of discharges.²²⁰ To ensure that NPDES permits meet the CWA’s requirements, EPA may object to any NPDES permit that a state proposes to issue if the permit does not comply with the CWA.²²¹ As the Second Circuit has explained, “the NPDES permit is critical to the successful implementation of the Act because . . . the NPDES permit ‘defines, and facilitates compliance with, and enforcement of, a preponderance of a discharger’s obligations under the [Act].’”²²²

²¹⁶ *Id.*

²¹⁷ *Id.*

²¹⁸ *See* Farm System Reform Act of 2021, S.2332, 117th Cong. § 102 (2021).

²¹⁹ *See* 33 U.S.C. § 1342. Where state agencies administer the NPDES permitting scheme, they must comply with all requirements of the CWA and federal regulations. *See id.* § 1342(b).

²²⁰ *Id.* at § 1362(11).

²²¹ *Id.* at § 1342(d).

²²² *Waterkeeper All., Inc.*, 399 F.3d at 492 (quoting *EPA v. California*, 426 U.S. 200, 205 (1976)).

Currently, CAFO NPDES permits rely largely on best management practice effluent limitations, which are qualitative limitations on pollutant discharges.²²³ For example, CAFOs operating under NPDES permits must develop and implement a nutrient management plan, which CAFO operators should use to manage the storage and disposal of manure and other waste; analyze manure and soil for their nutrient content at specific intervals; and avoid applying waste within 100 feet of any down-gradient surface water unless certain conditions are satisfied.²²⁴ These best management practices are specific, enforceable requirements for CAFO operations; however, they are not technologically complex and, thus, are not unduly burdensome. As detailed below, the best management practices in NPDES permits are often more protective of water quality than the requirements for CAFOs in state laws and permits.²²⁵

2. CAFOs Operating Under NPDES Permits Are Subject to Public Participation During the Permitting Process.

The CWA requires that the public have an opportunity to participate in the NPDES permitting process.²²⁶ When a CAFO operator applies for a NPDES permit, the permitting agency must notify the public of the application and make the application available for public review.²²⁷ If the CAFO operator has applied for coverage under a NPDES general permit,²²⁸ and the permitting agency makes a preliminary determination to grant coverage, the agency must accept public comments on the application, including the CAFO's nutrient management plan, which the CAFO operator should use to manage the storage and disposal of manure and other waste to reduce the likelihood of discharges.²²⁹ The agency must respond to "significant comments" received during the comment period and, if necessary, require the CAFO operator to revise its application in response to comments.²³⁰ In addition, before a permitting agency grants any NPDES permit, it must provide an opportunity for a public hearing.²³¹

The CWA's legislative history "emphasize[s] that an essential element of the NPDES program is public participation."²³² In fact, lawmakers recognized that "[a] high degree of

²²³ See 40 C.F.R. § 412.

²²⁴ *Id.* § 412.4.

²²⁵ See *infra* Section III.A.3.

²²⁶ See 33 U.S.C. § 1251(e) ("Public participation in the development, revision, and enforcement of any regulation, standard, effluent limitation, plan, or program established by the Administrator or any State under this chapter shall be provided for, encouraged, and assisted by the Administrator and the States.").

²²⁷ See 33 U.S.C. § 1342(a)(3), (b)(3), (j).

²²⁸ NPDES general permits authorize categories of discharges within geographic areas. See 40 C.F.R. § 122.2.

²²⁹ *Id.* § 122.23(h)(1).

²³⁰ *Id.*

²³¹ See 33 U.S.C. § 1342 (a)(3), (b)(3).

²³² *Costle v. Pac. Legal Found.*, 445 U.S. 198, 216 (1980); see *Env't Def. Ctr., Inc. v. EPA*, 344 F.3d 832, 856 (9th Cir. 2003) ("Congress identified public participation rights as a critical means of advancing the goals of the Clean Water Act in its primary statement of the Act's approach and philosophy.").

informed public participation . . . is essential to the accomplishment of the objectives [of the Act]—a restored and protected natural environment.”²³³ Thus, “[t]he public must have a genuine opportunity to speak on the issue of protection of its waters.”²³⁴ In the CAFO NPDES permitting context, public review of nutrient management plans is particularly important. Reviewing nutrient management plans enables the public to “call[] for a hearing about—and then meaningfully comment on—NPDES permits before they issue.”²³⁵ And, as discussed below, public participation is also necessary to reveal and begin to address the environmental injustice that CAFOs cause.²³⁶ Despite the importance of public participation, however, state laws and permits governing CAFOs typically provide fewer opportunities for public involvement than NPDES permits.²³⁷

3. CAFOs Operating Under NPDES Permits Are Subject to Citizen Suits.

In addition to providing for public participation in NPDES permitting, the CWA allows the public to enforce effluent limitations in NPDES permits. The Act provides that, so long as certain conditions are satisfied, any citizen may bring a civil action against any person who has violated an effluent limitation.²³⁸ In other words, the CWA allows citizens to sue CAFOs that violate the terms of the CWA or their NPDES permits. These “citizen suits” allow citizens to “act[] as private attorneys general,”²³⁹ and they are “intended [to be used . . .] to both spur and supplement government enforcement actions.”²⁴⁰ “[A]ccordingly, the purpose of [a citizen] suit is to protect and advance the public’s interest in pollution-free waterways[.]”²⁴¹

Citizen suits have played an important role in holding CAFOs accountable for the water pollution they cause. Indeed, one of the seminal decisions involving CAFO water pollution—*Community Association for Restoration of the Environment v. Henry Bosma Dairy*—was the result of a citizen suit.²⁴² In that case, the U.S. Court of Appeals for the Ninth Circuit affirmed a \$171,500 civil penalty assessed against a CAFO operator with “a long history of [NPDES permit] compliance problems,” including continuing violations and violations that were likely to recur related to the “misapplication or overapplication” of manure to a nearby field, discharges from which ultimately reached the Yakima River.²⁴³ Advocates also have relied on citizen suits

²³³ S. Rep. No. 92-414, at 12.

²³⁴ *Id.* at 72.

²³⁵ *Waterkeeper Alliance, Inc.*, 399 F.3d at 503.

²³⁶ *See infra* Sections II.B.1. and III.B.2.

²³⁷ *See infra* Section III.A.3.

²³⁸ *See* 33 U.S.C. § 1365.

²³⁹ *Pa. Env’t Defense Found. v. Bellefonte Borough*, 718 F. Supp. 431, 434 (M.D. Pa. 1989).

²⁴⁰ *Waterkeeper All., Inc.*, 399 F.3d at 503 (quoting S. Rep. No. 50, 99th Cong., 1st Sess. 28 (1985)).

²⁴¹ *Pa. Env’t Defense Found.*, 718 F. Supp. at 434.

²⁴² *See CARE II*, 305 F.3d at 948.

²⁴³ *Id.* at 954.

to challenge CAFOs that discharge water pollution without NPDES permits in violation of federal law, lengthy and costly actions that illustrate the importance of the requested presumption.²⁴⁴ Citizen suits provide CAFO neighbors with recourse in situations in which EPA and state environmental agencies are unable or unwilling to bring enforcement actions. And, as described below, citizen suits offer members of environmental justice communities who are disproportionately harmed by CAFO permit violations an additional tool to hold those CAFOs accountable.²⁴⁵ Although citizen suits can be a powerful tool, the CWA imposes limitations to ensure that they do not overwhelm courts or regulated parties with excessive and burdensome litigation.²⁴⁶ For example, the CWA provides that citizens must provide the federal government and defendants with 60 days' notice of alleged violations prior to filing suit, thereby allowing "agencies [to] step in, investigate, and bring the defendant into compliance."²⁴⁷ In addition, courts have made clear that a CWA citizen suit will fail if it alleges "wholly past violations;" instead, plaintiffs must "allege a state of either continuous or intermittent violation—that is, a reasonable likelihood that a past polluter will continue to pollute in the future."²⁴⁸ Because of these limitations, citizen suits serve a narrow but important role in vindicating the CWA's protections. Yet, as discussed below, Petitioners are not aware of any state law governing CAFOs that provides for citizen suits.²⁴⁹

²⁴⁴ See, e.g., *Carr v. Alta Verde Industries, Inc.*, 931 F. 2d 1055, 1063 (concluding that a discharging cattle facility, which confined up to 30,000 animals and employed a wet manure management system, constituted a CAFO within the meaning of the CWA, and it would "remain[] in a continuing state of violation until it either obtains a permit or no longer meets the definition of a point source"); *Concerned Area Residents for the Env't v. Southview Farm*, 34 F.3d 114, 118, 121, 123 (finding that a dairy facility, which confined 2,200 animals and employed a wet manure management system, constituted a CAFO within the meaning of the CWA and improperly discharged water pollution without an NPDES permit by, among other things, allowing manure to travel through a ditch that ultimately led to the Genesee River and over-applying manure to fields in advance of rain).

²⁴⁵ See *infra* Section III.B.3.

²⁴⁶ See, e.g., *Hallstrom v. Tillamook Cnty.*, 493 U.S. 20, 29 (1989) (explaining that the CWA "strike[s] a balance between encouraging citizen enforcement of environmental regulations and avoiding burdening the federal courts with excessive numbers of citizen suits").

²⁴⁷ *CARE II*, 305 F.3d at 953; see also *Gwaltney of Smithfield, Ltd. v. Chesapeake Bay Found., Inc.*, 484 U.S. 49, 60 (1987) (observing that the purpose of the 60-day notice provision is "to give [the alleged violator] an opportunity to bring itself into complete compliance with the Act and thus likewise render unnecessary a citizen suit."); *CARE II*, 305 F.3d at 953 ("The point is to trigger agency enforcement and avoid a lawsuit. Congress did not intend to unduly burden citizens by requiring them to basically carry out the job of the agency.").

²⁴⁸ *Gwaltney of Smithfield*, 484 U.S. at 57.

²⁴⁹ See *infra* Section III.B.3.

B. Executive Orders Require EPA to Advance Environmental Justice.

1. Executive Order 12,898 Requires EPA to Collect Data on Environmental Justice Issues, Address Those Issues, and Ensure that Environmental Justice Communities Are Able to Participate in EPA’s Activities.

Executive Order 12,898 establishes “the goal of achieving environmental protection for all communities.”²⁵⁰ To accomplish this goal, the order requires each federal agency to “collect, maintain, and analyze information assessing and comparing environmental and human health risks borne by populations identified by race, national origin, or income.”²⁵¹ The agencies “shall use this information to determine whether their programs, policies, and activities have disproportionately high and adverse human health or environmental effects on minority populations and low-income populations.”²⁵² The order also requires that, to “the greatest extent practicable,” each federal agency must “identify[] and address[], as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.”²⁵³ In addition, the order requires each federal agency to “conduct its programs, policies, and activities that substantially affect human health or the environment[] in a manner that ensures that such programs, policies, and activities do not have the effect of excluding persons . . . from participation” in them.²⁵⁴

In response to Executive Order 12,898, EPA developed an environmental justice strategy that reiterates the importance of the objectives in the executive order.²⁵⁵ The strategy aims to ensure that “[n]o segment of the population, regardless of race, color, national origin, or income, . . . suffers disproportionately from adverse human health or environmental effects, and all people live in clean, healthy, and sustainable communities.”²⁵⁶ EPA recognized that both data and public participation are necessary for achieving this goal. EPA explained that its “mission of protecting public health and the environment depends on individuals within and outside of the Federal government having access to good data for informed decision-making” and that “[a] comprehensive approach to identifying and addressing environmental justice concerns requires

²⁵⁰ EPA, *Summary of Executive Order 12898 – Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, <https://www.epa.gov/laws-regulations/summary-executive-order-12898-federal-actions-address-environmental-justice>.

²⁵¹ Exec. Order No. 12,898 § 3-302.

²⁵² *Id.*

²⁵³ *Id.* § 1-101.

²⁵⁴ *Id.* § 2-2.

²⁵⁵ See EPA, *The Environmental Protection Agency’s Environmental Justice Strategy* (1995), https://www.epa.gov/sites/default/files/2015-02/documents/ej_strategy_1995.pdf.

²⁵⁶ *Id.*

the early involvement of affected communities.”²⁵⁷ EPA also committed to “incorporat[ing] environmental justice concerns into its program for ensuring compliance with Federal environmental requirements at both private and Federal facilities” and to using “the full range of tools available to it to correct noncompliance” in environmental justice communities.²⁵⁸

In an August 2022 document, EPA again highlighted the importance of public participation to advancing environmental justice. EPA stated:

Community engagement should occur as soon as possible and should go far beyond simply posting public notices. With respect to permitting actions that could result in significant health, environmental, and quality of life impacts, the stakes are often that much higher for communities with [environmental justice] concerns. The goal of community engagement is to ensure that the people most affected by the permit have input into the decisions that will impact their lives. . . . Robust community engagement is crucial for making informed permitting decisions that meaningfully consider the site-specific circumstances of the permitting action.²⁵⁹

As this petition makes clear, CAFO permitting has significant health, environmental, and quality of life impacts.²⁶⁰ Thus, opportunities for public participation are crucial for the environmental justice communities that CAFOs disproportionately harm.²⁶¹

2. Executive Order 14,008 Requires EPA to Strengthen Enforcement of Environmental Violations that Disproportionately Harm Environmental Justice Communities.

Executive Order 14,008 reiterates and builds on Executive Order 12,898’s requirement that agencies address environmental justice issues. Executive Order 14,008 acknowledges that “[t]o secure an equitable economic future, the United States must ensure that environmental and economic justice are key considerations in how we govern.”²⁶² To this end, the order directs EPA to “strengthen enforcement of environmental violations with disproportionate impact on underserved communities.”²⁶³

Following Executive Order 14,008, EPA Administrator Michael Regan emphasized the role of enforcement in advancing environmental justice. Administrator Regan directed all EPA offices to “examine, and appropriately use, the full array of policy and legal tools at [their]

²⁵⁷ *Id.*

²⁵⁸ *Id.*

²⁵⁹ EPA, *Interim Environmental Justice and Civil Rights in Permitting Frequently Asked Questions*, *supra* note 26, at 16–17.

²⁶⁰ *See supra* Section I.

²⁶¹ *See infra* Section III.B.1.

²⁶² Exec. Order No. 14,008 § 219.

²⁶³ *Id.* § 222(i).

disposal to incorporate environmental and climate justice considerations in [their] analysis, rulemaking, permitting, enforcement, . . . and other activities.”²⁶⁴ Administrator Regan also specifically directed EPA offices to “[s]trengthen enforcement of violations of cornerstone environmental statutes and civil rights laws in communities overburdened by pollution.”²⁶⁵

III. JUSTIFICATION

EPA’s current approach to CAFO permitting depends on self-reporting. CAFO operators are responsible for determining whether they discharge and, if so, applying for NPDES permits. EPA’s approach allows many CAFOs that discharge water pollution to avoid operating under NPDES permits and instead operate without permits or according to state laws and permits that fail to protect water quality or advance environmental justice. Indeed, EPA itself has acknowledged the importance of “improv[ing] the effectiveness of [its] CAFO regulations.”²⁶⁶ For these reasons and as explained in detail below, when applied to Large CAFOs using wet manure management systems, EPA’s current approach violates the CWA and falls short of the environmental justice goals set out in Executive Orders 12,898 and 14,008.

A. EPA’s Current Approach to Permitting Large CAFOs Using Wet Manure Management Systems Violates the CWA.

The CWA is the “principal legislative source of the EPA’s authority—and responsibility—to abate and control water pollution.”²⁶⁷ The Act prohibits discharges from point sources to navigable waters unless the discharger has a permit. For any given discharge subject to the CWA, therefore, EPA must “either [] issue a permit for the discharge of the pollutant or [] enforce the total proscription on discharge[s].”²⁶⁸ Under no circumstances may EPA “leave pollutants subject to the requirements of the statute unregulated.”²⁶⁹ Because the CWA expressly identifies CAFOs as point sources, EPA must either ensure that discharging CAFOs obtain NPDES permits or enforce the Act’s prohibition on unpermitted discharges from CAFOs.²⁷⁰

²⁶⁴ Michael S. Regan, Message from the Administrator, <https://www.epa.gov/sites/default/files/2021-04/documents/regan-messageoncommitmenttoenvironmentaljustice-april072021.pdf>.

²⁶⁵ *Id.*

²⁶⁶ See EPA, *EPA Legal Tools to Advance Environmental Justice*, *supra* note 2, at 75.

²⁶⁷ *Waterkeeper All., Inc.*, 399 F.3d at 491 (emphasis added).

²⁶⁸ *L.A. Waterkeeper v. Pruitt*, 320 F. Supp. 3d 1115, 1122 (C.D. Cal. 2018); see *Nat. Res. Def. Council v. Costle*, 568 F.2d 1369, 1375 (D.C. Cir. 1977); see also *Nw. Env’t Advocs. v. EPA*, 537 F.3d 1006, 1021–22 (9th Cir. 2008).

²⁶⁹ *L.A. Waterkeeper*, 320 F. Supp. 3d at 1122 (emphasis omitted).

²⁷⁰ EPA may not evade this requirement by citing infeasibility. The CWA provides “devices to mitigate the burden to accommodate within a practical regulatory scheme Congress’s clear mandate that all point sources have permits.” *Nat. Res. Def. Council v. Costle*, 568 F.2d at 1381. For example, EPA may use general permits to avoid an “intolerable permit load.” *Id.*

For the reasons below, EPA’s self-reporting approach does not ensure that discharging CAFOs obtain NPDES permits. Indeed, EPA admits that, under its current approach, “[m]any CAFOs are not regulated and continue to discharge without NPDES permits,” and “many waters are affected by pollutants from CAFOs.”²⁷¹ EPA also admits that EPA and state agencies are failing to enforce the Act’s prohibition on unpermitted discharges.²⁷² As a result, many CAFOs discharge water pollution without appropriate oversight, causing serious and extensive harm to human health and the environment, including water quality.²⁷³ Thus, EPA’s approach runs counter to the CWA and undermines the Act’s goal of restoring and maintaining the nation’s waters.

1. EPA’s Approach Fails to Require NPDES Permits for CAFOs that Discharge.

As EPA is aware, under the Agency’s current approach to CAFO permitting, many CAFOs discharge water pollution without NPDES permits, in violation of the CWA.²⁷⁴ Three sources of evidence demonstrate the under-permitting problem. *First*, EPA’s own estimates and admissions indicate that a majority of all discharging CAFOs lack NPDES permits, and the same pattern holds true for Large CAFOs. *Second*, data on NPDES permit coverage in states where CAFOs are concentrated show that many CAFOs almost certainly discharge water pollution without NPDES permits. *Third*, documented evidence of numerous unpermitted discharges confirms that CAFOs routinely discharge water pollution without NPDES permits.

First, EPA’s own estimates and admissions show that a majority of CAFOs that discharge water pollution do not, in fact, have NPDES permits. In 2001, EPA estimated that approximately 12,000 CAFOs discharged water pollution, but only 2,530 had applied for NPDES permits, meaning that about 9,470 CAFOs were discharging without NPDES permits in violation of the CWA.²⁷⁵ In 2009, EPA estimated that there were “19,000 large and medium-sized CAFOs nationwide and that as many as 75% of these may need to obtain NPDES permits because they discharge.”²⁷⁶ However, as of March 2008, only 47 percent—or 8,930 CAFOs—had obtained NPDES permits,²⁷⁷ meaning that about 5,320 CAFOs were discharging without NPDES permits. Since 2009, the estimated number of Large CAFOs in the country has grown to

²⁷¹ See EPA, *EPA Legal Tools to Advance Environmental Justice*, *supra* note 2, at 75.

²⁷² *Id.*

²⁷³ See *infra* Section III.A.3.

²⁷⁴ See EPA, *EPA Legal Tools to Advance Environmental Justice*, *supra* note 2, at 75.

²⁷⁵ See 66 Fed. Reg. at 2,963.

²⁷⁶ EPA Office of Civil Enforcement, EPA 325-F-09-001, *EPA Targets Clean Water Act Violations at Livestock Feeding Operations Enforcement Alert 2* (2009), <https://nepis.epa.gov/Exe/ZyPDF.cgi/P10039VB.PDF?Dockkey=P10039VB.PDF>. EPA did not explain how it determined the percentage of CAFOs required to obtain NPDES permits because they discharge.

²⁷⁷ *Id.*

21,237, but the number of CAFOs operating under NPDES permits has fallen to 6,266.²⁷⁸ Conservatively assuming that 75 percent of CAFOs require NPDES permits, as EPA has estimated in the past, this means that almost 10,000 Large CAFOs are discharging without NPDES permits in violation of the CWA. In other words, the under-permitting problem that EPA identified over 20 years ago persists and has grown worse. Indeed, in May 2022, EPA acknowledged that “[m]any CAFOs are not regulated and continue to discharge without NPDES permits.”²⁷⁹

EPA has acknowledged that Large CAFOs are especially likely to discharge water pollution without NPDES permits. According to EPA, “since the inception of the NPDES permitting program in the 1970s, only a small number of Large CAFOs have actually sought permits . . . while numerous documented discharges occurred over time.”²⁸⁰ The U.S. Court of Appeals for the Second Circuit has reiterated this point, observing that “Large CAFOs are important contributors to water pollution and [] they have, historically at least, improperly tried to circumvent the permitting process.”²⁸¹

Second, recent data on NPDES permit coverage in states where swine and dairy CAFOs are most concentrated confirm that discharging CAFOs routinely lack NPDES permits. Most swine and dairy cow CAFOs use wet manure management systems,²⁸² and wet manure management systems predictably cause discharges.²⁸³ Yet, as the figures below show, in four of the top five swine-producing states and four of the top five dairy cow-confining states,²⁸⁴ the majority of Large CAFOs do not have NPDES permits. Indeed, in six of these states, fewer than 10 percent of Large CAFOs have NPDES permits, and in three states, *zero* Large CAFOs have NPDES permits. These data strongly suggest that, across the country, thousands of Large CAFOs are discharging water pollution without a permit in violation of the CWA.

²⁷⁸ See EPA, *NPDES CAFO Permitting Status Report: National Summary, Endyear 2021, completed 07/20/22*, *supra* note 5.

²⁷⁹ EPA, *EPA Legal Tools to Advance Environmental Justice*, *supra* note 2, at 75.

²⁸⁰ National Pollutant Discharge Elimination System Permit Regulation and Effluent Limitation Guidelines and Standards for Concentrated Animal Feeding Operations (CAFOs), 68 Fed. Reg. 7,176, 7,201 (Feb. 12, 2003).

²⁸¹ *Waterkeeper Alliance, Inc.*, 399 F.3d at 506, n.22.

²⁸² See 66 Fed. Reg. at 2,989, 2991.

²⁸³ See *infra* Section IV.B.

²⁸⁴ See Univ. of Iowa Dep’t of Geographical & Sustainability Scis., *CAFOs in the US: The Wheres and Whys of Industrial Meat Production in the United States*, <https://cafomaps.org/index.html> (drawing from the 2017 Census of Agriculture).

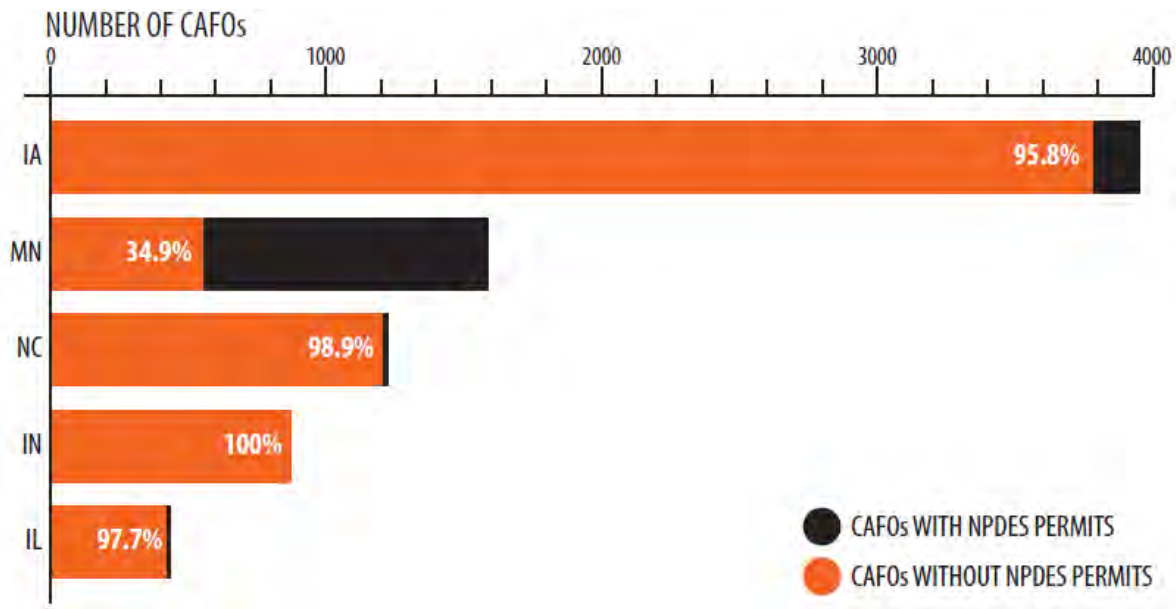


Figure Seven. Percentage of Large CAFOs with NPDES permits in the top five swine-producing states.²⁸⁵

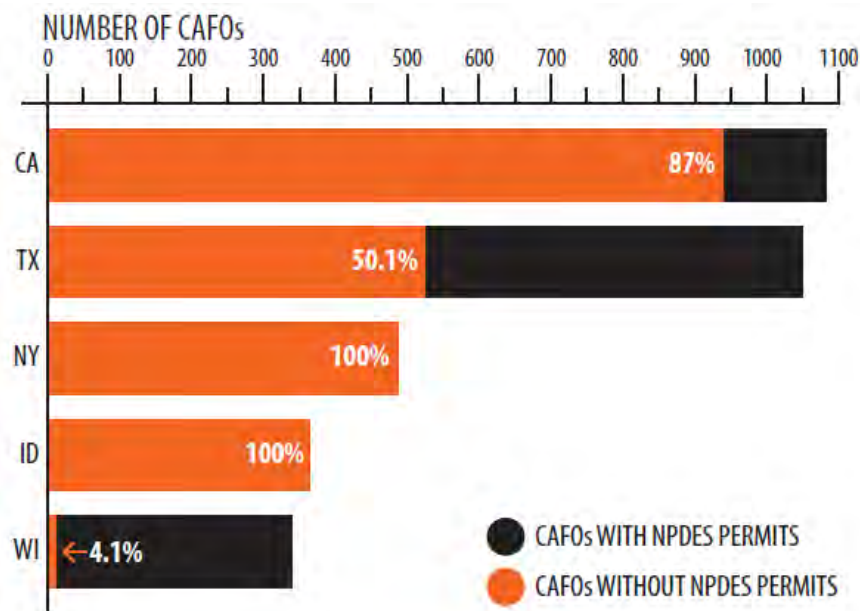


Figure Eight. Percentage of Large CAFOs with NPDES permits in the top five dairy cow-producing states.²⁸⁶

²⁸⁵ See EPA, *NPDES CAFO Permitting Status Report: National Summary, Endyear 2021, completed 07/20/22*, *supra* note 5.

²⁸⁶ *Id.*

CAFO permit coverage in New York, the third-largest dairy cow-confining state, offers particularly strong evidence that discharging CAFOs are operating without NPDES permits. In 2017, a coalition of environmental organizations won an order directing New York to bring its CAFO NPDES permit into compliance with federal law.²⁸⁷ Following the court’s order, 288 CAFOs that had been operating under the NPDES permit switched to New York’s state-law CAFO permit.²⁸⁸ In other words, nearly 300 CAFOs that had previously concluded that they required NPDES permits suddenly claimed that they no longer discharge. At least 30 of those CAFOs had been subject to enforcement actions for NPDES permit violations since 2012, and at least three additional CAFOs had indicated that they were “daily spread” operations with no or minimal manure storage,²⁸⁹ meaning that they could have no alternative but to land apply waste during conditions that pose a high risk of discharges. Unless those CAFOs significantly changed their practices or facilities—and there is no evidence whatsoever that they did so—this switch was inappropriate, and it led to a serious under-permitting problem in New York.²⁹⁰

Third, as EPA itself has acknowledged, “there are numerous documented instances . . . of actual discharges at unpermitted CAFOs.”²⁹¹ A recent report by the North Carolina Department of Environmental Quality (“NC DEQ”) supports this conclusion. Between July 1, 2020 and June 30, 2021, NC DEQ inspectors found 36 separate instances of unpermitted discharges at swine CAFOs.²⁹² Eighteen of those discharges reached surface waters.²⁹³ Similarly, the Illinois Environmental Protection Agency reported in 2011—the most recent year for which a report is available—that its inspectors visited 189 CAFOs and found that 25 CAFOs without NPDES permits must obtain them.²⁹⁴ In addition, inspectors observed 63 instances of runoff from production areas, 18 instances of discharges from waste storage structures, 7 instances of intentional discharges, and 12 instances of discharges from land application.²⁹⁵ In Washington, information produced in response to a public records request revealed that CAFOs are

²⁸⁷ See *Riverkeeper, Inc. v. Seggos*, 75 N.Y.S. 3d 854 (N.Y. Sup. Ct. 2018).

²⁸⁸ See “GP-04-02,” attached as Exhibit 19. This spreadsheet was produced by the New York Department of Environmental Conservation as part of its response to a 2018 Freedom of Information Law records request. The request sought, *inter alia*, a list of CAFOs formerly covered under the NPDES permit that later obtained coverage under the state-law permit.

²⁸⁹ Based on records received in response to a 2017 Freedom of Information Law records request.

²⁹⁰ See Lee Harris, *New York Dairy Farms Skirt Clean Water Act Requirements*, The Am. Prospect (Aug. 11, 2021), <https://prospect.org/environment/new-york-dairy-farms-skirt-clean-water-act-requirements/>.

²⁹¹ 68 Fed. Reg. at 7,201.

²⁹² See N.C. Dep’t Env’t Quality, *Animal Waste Management July 1, 2020 – June 30, 2021* 5, Tbl. 6, <https://deq.nc.gov/media/17775/open>.

²⁹³ *Id.*

²⁹⁴ See Ill. Env’t Protection Agency, *Illinois EPA Livestock Program 2011 Livestock Facility Investigation Annual Report* 2, 4, <http://www.epa.state.il.us/water/cafo/reports/2011-livestock-annual.pdf>.

²⁹⁵ *Id.* at 6.

discharging without NPDES permits.²⁹⁶ And in Ohio, a 2015 report on CAFOs in the Western Lake Erie Watershed found that since 2008, seven dairy CAFOs discharged on at least 44 occasions.²⁹⁷ According to the Ohio Environmental Protection Agency, none of these CAFOs currently have NPDES permits.²⁹⁸ These findings likely represent only a small percentage of the total number of unpermitted discharges, as CAFO discharges usually are unplanned or intermittent,²⁹⁹ and there is no reason to believe that an unplanned or intermittent discharge would be especially likely to coincide with an inspection.

2. EPA and State Agencies Are Failing to Enforce the CWA's Prohibition on Unpermitted Discharges.

Not only does EPA's permitting approach fail to require NPDES permits for discharging CAFOs, but EPA also fails to enforce the CWA's prohibition on unpermitted discharges, in contravention of the CWA. Indeed, the Agency admits that "EPA and state permitting agencies lack the resources to regularly inspect [CAFOs] to assess" whether discharges are occurring, and its existing regulations "make it difficult to compel permit coverage, limit the discharge of pollutants under certain circumstances, and enforce requirements even when discharges have been established."³⁰⁰ According to a 2016 report, EPA "decreased the number of federal inspections and enforcement actions against [CAFOs] every year" from 2012 to 2015.³⁰¹ During that period, the number of EPA inspections at CAFOs dropped from 291 to 141, and the number of enforcement actions fell from 55 to 26.³⁰² Yet there is no reason to believe that discharges declined during this time. As the report concluded, "[t]he decline is steady, reflecting a trend and not a one-year anomaly."³⁰³ Indeed, given the agency-wide reduction in enforcement from

²⁹⁶ See Letter from Jean Mendoza, Exec. Director, Friends of Toppenish Creek to Chery Sullivan, Director, Dairy Nutrient Mgmt. Program, Wash. State Dep't of Agric. 2 (Dec. 27, 2019), attached as Exhibit 20.

²⁹⁷ See *Follow the Manure: Factory Farms and the Lake Erie Algal Crisis* 15, Tbl. 4 (2015), https://drive.google.com/file/d/0B9i1r38NLgy9TkYdUgwWVhRUEE/view?resourcekey=0-guzNJUhVf7n_OC0heFaXfA.

²⁹⁸ See Ohio Env't Protection Agency, *Concentrated Animal Feeding Operations*, <https://epa.ohio.gov/divisions-and-offices/surface-water/permitting/concentrated-animal-feeding-operations#:~:text=You%20are%20also%20responsible%20for,expiration%20date%20of%20your%20permit> (listing each CAFO with an NPDES permit).

²⁹⁹ See *infra* Section IV.C.

³⁰⁰ See EPA, *EPA Legal Tools to Advance Environmental Justice*, *supra* note 2, at 75.

³⁰¹ Brett Walton, *Preventing CAFO Water Pollution Not an EPA Priority*, Circle of Blue (Jan. 22, 2016), <https://www.circleofblue.org/2016/world/67739/>.

³⁰² *Id.*

³⁰³ *Id.*

2017 to 2020,³⁰⁴ the trend in declining CAFO inspections and enforcement actions has certainly continued and accelerated.

Like EPA, state agencies administering NPDES programs do not adequately enforce the prohibition on unpermitted discharges. For example, in 2010, EPA released a report finding that the Illinois Environmental Protection Agency “fails to act in a timely and/or appropriate way in response to violations of NPDES program requirements” by CAFOs.³⁰⁵ In 2012, EPA released another report finding that the Iowa Department of Natural Resources (“IA DNR”) failed to act in response to CWA violations by CAFOs in nearly half of the cases EPA reviewed, and IA DNR failed to assess adequate penalties for CWA violations by CAFOs.³⁰⁶ And, a recent analysis of records from the Missouri Department of Natural Resources (“MO DNR”) concerning the 21 swine CAFOs currently owned and operated by Smithfield Foods (“Smithfield”) in Missouri found that “[MO DNR’s] enforcement efforts appear to have decreased markedly since . . . 2006.”³⁰⁷ Similarly, an analysis of records from the Washington State Department of Ecology found that the agency rarely takes enforcement action in response to complaints about air and water pollution from dairy cow CAFOs and fails to require discharging CAFOs to obtain NPDES permits.³⁰⁸

Community members confirm these findings. For example, the Dodge County, Minnesota resident reports that she filed a complaint with the Minnesota Pollution Control Agency (“MPCA”) after witnessing a CAFO operator overapply manure on frozen ground, which creates a significant risk of discharge, but MPCA did not investigate her complaint.³⁰⁹ A resident of Grant County, South Dakota—whose home is surrounded by six CAFOs—says that “[t]here is little oversight of CAFOs in South Dakota” and “there are little or no inspections or

³⁰⁴ See Env’t Integrity Project, *New EPA Enforcement Data Show Continued Downward Trend During Trump Administration* (2021), <https://environmentalintegrity.org/news/epa-enforcement-data-downward-trend-during-trump-administration/>.

³⁰⁵ EPA Region 5, *Initial Results of an Informal Investigation of the National Pollutant Discharge Elimination System Program for Concentrated Animal Feeding Operations in the State of Illinois 27* (2010), https://archive.epa.gov/region5/illinoisworkplan/web/pdf/iepa_cafo-report.pdf.

³⁰⁶ See Env’t Integrity Project, *EPA Report: Iowa Factory Farm Program Shown to Violate Federal Clean Water Act* (July 13, 2012), <https://environmentalintegrity.org/news/epa-report-iowa-factory-farm-program-shown-to-violate-federal-clean-water-act/>; see also Exhibit 15 ¶ 13 (explaining that IA DNR “fails to take adequate enforcement actions against CAFOs when they pollute waterways”). Though the reports in this section do not distinguish between enforcement actions against unpermitted discharges and those against permit violations, these general enforcement failures strongly suggest that EPA and state agencies are failing to take enforcement actions against unpermitted discharges.

³⁰⁷ See Scott Dye, Socially Responsible Agric. Project, *The Rap Sheet on Smithfield’s Industrial Hog Facilities in Missouri* 12–71 (2022), <https://sraproject.org/1/smithfieldmorapsheet/#:~:text=The%20Rap%20Sheet%20on%20Smithfield's%20Industrial%20Hog%20Facilities%20in%20Missouri,-Share&text=SRAP%20reviewed%20three%20decades%20of,land%20and%20waterways%20across%20Missouri> (press “Read the Rap Sheet Hyperlink”).

³⁰⁸ See Exhibit 20.

³⁰⁹ See Exhibit 2 ¶ 18.

monitoring to detect spills.”³¹⁰ And the Executive Director of Snake River Waterkeeper explains that CAFOs in Idaho “avoid operating under NPDES permits because the Idaho Department of Environmental Quality . . . does very little to monitor them or take enforcement actions against them when they discharge.”³¹¹ As a result of these weak enforcement efforts by EPA and state agencies, many CAFOs—including Large CAFOs—are able to discharge water pollution without NPDES permits, in violation of federal law, with little fear of being held accountable.

3. EPA’s Approach Fails to Restore and Maintain the Nation’s Waters.

Not only does EPA’s approach to CAFO permitting fail to require that discharging CAFOs obtain NPDES permits or cease discharging, but it also fails to advance our national goal of restoring and maintaining water quality. Under EPA’s approach, most Large CAFOs either lack water pollution permits altogether or operate under state laws and permits that typically are less protective of water quality than federal law and regulations governing NPDES permits.³¹² Indeed, state laws and permits in California, Idaho, Illinois, Indiana, Iowa, Missouri, New York, North Carolina, and Washington—states where swine and dairy cow CAFOs are concentrated and most CAFOs operate under state laws or permits—all have components that are less stringent than federal law and regulations. Many of these less-stringent components fall into four categories: (1) practices for land application of waste, (2) requirements for monitoring to ensure that a CAFO does not discharge, (3) provisions for agency review of nutrient management plans, and (4) opportunities for public review and comment on permits and nutrient management plans prior to permit issuance. Moreover, in Idaho, Illinois, and Iowa, not only are state laws less stringent, but they also allow CAFOs that do not operate under NPDES permits to operate without *any* permit to prevent water pollution.

First, some state laws and permits allow practices for the land application of waste that are less protective than federal requirements. One such practice is applying manure in close proximity to waterways. For example, in Idaho, Iowa, North Carolina, and Washington, CAFOs operating under state laws and permits are allowed to apply manure and other waste to fields less than 100 feet from surface waters under some circumstances.³¹³ In North Carolina, CAFOs sited or expanded prior to September 30, 1995 may apply waste up to 25 feet from streams or

³¹⁰ Exhibit 4 ¶ 9.

³¹¹ Decl. of Buck Ryan ¶ 11, attached as Exhibit 21.

³¹² See EPA, *NPDES CAFO Permitting Status Report: National Summary, Endyear 2021, completed 07/20/22*, *supra* note 5. Although most states with a substantial number of pig and dairy cow CAFOs have low NPDES permit coverage, some states, including Michigan, Minnesota, and Wisconsin, have achieved high NPDES permit coverage. See *id.*

³¹³ See Iowa Admin. Code 567-65.3(3)(g)(1) (allowing CAFOs to apply waste within 200 feet from surface water if the manure is injected or incorporated into the soil on the same day as it was applied); see also N.C. Dep’t of Env’t Quality, Swine Waste Management System General Permit § I(12)(b)–(d) (April 12, 2019) (allowing land application as close as 25 feet from surface water for certain CAFOs). Idaho law does not set any limits on the distance between land application areas and surface water for dairy cow CAFOs.

waterbodies.³¹⁴ In Iowa, CAFOs may apply waste to the edge of waterbodies, provided that they inject or incorporate the waste into the soil.³¹⁵ In Washington, CAFOs may apply waste to the edge of waterbodies regardless of the application method.³¹⁶ And in Idaho, dairy cow CAFOs are not subject to any statewide prohibition on applying waste within 100 feet of surface waters. Under federal regulations, however, CAFOs operating under NPDES permits may not apply waste less than 100 feet from down-gradient surface water or conduits to surface water, regardless of the application method, unless there is a 35-foot vegetated buffer between the application area and the surface water where application is prohibited.³¹⁷ This restriction is necessary because land application close to surface waters is more likely to lead to discharges.³¹⁸

In other states, CAFOs operating under state law and permits can apply waste at higher rates than CAFOs operating under NPDES permits. For example, in Illinois, CAFO operators are allowed to apply waste at rates based on the nitrogen needs of the crops averaged over a five-year period.³¹⁹ In other words, in any single year, they may apply *more* waste than is necessary to meet crops' nitrogen needs. By contrast, federal regulations prohibit CAFOs operating under NPDES permits from applying more nitrogen than crops can utilize.³²⁰

Similarly, in California's Central Valley, CAFO operators are allowed to apply waste at rates that exceed crops' phosphorus needs, until the applications cause "adverse impacts."³²¹ The Central Valley Regional Water Quality Control Board recognizes that excessive application rates can cause phosphorus to "build up in the soils and . . . cause adverse impacts," including "leav[ing] the land application area in surface runoff and contribut[ing] to excessive algae growth in receiving waters."³²² But CAFO operators are not required to prevent these adverse

³¹⁴ See N.C. Dep't of Env't Quality, Swine Waste Management System General Permit § I(12)(b) (April 12, 2019).

³¹⁵ See Iowa Admin. Code 567-65.3(3)(g)(1) (allowing CAFOs to apply waste within 200 feet from surface water if the manure is injected or incorporated into the soil on the same day as it was applied).

³¹⁶ Compare State of Wash. Dep't of Ecology, National Pollutant Discharge Elimination System and State Waste Discharge General Permit S4.M. (Jan. 18, 2017) (prohibiting CAFOs from applying waste less than 100 feet from down-gradient surface water or conduits to surface water unless certain conditions are satisfied), with State of Wash. Dep't of Ecology, State Waste Discharge General Permit (Jan. 18, 2017) (containing no prohibition on applying waste less than 100 feet from down-gradient surface water or conduits to surface water).

³¹⁷ See 40 C.F.R. § 412.4(c)(5).

³¹⁸ EPA, *NPDES Permit Writers' Manual for Concentrated Animal Feeding Operations* 5-32 (2012), https://www.epa.gov/sites/default/files/2015-10/documents/cafo_permitmanual_entire.pdf.

(explaining that the federally required 100-foot setback from waterbodies "reduces pollution by increasing the distance pollutants in land-applied manure, litter or process wastewater has to travel to reach surface water bodies").

³¹⁹ See 510 Ill. Comp. Stat. 77/20(f)(4).

³²⁰ See 40 C.F.R. § 122.42(e)(1)(viii).

³²¹ Cal. Regional Water Quality Control Board, Central Valley Region, Order R5-2013-0122, Reissued Waste Discharge Requirements General Order for Existing Milk Cow Dairies, Attach. C, at C-11.

³²² *Id.* at C-11-12.

impacts from occurring; they are required to stop applying waste at rates above crops' phosphorus needs only *after* the adverse impacts have occurred.³²³ Federal regulations require CAFOs operating under NPDES permits to take greater precautions when applying waste at rates above crops' phosphorus needs. Under federal regulations, CAFO operators can apply waste at rates above phosphorus needs for one year, but they must not apply *any* additional waste to the crops in subsequent years, until the phosphorus has been removed by harvest and crop removal.³²⁴ As California recognizes, allowing CAFOs to apply waste at higher rates increases the likelihood of discharges.

Second, some state laws and permits have less stringent requirements for monitoring CAFO waste storage structures to ensure that they do not breach or overflow. Under Idaho state law, CAFO operators are not required to inspect waste storage structures at any specific intervals.³²⁵ Under Iowa state law, CAFO operators are required to inspect earthen waste storage structures only “at least semiannually.”³²⁶ And under North Carolina state permits, CAFO operators are required to inspect waste storage structures only “at least monthly and after all storm events of greater than one (1) inch in 24 hours.”³²⁷ Under federal regulations, by contrast, CAFO operators must inspect waste storage structures weekly and note the level of the waste stored in the structure.³²⁸ As the Ninth Circuit Court of Appeals has held, these federal inspection requirements are, in effect, monitoring requirements, and they help ensure that a CAFO will not discharge from a waste storage structure.³²⁹

Third, some state laws and permits have weaker requirements for agency review of “nutrient management plans,” which CAFOs should use to plan for the storage and disposal of manure and other waste, thereby reducing the likelihood of discharges. Unlike CAFOs operating under federal regulations,³³⁰ CAFOs operating under state law or permits in California’s Central Valley, Illinois, New York, and Washington generally do not have to submit their nutrient management plans to the permitting agency for review.³³¹ But impartial agency review is

³²³ *Id.* at C-11.

³²⁴ See 40 C.F.R. § 412.4(b)(3), (c)(2)(ii).

³²⁵ See Idaho State Dep’t of Agric., *Nutrient Management Plan for Example Dairy Farm* 10 (1998), <https://agri.idaho.gov/main/wp-content/uploads/2017/12/ExamplePlan.pdf> (noting only that “[c]ontinual inspection and maintenance of waste handling facilities and equipment will prevent unwarranted waste discharges into surface water and groundwater”).

³²⁶ Iowa Admin. Code r. 65.15(15)(b).

³²⁷ See N.C. Dep’t of Env’t Quality, Swine Waste Management System General Permit § III(1) (April 12, 2019).

³²⁸ See 40 C.F.R. § 412.37(a)(1)(iii).

³²⁹ See *Food & Water Watch v. EPA*, 20 F.4th 506, 516–17 (9th Cir. 2021).

³³⁰ See 40 C.F.R. § 122.23(h)(i).

³³¹ In California, New York, and Washington, CAFO operators do not have to submit their nutrient management plans to the permitting agency at all. In Illinois, only CAFO operators that confine more than 13,350 breeding swine or 45,450 swine for slaughter have to submit their nutrient management plans. See 510 Ill. Comp. Stat. 77/20(b)–(d).

essential to ensuring both that CAFOs actually develop nutrient management plans and that those plans are adequate to prevent discharges.³³² In addition, failing to require agency review increases the likelihood that nutrient management plans will remain hidden from the public, as plans in the possession of CAFO operators, unlike plans in the possession of state agencies, likely are not subject to disclosure under public records laws.

Fourth, some states do not provide for public review and comment on permits and nutrient management plans prior to permit issuance. In California’s Central Valley, Idaho, Illinois, Indiana, Iowa, Missouri, New York, North Carolina, and Washington, CAFOs operating under state law and permits are not required to make their nutrient management plans available for public review and comment, unlike CAFOs applying to operate under NPDES permits.³³³ This difference prevents the public from identifying aspects of a nutrient management plan that are insufficient to protect local waterways, and it also reduces transparency around the plans. In addition, in California’s Central Valley, New York, and North Carolina, state law does not provide for public review and comment on CAFO construction permits or water pollution control permits. In those areas, the public cannot provide input on a proposed CAFO before permit issuance, and it has little access to information on the CAFO.

In addition to allowing the less-stringent provisions above, Idaho, Illinois, and Iowa further weaken protections for water quality by allowing CAFOs that do not operate under NPDES permits to operate without *any* water pollution control permits. Permitting systems help protect water quality by making applicable laws and regulations more accessible to CAFO operators and community members. Permits generally reflect a compilation of the laws and regulations that govern a CAFO’s operations. Collecting the relevant provisions in a single document that a CAFO operator typically must maintain on site makes it easier for a CAFO operator to consult and adhere to provisions meant to prevent water pollution.³³⁴ When permits are made publicly available, community members are better able to access those provisions and ensure that CAFOs comply with them. Permitting systems also help protect water quality by periodically requiring CAFO operators to provide updated information to state agencies and confirm that they continue to operate in accordance with state laws and regulations. If CAFO operators modify their facilities, they generally must notify the permitting agency, which allows the agency to confirm that the CAFO is still in compliance with the permit’s requirements for

³³² See *Waterkeeper All., Inc.*, 399 F.3d at 502 (explaining that a decision not to require agency review of nutrient management plans constitutes failure to “ensure that . . . CAFOs will, in fact, develop nutrient management plans—and waste application rates—that comply with all applicable . . . limitations and standards”).

³³³ See 40 C.F.R. § 122.23(h)(1).

³³⁴ See, e.g., N.Y. Dep’t of Env’t Conservation, ECL SPDES General Permit for Concentrated Animal Feeding Operations § IV.F.1. (July 22, 2022) (requiring CAFO owners or operators to maintain a copy of the state permit on site).

preventing water pollution.³³⁵ In addition, when a state permit expires, the permitting agency typically issues a renewed permit and requires all CAFOs to reapply for coverage under the renewed permit.³³⁶ CAFOs must resubmit information about their operations and confirm that they are complying with the renewed permit. As discussed below, this information helps state agencies ensure that CAFOs are not discharging water pollution.³³⁷

Inadequately protective measures in state law and permits have had devastating consequences for the quality of our nation's waters, resulting in contaminated surface water and drinking water in areas where CAFOs are concentrated. For example, a recent study concluded that "[u]nregulated animal factory farms [in Ohio, Indiana, and Michigan] are funneling nutrient-rich pollution into Lake Erie, feeding an enormous toxic algae bloom each summer."³³⁸ Harmful algal blooms also plague the Finger Lakes in New York,³³⁹ which are surrounded by many Large dairy cow CAFOs operating without NPDES permits.³⁴⁰ In Iowa, the Raccoon River was included in a 2021 inventory of America's most endangered rivers in light of "the grave threat that factory farms and industrial agricultural pollution [in this watershed] pose" to the river.³⁴¹ Likewise, in Indiana, 73 percent of the state's river and stream miles are designated as unsafe for recreation.³⁴² The Indiana Department of Environmental Management lists *E. coli* as the top source of impairment, and it names CAFOs as a significant source of the *E. coli* contamination.³⁴³ And, as discussed below, water pollution in North Carolina and California's Central Valley has been linked to CAFOs in those states.³⁴⁴ Indeed, NC DEQ has concluded that "[t]he land application of waste . . . is contributing to runoff of nutrients to the nutrient sensitive

³³⁵ See N.C. Dep't of Env't Quality, Swine Waste Management System General Permit § I(6) (April 12, 2019).

³³⁶ See, e.g., *id.* § V(9).

³³⁷ See *infra* Section IV.C.

³³⁸ Env't Working Grp., *Investigation: Manure from Unregulated Factory Farms Fuels Lake Erie's Toxic Algae Blooms* (Apr. 9, 2019), <https://www.ewg.org/news-insights/news-release/investigation-manure-unregulated-factory-farms-fuels-lake-erics-toxic>.

³³⁹ See Citizen staff, *Harmful Algal Blooms Proliferate in Owasco, Skaneateles Lakes*, The Citizen (Aug. 28, 2021), https://auburnpub.com/news/local/harmful-algal-blooms-proliferate-in-owasco-skaneateles-lakes/article_e5fb11e3-e323-5c01-a04b-a0fafdd81051.html.

³⁴⁰ See N.Y. State Dep't of Env't Conservation, Map of Concentrated Animal Feeding Operations in New York State, <https://www.dec.ny.gov/permits/36895.html> (last accessed May 7, 2022).

³⁴¹ Am. Rivers, *Raccoon River Named Among America's Most Endangered Rivers*, <https://www.americanrivers.org/conservation-resource/raccoon-river-named-among-americas-most-endangered-rivers/#:~:text=Raccoon%20River%20named%20among%20America's%20Most%20Endangered%20Rivers,-Factory%20farm%20pollution&text=Washington%2C%20D.C.%20%E2%80%93%20Today%2C%20American,pose%20to%20drinking%20water%20supplies>.

³⁴² See Env't Integrity Project, *The Clean Water Act at 50: Promises Half Kept at the Half-Century Mark* 33 (2022), <https://environmentalintegrity.org/wp-content/uploads/2022/03/CWA@50-report-EMBARGOED-3.17.22.pdf>.

³⁴³ *Id.* at 34.

³⁴⁴ See *infra* Section III.B.1.b.

waters of the Neuse [River]” and, as a result CAFOs “are having a significant negative impact on the Neuse River water quality.”³⁴⁵

B. EPA’s Current Approach to Permitting Large CAFOs Using Wet Manure Management Systems Fails to Implement Executive Orders Dedicated to Advancing Environmental Justice.

Not only does EPA’s approach to permitting Large CAFOs using wet manure management systems violate the CWA, but it also fails to implement executive orders dedicated to advancing environmental justice. EPA has acknowledged that “[it] is aware of a growing body of literature suggesting that the communities disproportionately impacted by CAFOs are communities of color and economically disadvantaged communities.”³⁴⁶ In fact, as discussed below, ample well-established and emerging evidence shows that CAFOs disproportionately harm environmental justice communities across this country. EPA has also acknowledged that Executive Orders 12,898 and 14,008 require federal, state, and local environmental permitting programs to “integrate environmental justice . . . into relevant environmental permitting processes.”³⁴⁷ Despite this evidence, EPA’s approach to permitting Large CAFOs using wet manure management systems fails to implement the environmental justice initiatives in Executive Orders 12,898 and 14,008.

1. CAFOs Disproportionately Harm Environmental Justice Communities.

As Judge Wilkinson of the U.S. Court of Appeals for the Fourth Circuit acknowledged when assessing claims brought by North Carolina residents against a Large swine CAFO, “[i]t is well-established—almost to the point of judicial notice—that environmental harms are visited disproportionately upon . . . minority populations and poor communities.” *McKiver v. Murphy-Brown, LLC*, 980 F.3d 937, 982 (4th Cir. 2020) (Wilkinson, J., concurring).³⁴⁸ As discussed below, decades of evidence supports this conclusion. Further, new data confirm that CAFOs in North Carolina, California’s Central Valley, and Iowa are located disproportionately in communities of color, low-income communities, and under-resourced rural communities. And additional evidence indicates that CAFO pollution harms environmental justice communities.

³⁴⁵ Nora Deamer, N.C. Dep’t of Env’t & Nat. Res., *Neuse River Basinwide Water Quality Plan*, 360 (2009), <https://deq.nc.gov/media/4220/download>.

³⁴⁶ See EPA, *EPA Legal Tools to Advance Environmental Justice*, *supra* note 2, at 75.

³⁴⁷ EPA, *Interim Environmental Justice and Civil Rights in Permitting Frequently Asked Questions*, *supra* note 26, at 1.

³⁴⁸ In *McKiver v. Murphy-Brown*, the Fourth Circuit held that the CAFO’s use of a lagoon-and-sprayfield waste management system, “dead boxes” to collect dead swine, and persistent and unconstrained truck traffic was sufficient evidence to support an award of punitive damages. *Id.* at 965–68 (majority opinion).

a. CAFOs Are Located Disproportionately in Environmental Justice Communities.

Decades of well-established evidence shows that CAFOs disproportionately burden people living in environmental justice communities. For example, a 2000 study found that swine CAFOs in North Carolina were located disproportionately in communities with higher levels of poverty, higher proportions of nonwhite people, and higher dependence on wells for household water supply.³⁴⁹ The study also found that operations run by corporate integrators—that is, corporations that own the animals and establish the confinement conditions that CAFO operators then implement—are more concentrated in poor and nonwhite areas than operations run by independent operators.³⁵⁰ A 2002 study found that swine CAFOs in Mississippi were located disproportionately in Black communities and low-income communities.³⁵¹ Similarly, a 2013 study found that CAFOs in Ohio disproportionately harmed Black and Hispanic residents, as well as low-income residents.³⁵² And a 2014 study found that swine CAFOs in North Carolina were located disproportionately near Black, Hispanic, and American Indian residents.³⁵³ In 2017, in response to a complaint under Title VI of the Civil Rights Act of 1964 alleging that North Carolina’s permitting program for swine CAFOs has discriminatory impacts, EPA expressed “deep concern about the possibility that African Americans, Latinos, and Native Americans have been subject to discrimination” as a result of North Carolina’s permitting program.³⁵⁴ Thus, it is clear that CAFOs have long been a source of environmental injustice across the country.

A recent study of data from North Carolina, California’s Central Valley, and Iowa builds on this evidence and confirms this conclusion. To Petitioners’ knowledge, this is the first study to describe the disproportionate burdens that CAFOs impose on environmental justice

³⁴⁹ See Steve Wing et al., *Environmental Injustice in North Carolina’s Hog Industry*, 108 Env’t Health Persps. 225, 229 (2000); see also Gary R. Grant & Steve Wing, *Hogging the Land*, RP&E J., <https://reimaginerpe.org/node/164>.

³⁵⁰ See Wing et al., *supra* note 349, at 225.

³⁵¹ See Sacoby M. Wilson et al., *Environmental Injustice and the Mississippi Hog Industry*, 110 Env’t Health Persps. 195, 199 (2002).

³⁵² See Julia Lenhardt & Yelena Ogneva-Himmelberger, *Environmental Injustice in the Spatial Distribution of Concentrated Animal Feeding Operations in Ohio*, 6 Env’t Just. 133 (2013).

³⁵³ See Steve Wing & Jill Johnston, Univ. N.C. at Chapel Hill, *Industrial Hog Operations in North Carolina Disproportionately Impact African-Americans, Hispanics and American Indians* 1 (2014), attached as Exhibit 22; see also Ji-Young Son et al., *Distribution of Environmental Justice Metrics for Exposure to CAFOs in North Carolina, USA*, 195 Env’t Rsch. 110862, 110862 (2021) (finding that CAFOs in North Carolina are located disproportionately in communities of color and low-income communities).

³⁵⁴ Letter from Lilian S. Dorca, Director, External Civil Rights Compliance Off., EPA, to William G. Ross, Jr., Acting Secretary, N.C. Dep’t of Env’t Quality, at 1 (Jan. 12, 2017) (“EPA Letter of Concern”), https://www.epa.gov/sites/default/files/2018-05/documents/letter_of_concern_to_william_g_ross_nc_deq_re_admin_complaint_11r-14-r4_.pdf.

communities in the Central Valley. The study assessed the relationship between the presence of one or more Large CAFOs in a census block and the race and ethnicity of the population in the census block in order to identify disparities in exposure to pollution from Large CAFOs.³⁵⁵ It also examined CAFO exposure disparities by income, rurality, and social vulnerability. As described in greater detail below, the study concluded that in North Carolina and California’s Central Valley, Large CAFOs are disproportionately located in communities of color and low-income communities. And in Iowa, over 7,500 CAFOs—including 3,443 Large CAFOs—burden the state’s most rural areas, which span the vast majority of the state and are characterized by a lack of easy access to grocery stores, physicians, and hospitals.³⁵⁶ In these parts of Iowa, pollution from thousands of Large CAFOs poses a serious risk to almost all residents, especially elderly residents, and it has fundamentally changed the character of rural communities.

In North Carolina, Large swine CAFOs are located disproportionately in communities of color. The percent of people of color³⁵⁷ living within three miles of a Large swine CAFO in North Carolina is 1.42 times higher than the percent of non-Hispanic Whites.³⁵⁸ More specifically, the percent of Black, Hispanic, and American Indian³⁵⁹ residents living within three miles of a Large swine CAFO is 1.42, 1.57, and 2.20 times higher, respectively, than the percent of non-Hispanic Whites.³⁶⁰ These population statistics translate to tens of thousands of people at risk. If people of all races and ethnicities in the North Carolina study area were exposed to Large swine CAFOs at the same rate, then approximately 53,000 fewer Black residents, 29,400 fewer Hispanic residents, and 16,000 fewer American Indian residents would live within three miles of a Large swine CAFO.³⁶¹

³⁵⁵ See Quist Report at 1.

³⁵⁶ The study measured rurality using a geographic isolation scale that classifies census tracts according to their access to resources such as food, healthcare, and internet. *Id.* at 4; see Nathan J. Doogan et al., *Validation of a New Continuous Geographic Isolation Scale: A Tool for Rural Health Disparities Research*, 215 *Social Sci. & Med.* 123, 128 (2018).

³⁵⁷ In the study, the term “people of color” refers to all people who identified as Hispanic and/or one or more non-White race. Quist Report at 4.

³⁵⁸ *Id.* at 5.

³⁵⁹ The term “Black” includes residents who identified only as Black, as well as those who identified as Black and another racial or ethnic group. *Id.* at 3–4. The same is true for the terms “Hispanic” and “American Indian.” *Id.*

³⁶⁰ *Id.* at 5.

³⁶¹ *Id.*

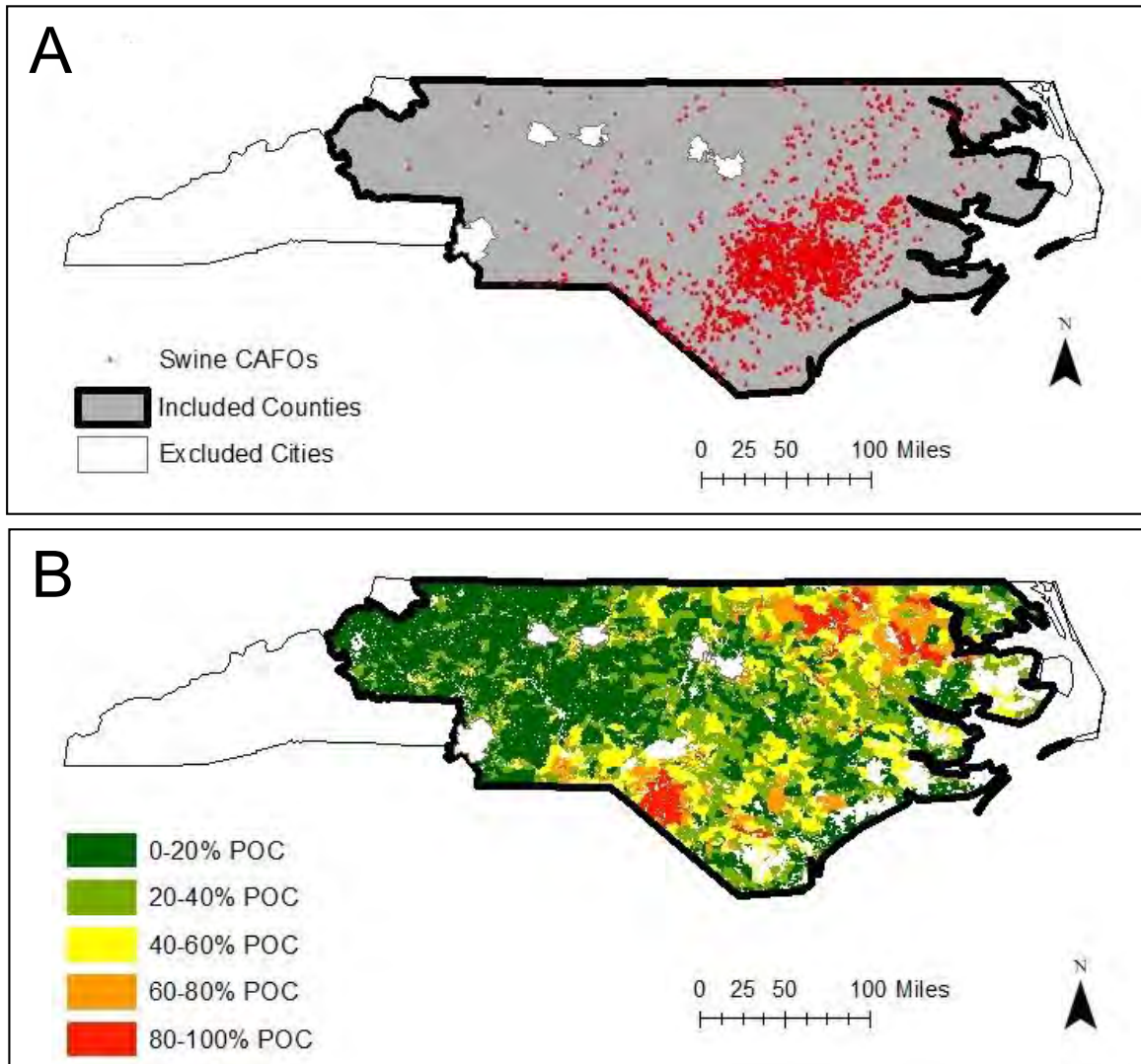


Figure Nine. North Carolina (A) swine CAFOs and (B) census blocks categorized by people of color (“POC”). The largest five cities in North Carolina (populations>250,000) and counties that do not contain swine CAFOs and do not neighbor counties with swine CAFOs were excluded from the study area and analysis. Swine CAFOs are concentrated in eastern North Carolina, where the percent of POC is higher than in central and western North Carolina.³⁶²

In addition, Large swine CAFOs in North Carolina are located disproportionately in low-income census blocks—that is, census blocks in which more than 35 percent of households fall below the 200 percent poverty level.³⁶³ The percent of North Carolina residents in low-income census blocks living within three miles of a Large swine CAFO is 15 times higher than the

³⁶² *Id.* at 12.

³⁶³ *See id.* at 6.

percent of residents in higher-income census blocks, where fewer than 20 percent of households are below the 200 percent poverty level.³⁶⁴

Like swine CAFOs in North Carolina, Large dairy cow CAFOs in California's Central Valley disproportionately burden communities of color. There, the percent of people of color living within three miles of a Large dairy cow CAFO is 1.29 times higher than the percent of non-Hispanic Whites.³⁶⁵ Specifically, the percent of Hispanic and American Indian residents living within three miles of a Large dairy cow CAFO is 1.54 and 1.15 times higher, respectively, than the percent of non-Hispanic Whites.³⁶⁶ If Hispanic people in the Central Valley were exposed to Large dairy cow CAFOs at the same rate as White non-Hispanic people, then approximately 227,600 fewer Hispanic people would live within three miles of a Large dairy cow CAFO.³⁶⁷

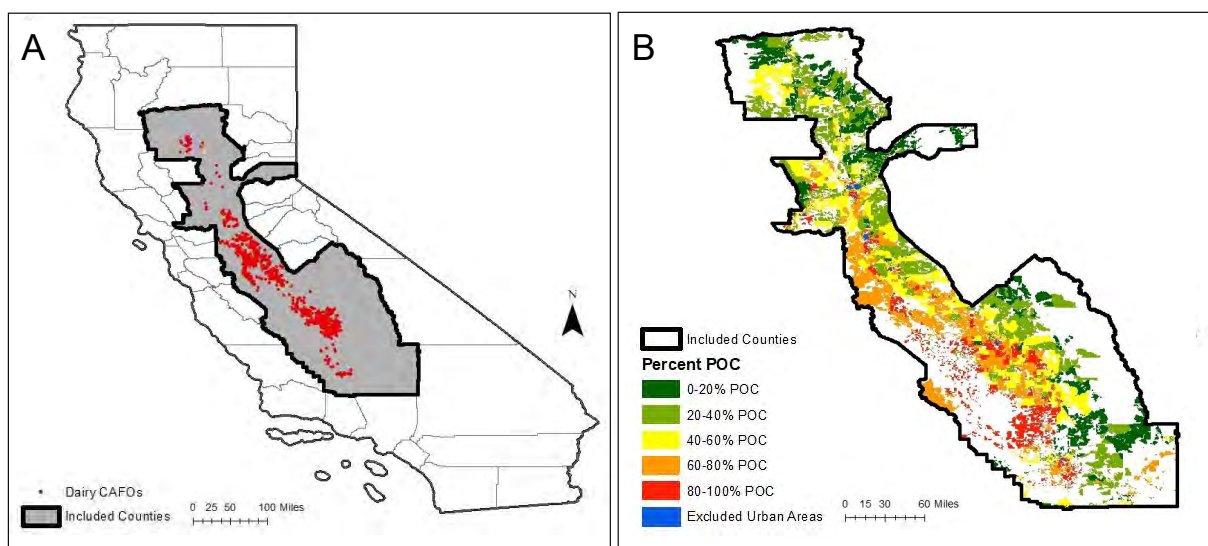


Figure Ten. California (A) dairy cow CAFOs and (B) census blocks categorized by people of color (“POC”) within study area. Urban areas and counties that do not contain CAFOs were excluded from the study area and analysis. Dairy cow CAFOs in California tend to be located in areas with a higher percent of POC.³⁶⁸

Not only do Large dairy cow CAFOs in the Central Valley disproportionately burden communities of color, but they also disproportionately burden low-income communities. The

³⁶⁴ *Id.* at 6.

³⁶⁵ *Id.* at 5.

³⁶⁶ *Id.*

³⁶⁷ *Id.*

³⁶⁸ *Id.* at 10.

percent of residents in low-income census blocks living within three miles of a Large dairy cow CAFO is 2.5 times higher than the percent of residents in higher-income census blocks.³⁶⁹

In Iowa, where the population is predominately White and over 7,500 swine CAFOs are spread across the state, harms from CAFOs especially burden the most rural areas, which make up the vast majority of the state and are where residents have the least access to grocery stores, physicians, and hospitals. In Iowa, 7,528 CAFOs, including 3,443 Large CAFOs—that is, 99.07 percent of all CAFOs and 99.48 percent of all Large CAFOs—are located in the most rural census tracts.³⁷⁰ In the most rural and isolated Iowa census tracts, 80.54 percent of the population—over 1.1 million people—lives within three miles of a CAFO, and 66.68 percent of the population lives within three miles of a Large CAFO.³⁷¹

In addition to burdening very rural communities, Large swine CAFOs in Iowa tend to be located near older residents. Areas in Iowa that have a higher-than-average percent of the population aged 70 and older have a larger proportion of the population living within three miles of a Large CAFO, compared to areas where the population is younger.³⁷²

Thus, for many elderly Iowans and over one million Iowans with limited access to food and healthcare, CAFO air and water pollution—which can spread for miles³⁷³—is likely inescapable and poses serious risks. Because CAFO pollution is linked to serious health problems,³⁷⁴ it is a particular threat to older residents and residents who have the least access to physicians and hospitals. And because CAFO odors often prevent community members from engaging in gardening,³⁷⁵ it is an especially large burden on people who have the least access to grocery stores. CAFO pollution also disrupts the way of life that inspires many people to live in rural communities.

The concentration of CAFOs in isolated areas in Iowa likely leads to further isolation in these communities. A recent report found that in Iowa, “[c]ounties that sold the most hogs and those with the largest farms suffered declines across several economic indicators—including real median household income and total wage jobs” and “also experienced significant population

³⁶⁹ *Id.* at 6.

³⁷⁰ *Id.* at 18, Tbl. 4.

³⁷¹ *Id.* at 17, Tbl. 3.

³⁷² *Id.* at 6.

³⁷³ See Thu et al., *supra* note 143, at 13; see also Mirabelli et al., *supra* note 145, at e70.

³⁷⁴ See *supra* Sections I.A. & I.B.

³⁷⁵ See *supra* Section I.B.1.

decline—twice the rate of Iowa’s more rural counties.”³⁷⁶ This report builds on previous research showing that CAFOs adversely affect property values in Iowa and across the country.³⁷⁷

b. CAFO Pollution Is Causing Harm in Environmental Justice Communities.

Not only are CAFOs disproportionately located in environmental justice communities, but they are also polluting the water and air and harming human health in those communities. For example, in a study of watersheds with active CAFOs in Eastern North Carolina, researchers found “measurable CAFO effects on water quality” in most watersheds.³⁷⁸ The researchers concluded that “it is apparent that land-applications of waste manure at swine CAFOs” caused ion and nutrient pollution in the watersheds.³⁷⁹ This water pollution can harm human health and wildlife, prevent people from enjoying an area’s waterways, and damage local economies. In addition, a study of areas downwind of swine CAFOs in North Carolina found ammonia concentrations that were up to three times higher than average.³⁸⁰ Exposure to ammonia can cause severe coughing, chronic lung disease, and chemical burns to the respiratory tract, skin, and eyes.³⁸¹

North Carolina’s CAFOs have harmed community members’ health. A recent study found that North Carolina residents who live near high densities of CAFOs have higher rates of all-cause mortality, infant mortality, mortality from anemia, kidney disease, tuberculosis, and septicemia, compared to residents who do not live near CAFOs.³⁸² Another recent study of North Carolina residents found that living near CAFOs is associated with increased rates of acute gastrointestinal illness, and the association is strongest in Black and American Indian communities.³⁸³

³⁷⁶ Food & Water Watch, *The Economic Cost of Food Monopolies: The Hog Bosses* 1–2 (2022), https://www.foodandwaterwatch.org/wp-content/uploads/2022/05/RPT2_2205_IowaHogs-WEB4.pdf.

³⁷⁷ See Raymond B. Palmquist et al., *Hog Operations, Environmental Effects, and Residential Property Values*, 73 Land Econ. 114 (1997); see also Joseph A. Herriges et al., *Living with Hogs in Iowa: The Impact of Livestock Facilities on Rural Residential Property Values*, 81 Land Econ. 530 (2005) (finding a statistically significant relationships between proximity to swine CAFOs and lower property values, especially for residences downwind of operations).

³⁷⁸ See Stephen L. Harden, *Surface-Water Quality in Agricultural Watersheds of the North Carolina Plain Associated with Concentrated Animal Feeding Operations* 50 (2015), <https://pubs.usgs.gov/sir/2015/5080/pdf/sir2015-5080.pdf>.

³⁷⁹ *Id.* at 51.

³⁸⁰ See Ogneva-Himmelberger et al., *supra* note 352, at 150.

³⁸¹ *Id.* at 151.

³⁸² See Julia Kravchenko et al., *Mortality and Health Outcomes in North Carolina Communities Located in Close Proximity to Hog Concentrated Animal Feeding Operations*, 79 N.C. Med. J. 278 (2018).

³⁸³ See Arbor J.L. Quist et al., *Exposure to Industrial Hog Operations and Gastrointestinal Illness in North Carolina, USA*, 830 Sci. Total Env’t 154823 (2022).

CAFO pollution is also harming environmental justice communities in California’s Central Valley. In the San Joaquin Valley, which makes up the southern portion of the Central Valley, drinking water is highly contaminated with nitrates, and nitrate levels are especially high in majority-Hispanic communities.³⁸⁴ As of 2019, CAFO land application areas constituted 88 percent of the lands in the San Joaquin Valley that contributed the highest amounts of nitrogen—a source of nitrates—to groundwater,³⁸⁵ meaning that CAFOs likely bear significant responsibility for the drinking water contamination that disproportionately harms Hispanic communities. Confirming the connection between CAFOs and nitrate pollution, a recent report by a dairy industry group on groundwater quality near 42 dairy CAFOs in the Central Valley found that “elevated [nitrate] concentrations were present beneath all monitored dairies.”³⁸⁶ This contamination forces many Central Valley residents to pay for bottled water, with some spending 10 percent of their household income on drinking water.³⁸⁷

In addition, CAFO pollution is harming rural communities in Iowa. A study of private drinking wells in Iowa found unsafe levels of nitrate, coliform bacteria, and fecal coliform bacteria in thousands of wells, and almost 75 percent of the contaminated wells were in rural counties.³⁸⁸ The study attributed the contamination to fertilizer and animal manure applied to fields.³⁸⁹

Algal blooms in Lake Erie, which are fueled by CAFO pollution, are contaminating drinking water in environmental justice communities.³⁹⁰ A recent report found that of the 35 water systems that get their water from Lake Erie, eight systems serving 77 percent of all people who get water from Lake Erie served communities with a higher percentage of people of color than the state average.³⁹¹ In addition, 11 systems serving 78 percent of people served low-

³⁸⁴ See Ann Weir Schechinger, Env’t Working Grp., *In California, Latinos More Likely to Be Drinking Nitrate-Polluted Water* (Oct. 7, 2020), <https://www.ewg.org/interactive-maps/2020-california-latinos-more-likely-drinking-nitrate-polluted-water/>.

³⁸⁵ See Ellen Hanak et al., Public Policy Institute of California, *Water and the Future of the San Joaquin Valley* 9 (2019), <https://www.ppic.org/wp-content/uploads/water-and-the-future-of-the-san-joaquin-valley-overview.pdf>.

³⁸⁶ Central Valley Dairy Representative Monitoring Program, *Summary Representative Monitoring Report (Revised*)* 6 (2019), <https://leadershipcounsel.org/wp-content/uploads/2019/10/Dairy-report.pdf>.

³⁸⁷ See Twilight Greenaway, *California Dairy Uses Lots of Water. Here’s Why It Matters*, Civ. Eats (June 30, 2022), https://civileats.com/2022/06/30/california-dairy-water-uses-climate-change-drought-pollution/?utm_source=Verified+CE+list&utm_campaign=837d1e83fc-EMAIL_CAMPAIGN_7_3_2018_8_13_COPY_01&utm_medium=email&utm_term=0_aae5e4a315-837d1e83fc-294264333.

³⁸⁸ See Env’t Working Grp., *Iowa’s Private Wells Contaminated by Nitrate and Bacteria* (2019), https://www.ewg.org/interactive-maps/2019_iowa_wells/.

³⁸⁹ *Id.*

³⁹⁰ See Env’t Working Grp., *Lake Erie’s Annual Algae Outbreak Mostly Threatens Health of People in Disadvantaged Communities* (2021), <https://www.ewg.org/news-insights/news/2021/08/lake-eries-annual-algae-outbreak-mostly-threatens-health-people>.

³⁹¹ *Id.*

income communities.³⁹² Because of the harmful algal blooms, these communities are at risk of drinking water contaminated with bacteria that causes gastrointestinal issues and harms the kidney and liver.³⁹³ In the wake of the 2014 algal bloom in Lake Erie, many residents of Toledo, Ohio—where the percentage of people of color is higher than the state average³⁹⁴—continued to avoid drinking tap water even five years later.³⁹⁵

In Yakima County, Washington, dairy CAFOs are harming environmental justice communities. Yakima County has a high proportion of low-income and Indigenous people and people of color.³⁹⁶ In 2013, EPA issued a report that concluded that dairies in the Lower Yakima Valley, which includes Yakima County, were likely responsible for elevated nitrate levels in residential drinking wells.³⁹⁷ And on a map of environmental health disparities in Washington State, Yakima County “is a big, red blemish” due, in part, to pollution from CAFOs.³⁹⁸

Further, ample evidence shows that many communities suffering disproportionate harm from CAFOs also are exposed to other pollution sources, which can worsen the human health and environmental problems associated with CAFOs. For example, in North Carolina, the same communities suffering from swine CAFO pollution are also overburdened by pollution from poultry CAFOs.³⁹⁹ A 2019 report found that “82 million poultry are packed in between four million pigs” in Duplin and Sampson Counties, which together “are home to almost half of all the swine operations in North Carolina.”⁴⁰⁰ Like swine CAFOs, poultry CAFOs contaminate waterways and emit toxic air pollution.⁴⁰¹

³⁹² *Id.*

³⁹³ *Id.*

³⁹⁴ *Id.*

³⁹⁵ See All. for the Great Lakes, *Five Years Later: Lessons From the Toledo Water Crisis* (Aug. 1, 2019), <https://greatlakes.org/2019/08/five-years-later-lessons-from-the-toledo-water-crisis/>.

³⁹⁶ See Letter from Jennifer D. Calkins, Att’y & Diehl Fellow, Western Env’t L. Center, et al., to Laura Watson, Dir., Wash. State Dep’t of Ecology 4–5 (May 6, 2022), attached as Exhibit 23.

³⁹⁷ See EPA, *Relation Between Nitrate in Water Wells and Potential Sources in the Lower Yakima Valley*, Washington ES-9 (2013), <https://www.epa.gov/sites/default/files/2017-12/documents/lower-yakima-valley-groundwater-report-2013.pdf>.

³⁹⁸ See Esmy Jimenez, *New Map Shows Hotspots of Environmental Health Hazards for Washington Neighborhoods*, Nw. Pub. Broadcasting (Jan. 20, 2019), <https://www.nwpb.org/2019/01/10/new-map-shows-hotspots-of-environmental-health-hazards-for-washington-neighborhoods/>.

³⁹⁹ See Soren Rundquist & Don Carr, Env’t Working Grp., *Under the Radar: New Data Reveals N.C. Regulators Ignored Decade-Long Explosion of Poultry CAFOs* 3 (2019), <https://www.ewg.org/research/under-radar>.

⁴⁰⁰ *Id.*

⁴⁰¹ See Env’t Integrity Project, *Poultry Industry Pollution in the Chesapeake Region 1* (2020), <https://environmentalintegrity.org/wp-content/uploads/2020/04/Chesapeake-Poultry-Report-.pdf>.

Adding to these burdens, CAFO operators in North Carolina have begun collaborating with energy companies on biogas projects,⁴⁰² which entrench the use of wet manure management systems at CAFOs—particularly Large CAFOs⁴⁰³—and exacerbate water and air pollution.⁴⁰⁴ For example, USDA has concluded that “[c]ompounds such as nitrogen, phosphorus and other elements become more soluble due to [the biogas production process] and therefore have higher potential to move with water.”⁴⁰⁵ In other words, pollutants in the waste that remains after the biogas production process are even more likely to reach surface water and groundwater. In addition, waste pits used in biogas projects can breach or fail, just as other waste pits. For example, at a swine CAFO in North Carolina, a cover on a waste pit used in a biogas project ruptured, spilling at least 37,000 gallons of gelatinous gray foam into nearby wetlands.⁴⁰⁶ In light of the pollution that biogas projects threaten, community groups in North Carolina have filed a complaint against NC DEQ under Title VI of the Civil Rights Act of 1964, contending that NC DEQ’s issuance of four permits for biogas projects has discriminatory impacts on communities of color already overburdened by CAFO pollution.⁴⁰⁷ EPA is investigating the complaint.⁴⁰⁸

⁴⁰² See Michael Sainato & Chelsea Skojec, *The North Carolina Hog Industry’s Answer to Pollution: A \$500m Pipeline Project*, *The Guardian* (Dec. 11, 2020), <https://www.theguardian.com/us-news/2020/dec/11/north-carolina-hog-industry-lagoons-pipeline>; see also Phoebe Gittelsohn et al., *The False Promises of Biogas: Why Biogas Is an Environmental Justice Issue* 4 (2021), <https://www.liebertpub.com/doi/epdf/10.1089/env.2021.0025>.

⁴⁰³ See Ruthie Lazenby, *Rethinking Manure Biogas* 24–25 (2022), https://www.vermontlaw.edu/sites/default/files/2022-08/Rethinking_Manure_Biogas.pdf.

⁴⁰⁴ See Viney Aneja, et. al, *Characterizing Ammonia Emissions from Swine Farms in North Carolina: Part 2—Potential Environmentally Superior Technologies for Waste Treatment*, 58 *J. Air & Waste Mgmt. Ass’n*, 1145, 1156, Tbl. 4 (2008) (finding a 11.9 percent increase in ammonia emissions from an open secondary lagoon storing digester waste over an open lagoon storing conventional hog waste); see also Michael A. Holly et al., *Greenhouse Gas and Ammonia Emissions from Digested and Separated Dairy Manure During Storage and After Land Application*, 239 *Agric., Ecosystems & Env’t* 410, 413 (2017) (finding that anaerobic digestion resulted in an 81 percent increase in ammonia emissions from waste storage pits); see also Exhibit 11 ¶ 16.

⁴⁰⁵ USDA, Conservation Practice Standard, Anaerobic Digester, Code 366, at 366-CPS-6 (2017), https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1254996.pdf.

⁴⁰⁶ See Adam Wagner, *Really Terrible Science Experiment Leads to Weeks-Long Spill from NC Hog-Waste Lagoon*, *The News & Observer* (Sept. 6, 2022), <https://www.newsobserver.com/news/state/north-carolina/article264779224.html>.

⁴⁰⁷ See Letter from Blakely Hildebrand, Staff Attorney, Southern Env’t Law Center, to Michel S. Regan, Administrator & Lilian Dorka, External Civil Rights Compliance Off., EPA 1 (Sept. 27, 2021), <https://www.southernenvironment.org/wp-content/uploads/2021/09/2021-09-27-Title-VI-Complaint-Index-DEQ-Biogas-Permits.pdf>.

⁴⁰⁸ See Letter from Lilian S. Dorka, External Civil Rights Compliance Off., EPA, to Blakely Hildebrand, Staff Attorney, Southern Env’t Law Center (Jan. 13, 2022), <https://www.southernenvironment.org/wp-content/uploads/2022/01/2022.01.13-Final-CP-Acceptance-Ltr.-EPA-Complaint-No.-05RNO-21-R4-NCDEQ-copy.pdf>.

Similar patterns are evident in California’s Central Valley, where communities disproportionately burdened by CAFO pollution are also overburdened by air pollution from crop production, truck traffic, and oil drilling.⁴⁰⁹ And there too, CAFO operators are launching biogas projects.⁴¹⁰

2. EPA’s Approach Fails to Implement Executive Order 12,898.

Officers of the executive branch “are duty-bound to give effect to the policies embodied in the President’s direction, to the extent allowed by the law.”⁴¹¹ Thus, “if an executive agency . . . may lawfully implement [an] Executive Order, then it must do so.”⁴¹² Despite this clear standard and the Biden Administration’s commitment to “ma[ke] achieving environmental justice a top priority,”⁴¹³ EPA’s approach to CAFO permitting fails to implement the directives in Executive Order 12,898 for at least three reasons. *First*, EPA’s approach fails to “collect, maintain, and analyze” information necessary to determine whether CAFOs “have disproportionately high and adverse human health or environmental effects on minority populations and low-income populations.”⁴¹⁴ *Second*, EPA’s approach fails to “address . . . [the] disproportionately high and adverse human health [and] environmental effects” that CAFOs impose on environmental justice communities.⁴¹⁵ *Third*, EPA’s approach fails to ensure that the public is able to participate in the CAFO permitting process.

First, EPA’s approach to CAFO permitting does not allow the agency to collect, maintain, and analyze information necessary to show that CAFOs disproportionately harm environmental justice communities, despite clear indications that disproportionate harm exists.⁴¹⁶ As noted above, EPA’s approach allows “[m]any CAFOs . . . to discharge [water pollution] without NPDES permits” in violation of federal law, instead allowing CAFOs to operate without water pollution permits or under state laws and permits.⁴¹⁷ However, these state laws and

⁴⁰⁹ See Brendan Borrell, *California’s Fertile Valley is Awash in Air Pollution*, Mother Jones (Dec. 10, 2018), <https://www.motherjones.com/environment/2018/12/californias-fertile-valley-is-awash-in-air-pollution/>.

⁴¹⁰ See Michael Sainato, *California Subsidies for Dairy Cows’ Biogas are a Lose-Lose, Campaigners Say*, The Guardian (Feb. 4, 2022), <https://www.theguardian.com/environment/2022/feb/04/california-subsidies-biogas-dairy-cows-emissions-climate>.

⁴¹¹ *Bldg. & Constr. Trades Dep’t v. Allbaugh*, 295 F.3d 28, 32 (D.C. Cir. 2002).

⁴¹² *Id.* at 33; see *Sherley v. Sebelius*, 689 F.3d 776, 784–85 (D.C. Cir. 2012).

⁴¹³ The White House, *Biden-Harris Administration Outlines Historic Progress on Environmental Justice in Report Submitted to Congress* (May 23, 2022), <https://www.whitehouse.gov/ceq/news-updates/2022/05/23/biden-harris-administration-outlines-historic-progress-on-environmental-justice-in-report-submitted-to-congress-2/>.

⁴¹⁴ Exec. Order No. 12,898 § 3-302.

⁴¹⁵ *Id.* §1-101.

⁴¹⁶ See *supra* Section III.B.1.

⁴¹⁷ See EPA, *EPA Legal Tools to Advance Environmental Justice*, *supra* note 2, at 75.

permits do not have standardized information collection requirements.⁴¹⁸ As a result, many states “lack critical data about operations’ size, permit status, location, method of storing manure, animal type, and ownership.”⁴¹⁹ Because EPA relies on states to collect this data,⁴²⁰ their failure also affects EPA. And without comprehensive, facility-specific information on CAFOs, EPA more easily can turn a blind eye to the disproportionate burdens that CAFOs impose on environmental justice communities.

Second, EPA’s approach to CAFO permitting fails to address the disproportionate burdens imposed by CAFOs. As shown above, EPA’s approach allows discharging CAFOs to operate under state laws and permits that are less stringent than NPDES permits.⁴²¹ This under-permitting problem is present across the country, including in states where data shows that CAFOs disproportionately burden environmental justice communities. In North Carolina, for example, nearly 99 percent of Large CAFOs operate under state-law permits, rather than NPDES permits.⁴²² And, as discussed above, North Carolina’s state-law permit contains provisions that are less stringent than federal requirements for CAFOs operating under NPDES permits.⁴²³ CAFO operators in North Carolina are allowed to apply manure and other waste to fields less than 100 feet from surface waters, and they are not required to make their nutrient management plans available for public review and comment.⁴²⁴ Thus, in North Carolina, not only are members of environmental justice communities more likely to live near CAFOs, but they also are more likely to live near CAFOs operating under permits that offer fewer protections against water pollution and less transparency.

The same is true in California’s Central Valley. Nearly 87 percent of Large CAFOs in California operate under a state-law general order, rather than NPDES permits.⁴²⁵ Because most CAFOs in California are concentrated in the Central Valley,⁴²⁶ it follows that a significant number of Large CAFOs in the Central Valley operate under the state-law general order. And, as discussed above, that order contains provisions that are less stringent than federal

⁴¹⁸ See Jon Devine & Valerie Baron, *CAFOs: What We Don’t Know Is Hurting Us*, Nat. Res. Def. Council at 11–12 (2019), <https://www.nrdc.org/sites/default/files/cafos-dont-know-hurting-us-report.pdf>.

⁴¹⁹ *Id.* at 5.

⁴²⁰ See National Pollutant Discharge Elimination System (NPDES) Concentrated Animal Feeding Operation (CAFO) Reporting Rule, 77 Fed. Reg. 42,679-01, 42, 681 (explaining that EPA will rely on the states for CAFO information).

⁴²¹ See *supra* Sections III.A.1. & III.A.3.

⁴²² See EPA, *NPDES CAFO Permitting Status Report: National Summary, Endyear 2021, completed 07/20/22*, *supra* note 5.

⁴²³ See *supra* Section III.A.3.

⁴²⁴ *Id.*

⁴²⁵ See EPA, *NPDES CAFO Permitting Status Report: National Summary, Endyear 2021, completed 07/20/22*, *supra* note 5.

⁴²⁶ See Sunghoon Baek & Charlotte D. Smith, *Potential Contaminant Runoff from California’s Dairy Concentrated Animal Feeding Operations (CAFOs): A Geospatial Analysis*, 11 Int’l J. Water Res. & Env’t Eng’g 1, 6 (2019).

requirements.⁴²⁷ CAFO operators in California are allowed to apply waste at rates that exceed crops' phosphorus needs, even though the Central Valley Regional Water Quality Control Board recognizes that these rates can cause harmful algal blooms and other adverse impacts, and CAFOs are not required to make their nutrient management plans available for public review and comment.⁴²⁸

Third, EPA's approach to CAFO permitting limits community members' ability to participate in the CAFO permitting process. EPA's approach allows discharging CAFOs to operate under state laws and permits that, in addition to being less stringent than NPDES permits, also offer fewer opportunities for public participation. This is the case in both North Carolina and California's Central Valley. In both areas, CAFOs operating under state law and permits are not required to make their nutrient management plans available for public review and comment. As a result, under EPA's approach, the communities that disproportionately suffer as a result of CAFO pollution also have little say in decisions to monitor, reduce, or continue that pollution.

3. EPA's Approach Fails to Implement Executive Order 14,008.

EPA's approach to CAFO permitting also fails to implement Executive Order 14,008's directive that EPA strengthen enforcement of environmental violations with disproportionate impacts on environmental justice communities. As explained above, EPA admits that "EPA and state permitting agencies lack the resources to regularly inspect [CAFOs] to assess [whether discharges are occurring]," and EPA's current regulations "make it difficult to compel permit coverage, limit the discharge of pollutants under certain circumstances, and enforce requirements even when discharges have been established."⁴²⁹ In addition, under EPA's current approach, most CAFOs operate under state laws, which generally do not provide for citizen suits. This is the case in both North Carolina and California's Central Valley, where CAFOs disproportionately harm environmental justice communities.

Allowing discharging CAFOs to operate under state laws and permits that do not provide for citizen suits weakens enforcement against CAFOs. Without citizen suits, only permitting agencies can take enforcement actions when CAFOs violate a state law or permit. But, for the reasons detailed below, permitting agencies often lack the facility-specific information necessary to identify violations, and violations commonly are unplanned or intermittent.⁴³⁰ Unlike permitting agencies, citizens who live near discharging CAFOs are well-suited to identify violations, as they can consistently observe the CAFOs' operations and typically are the first to experience harm associated with CAFO pollution. When citizens identify a violation of a NPDES permit, they can use citizen suits to "both spur and supplement government enforcement

⁴²⁷ See *supra* Section III.A.3.

⁴²⁸ See *supra* Section III.A.3.

⁴²⁹ See EPA, *EPA Legal Tools to Advance Environmental Justice*, *supra* note 2, at 75.

⁴³⁰ See *infra* Section IV.C.

actions.”⁴³¹ Under EPA’s approach, however, which allows many discharging CAFOs to operate without NPDES permits, citizens are left without this recourse.

IV. EPA SHOULD ADOPT A REBUTTABLE PRESUMPTION THAT LARGE CAFOs USING WET MANURE MANAGEMENT SYSTEMS ACTUALLY DISCHARGE POLLUTANTS.

To remedy its failure to satisfy its duties under the CWA and Executive Orders 12,898 and 14,008, EPA should adopt a rebuttable presumption that Large CAFOs using wet manure management systems actually discharge and, thus, must apply for NPDES permits. For the reasons that follow, the requested presumption is legally sound, and it will help ensure the objectives of the CWA and the environmental justice initiatives in Executive Orders 12,898 and 14,008, thereby protecting human health and the environment.⁴³²

A. EPA May Adopt Rebuttable Presumptions.

It is “well settled” that administrative agencies may establish presumptions.⁴³³ An agency’s presumption is lawful if there is “a sound and rational connection” between the proved facts, which trigger the presumption, and the inferred facts, which follow.⁴³⁴ A sound and rational connection is present “when ‘proof of one fact renders the existence of another fact so probable that it is sensible and timesaving to assume the truth of [the inferred] fact . . . until the adversary disproves it.’”⁴³⁵ In other words, “the circumstances giving rise to the presumption must make it more likely than not that the [inferred] fact exists.”⁴³⁶

A presumption is sensible and timesaving—and, therefore, appropriate—where the inferred fact is difficult to prove.⁴³⁷ For example, in *United States Steel Corp. v. Astrue*, the U.S. Court of Appeals for the Eleventh Circuit upheld the Social Security Administration’s (“SSA”) rebuttable presumption that a beneficiary was employed in the coal industry and, thus, entitled to certain benefits, if the employer was a coal mine operator that had signed a national coal wage agreement and the employment occurred during the employer’s participation in the agreement.⁴³⁸

⁴³¹ *Waterkeeper All., Inc.*, 399 F.3d at 503 (quoting S. Rep. No. 50, 99th Cong., 1st Sess. 28 (1985)).

⁴³² See *NLRB v. Tahoe Nugget, Inc.*, 584 F.2d 293, 303 (9th Cir. 1978) (explaining that whether a presumption “ensures the [governing statute’s] . . . objective” is a “secondary consideration supporting the presumption’s continued vitality”).

⁴³³ *Chemical Mfrs. Ass’n*, 105 F.3d 702, 705 (D.C. Cir. 1997); see also *Cole v. U.S. Dep’t of Agric.*, 33 F.3d 1263, 1267 (11th Cir. 1994) (“The law is well established that presumptions may be established by administrative agencies[.]”).

⁴³⁴ *Chemical Mfrs. Ass’n*, 105 F.3d at 705.

⁴³⁵ *Id.* (quoting *NLRB v. Curtin Matheson Scientific, Inc.*, 494 U.S. 775, 788–79 (1990)) (some internal quotation marks omitted).

⁴³⁶ *Nat’l Mining Ass’n v. Babbitt*, 172 F.3d 906, 910 (D.C. Cir. 1999).

⁴³⁷ See *USX Corp. v. Barnhart*, 395 F.3d 161, 172 (3d Cir. 2004).

⁴³⁸ See *U.S. Steel Corp. v. Astrue*, 495 F.3d 1272, 1284 (11th Cir. 2007).

The court explained that there was a sound connection between the proved and inferred facts and that “the SSA’s ‘rebuttable presumption is a sensible response’ to the difficulty of locating records that the worker was employed specifically in the coal industry[,] as the ‘beneficiaries’ personnel files can date back fifty to sixty years, and even a [worker]’s own employer can have difficulty retrieving them.”⁴³⁹ A presumption is also sensible and timesaving where, as here, the party against whom the presumption applies is well-positioned to rebut the presumption.⁴⁴⁰

Whether a presumption “ensures the [governing statute’s] . . . objective” is a “secondary consideration supporting the presumption’s continued vitality.”⁴⁴¹ For example, in *National Labor Relations Board v. Tahoe Nugget, Inc.*, the Ninth Circuit upheld a presumption adopted by the National Labor Relations Board because there was a sound connection between the proved and inferred facts and, secondarily, because the presumption “ensure[d] the [National Labor Relations Act’s] most valued objective: industrial peace.”⁴⁴² The court explained that “[p]resumptions often function to further social, economic, or other policies, distinct from the fact presumed.”⁴⁴³

EPA and other agencies commonly adopt rebuttable presumptions, and courts regularly uphold them. For example, in 2003, EPA adopted a rebuttable presumption concerning the designation of “nonattainment” areas under the Clean Air Act.⁴⁴⁴ Under the presumption, “if any area within a metropolitan area exceeds the annual [air quality standard], then *all* areas within the metropolitan area presumptively ‘contribute’ to that violation . . . and therefore warrant ‘nonattainment’ designations.”⁴⁴⁵ EPA explained that it adopted the presumption after examining the geographic distribution of pollutant sources in some metropolitan areas and finding that they were distributed throughout the areas.⁴⁴⁶ Thus, “[the] presumption reflects EPA’s view that, in the absence of evidence to the contrary, violations of the [air quality standard] in urban areas may be presumed attributable at least in part to contributions from sources distributed throughout the Metropolitan Area.”⁴⁴⁷ Here, EPA has similar support for the requested presumption. Along with the following evidence showing that Large CAFOs using wet manure management systems actually discharge, EPA has examined some CAFOs and concluded that “[m]any . . . discharge without NPDES permits.”⁴⁴⁸ Thus, absent evidence to the

⁴³⁹ *Id.* (quoting *USX Corp.*, 395 F.3d at 172).

⁴⁴⁰ *See USX Corp.*, 395 F.3d at 172 (noting that the party against whom the presumption applied was “in a position to correct any misapprehensions”).

⁴⁴¹ *NLRB v. Tahoe Nugget, Inc.*, 584 F.2d at 303.

⁴⁴² *Id.*

⁴⁴³ *Id.* at 304.

⁴⁴⁴ *See Catawba Cnty. v. EPA*, 571 F.3d 20, 25–27 (D.C. Cir. 2009).

⁴⁴⁵ *Id.* at 27.

⁴⁴⁶ *Id.* at 28.

⁴⁴⁷ *Id.*

⁴⁴⁸ EPA, *EPA Legal Tools to Advance Environmental Justice*, *supra* note 2, at 75.

contrary, EPA may presume that all Large CAFOs using wet manure management systems actually discharge.

In addition, EPA's regulations implementing the Resource Conservation and Recovery Act include a rebuttable presumption concerning the identification of hazardous waste.⁴⁴⁹ And the Department of Transportation ("DOT") uses a rebuttable presumption to identify the cause of loose closures on railroad tank cars transporting hazardous materials.⁴⁵⁰ Courts upheld both EPA's presumption regarding the designation of nonattainment areas and DOT's presumption regarding the cause of loose closures on railroad tank cars,⁴⁵¹ and EPA's presumption concerning the identification of hazardous waste has not been challenged.

B. There Is a Sound and Rational Connection Between Large CAFOs Using Wet Manure Management Systems and Actual Discharges.

As described above, CAFOs generate a tremendous amount of urine and feces.⁴⁵² CAFOs using wet manure management systems store urine, feces, and other wastewater in liquid form in vast pits or large tanks. These CAFOs often use pipes to transport the liquid waste from one location to another, and they typically dispose of the waste by applying it to fields. For the reasons that follow, using these practices to store, transport, and dispose of large amounts of liquid waste is almost certain to cause at least intermittent or sporadic discharges. Indeed, discharges regularly occur, causing serious harm to human health and the environment, and the effects of climate change increase the risk of additional, severe discharges in the future. Large CAFOs using standard storage, transport, and disposal practices to manage liquid waste are an especially significant source of water pollution. Thus, there is a sound and rational connection between Large CAFOs using wet manure management systems and actual discharges.

1. CAFOs Using Wet Manure Management Systems Discharge from Waste Storage Structures.

Extensive evidence shows that CAFOs using wet manure management systems release pollutants from waste storage structures into surface water and groundwater, because waste pits breach and overflow, waste tanks fail, and waste seeps out of storage pits. Provided that these pollutants reach navigable waters, which CAFO operators can address to rebut the presumption,

⁴⁴⁹ See 40 C.F.R. § 279.10(b)(1)(ii). The regulation provides that "[u]sed oil containing more than 1,000 [parts per million] total halogens is presumed to be a hazardous waste because it has been mixed with halogenated hazardous waste." *Id.*

⁴⁵⁰ See 49 C.F.R. § 173.31(d)(2). Under this presumption, "the lack of securement of any closure to a tool-tight condition, detected at any point, will establish a rebuttable presumption that a proper inspection was not performed by the offeror of the car." *Id.*

⁴⁵¹ See *Catawba Cnty. v. EPA*, 571 F.3d at 40; see also *Chemical Mfrs. Ass'n*, 105 F.3d at 707–08.

⁴⁵² See *supra* Section I.

the releases constitute discharges that require a permit under the CWA.⁴⁵³ As shown below, these discharges are routine, predictable consequences of storing large quantities of liquid waste in vast pits and tanks. Thus, there is a sound and rational connection between waste storage structures and discharges.

Waste pits and tanks regularly breach or fail due to structural problems and precipitation, releasing pollutants into waterbodies. Not only are these incidents common, but they also cause serious harm to wildlife and disrupt recreational and commercial uses of waterways. For example, in August 2005, the side of a CAFO waste pit in New York gave way, spilling three million gallons of waste into the Black River.⁴⁵⁴ The waste plume grew to roughly one-fourth the size of the infamous Exxon Valdez oil spill and killed vast numbers of fish.⁴⁵⁵ In 2009 in Illinois, a waste pit breach released approximately 200,000 gallons of waste, killing at least 110,436 fish in a nearby creek.⁴⁵⁶ In 2017, a storage tank at a CAFO in Oregon failed, releasing 190,000 gallons of manure into the Tillamook River.⁴⁵⁷ As a result of the spill, health officials closed the area to recreational and commercial use for more than a week.⁴⁵⁸ In 2020 in North Carolina, relatively light precipitation—just two inches of rainfall—caused a waste pit to breach, releasing over three million gallons of waste and killing at least 1,000 fish in surrounding waterways.⁴⁵⁹ And there are other structural failures that have occurred at CAFOs across the country, causing extensive water pollution.⁴⁶⁰

⁴⁵³ See 33 U.S.C. § 1362(12) (defining a discharge as “any addition of any pollutant to navigable waters from any point source”); see also *Cnty. of Maui*, 140 S. Ct. at 1477 (holding that the CWA’s permitting requirement extends to “a discharge (from a point source) of pollutants that reach navigable waters after traveling through groundwater if that discharge is the functional equivalent of a direct discharge from the point source into navigable waters”).

⁴⁵⁴ See Michelle York, *Workers Trying to Contain Effects of Big Spill Upstate*, N.Y. Times (Aug. 15, 2005), <https://www.nytimes.com/2005/08/15/nyregion/workers-trying-to-contain-effects-of-big-spill-upstate.html>.

⁴⁵⁵ *Id.*

⁴⁵⁶ Jackson & Marx, *supra* note 90.

⁴⁵⁷ See Tracy Loew, *Dairy Fined \$16,800 for Manure Spill that Shut Down Tillamook Bay*, Statesman J. (Feb. 13, 2018), <https://www.statesmanjournal.com/story/tech/science/environment/2018/02/13/dairy-fined-16-800-manure-spill-shut-down-tillamook-bay/334888002/>.

⁴⁵⁸ *Id.*

⁴⁵⁹ See Lisa Sorg, *1,000+ Dead Fish: NC DEQ Releases More Troubling Details on Hog Lagoon Spill*, NC Policy Watch (July 17, 2020), <https://pulse.ncpolicywatch.org/2020/07/17/1000-dead-fish-deq-releases-more-troubling-details-on-hog-lagoon-spill/#sthash.aQq63lkY.dpbs>.

⁴⁶⁰ See DNR Assisting With Cleanup of Manure Spill Near the Town of Merrill, Antigo Times (June 11, 2021), <https://antigotimes.com/2021/06/dnr-assisting-with-cleanup-of-manure-spill-near-the-town-of-merrill/> (describing a manure spill caused by an open valve on a manure pit at a dairy cow CAFO in Missouri, which killed fish in multiple sections of a nearby creek); see also Lisa Sorg, *Hog Farm That Spilled 1 Million Gallons of Feces, Urine Into Waterways Had Been Warned of Lagoon Problems*, N.C. Policy Watch (Jan. 12, 2021), <https://ncpolicywatch.com/2021/01/12/hog-farm-that-spilled-1-million-gallons-of-feces-urine-into-waterways-had-been-warned-of-lagoon-problems/> (describing a waste pit

In addition to breaching, waste storage pits commonly overflow, releasing large amounts of waste. For example, in 2021 in Ohio, a dairy cow CAFO's waste pit overflowed, polluting up to a mile of a nearby stream and leaving the cows to stand in manure a foot deep.⁴⁶¹ Ohio Attorney General Dave Yost said of the overflow, "This isn't a farm right now. It's a biohazard that needs cleaned up before more harm is done."⁴⁶² Other overflow incidents have occurred at CAFOs across the country.⁴⁶³ Waste pit overflows are especially common and destructive in areas that experience hurricanes and other extreme storms. In Eastern North Carolina, where over 500 waste pits are located in or near the state's 100-year floodplain, hurricanes and tropical storms commonly cause overflows.⁴⁶⁴ In 1999, flooding from Hurricane Floyd caused at least 45

breach at a swine CAFO in North Carolina, which spilled an estimated one million gallons of waste into a tributary of the Trent River); Jennifer Bjorhus, *Minnesota Pollution Officials Monitoring Large Stearns County Manure Spill*, Star Tribune (Sept. 26, 2019), <https://www.startribune.com/minnesota-pollution-officials-monitoring-large-stearns-county-manure-spill/561460822/> (describing a manure spill caused by a failed valve on a manure storage tank at a dairy cow CAFO in Minnesota); Ad Crabel, *100,000-Gallon Manure Spill Causes Fish Kill in Sadsbury Township*, Lancaster Online (Mar. 6, 2018), https://lancasteronline.com/news/local/100-000-gallon-manure-spill-causes-fish-kill-in-sadsbury-township/article_728195ca-2169-11e8-a744-9bb6fe255de4.html (describing waste pit ruptures in March 2018 and October 2017 at CAFOs in Pennsylvania, which both caused fish kills); *Manure Spill Kills Fish in Creek Near Freedom*, FOX 11 News (July 11, 2017), <https://fox11online.com/news/local/fox-cities/manure-spill-kills-fish-in-creek-near-freedom> (describing a 20,000 gallon manure spill from a dairy cow CAFO waste pit in Wisconsin, which caused a fish kill); O. Kay Henderson, *Manure Spill at Dubuque County Dairy Farm*, Radio Iowa (Sept. 18, 2014), <https://www.radioiowa.com/2014/09/18/manure-spill-at-dubuque-county-dairy-farm/> (describing a manure spill from a dairy cow CAFO waste pit in Iowa, which caused a fish kill).

⁴⁶¹ See Cameron Knight, *'Hundreds of Dead Fish' and Foot-Deep Manure: State Acts Against Clermont County Farm*, Cincinnati Enquirer (June 9, 2021), <https://www.cincinnati.com/story/news/2021/06/09/foot-deep-manure-and-dead-fish-state-takes-action-against-clermont-co-farm/7619801002/>.

⁴⁶² *Id.*

⁴⁶³ See Jeremy Boyer, *Cayuga County Farm to Pay \$111K Penalty for March Violations*, The Citizen (Aug 4, 2021), https://auburnpub.com/news/local/cayuga-county-farm-to-pay-111k-penalty-for-march-violations/article_5f831245-dad1-50b3-a87c-ea98c1db3123.html (describing an overflow at a dairy cow CAFO in New York that caused waste to enter a tributary of Cayuga Lake); see also Tracy Loew, *Oregon Megadairy Lost Valley Farm Fined \$187,320 for 224 Environmental Violations*, Statesman J. (Oct. 16, 2018), <https://www.statesmanjournal.com/story/tech/science/environment/2018/10/16/oregon-megadairy-lost-valley-farm-fined-environmental-violations/1659452002/> (describing overflows at a Large dairy cow CAFO in Oregon); Assoc. Press, *Heavy Rains Cause Flooding, Manure Discharges in Northwest Iowa*, Des Moines Register (Sept. 21, 2018), <https://www.desmoinesregister.com/story/news/2018/09/21/flooding-northwest-iowa-spencer-hartley-national-weather-service-little-sioux-river-storms-rain-road/1379221002/> (describing overflows at 26 CAFOs in Iowa).

⁴⁶⁴ See Env't Working Grp., *Exposing Fields of Filth* (Nov. 4, 2016), <https://www.ewg.org/research/exposing-fields-filth>.

waste pits to overflow;⁴⁶⁵ in 2016, Hurricane Matthew caused 14 pits to overflow;⁴⁶⁶ and in 2018, Hurricane Florence caused 49 pits to breach or overflow and an additional 60 pits to nearly overflow, increasing the risk of later overflows due to additional precipitation.⁴⁶⁷ Satellite images taken after Hurricane Florence show brown liquid from flooded waste pits flowing through rivers into the Atlantic ocean.⁴⁶⁸ And a resident of Pender County, North Carolina, whose home was flooded after Hurricane Florence, explains that flood waters “flow into communities downstream and sometimes remain there for weeks while animal waste seeps into homes, churches, schools, and anything else in the waters’ path.”⁴⁶⁹

Waste pits also leach pollutants into soil, groundwater, and aquifers, even in the absence of structural failures or precipitation.⁴⁷⁰ Indeed, one court has recognized that the national standards for waste pit design “specifically allow for permeability and, thus, the [pits] are designed to leak.”⁴⁷¹ National standards for waste pits with clay liners, which acknowledge that it is “seldom technically or economically feasible” for those pits to leach less than 500 gallons per acre per day,⁴⁷² confirm the court’s conclusion. In addition, samples of soil around waste pits show that the pits leach pollutants. For example, soil samples collected from 10 feet below the bottom of a waste pit in Washington revealed ammonia and nitrate concentrations in excess of target levels.⁴⁷³ And a study of waste pits in North Carolina showed that the pits leached moderate to significant amounts of pollutants, including fecal bacteria and nutrients.⁴⁷⁴ These

⁴⁶⁵ See Amy Henderson et al., *Mathematical Modeling of Algal Blooms Due to Swine CAFOs in Eastern North Carolina*, 15 Am. Inst. Mathematical Scis. 555, 558 (2022).

⁴⁶⁶ See Kendra Pierre-Louis, *Lagoons of Pig Waste Are Overflowing After Florence. Yes, That’s as Nasty as It Sounds*, N.Y. Times (Sept. 19, 2019), <https://www.nytimes.com/2018/09/19/climate/florence-hog-farms.html>.

⁴⁶⁷ See Emilie Karrick Surrusco, *The Storm Moved On, but North Carolina’s Hog Waste Didn’t* (Jan. 9, 2019), <https://earthjustice.org/blog/2019-january/hog-waste-creates-problems-for-north-carolina-residents>.

⁴⁶⁸ See Alex Formuzis, *Dramatic Satellite Photos Reveal Impact of Hurricane Florence on North Carolina CAFOs*, Environmental Working Group (Sept. 21, 2018), <https://www.ewg.org/news-insights/news-release/dramatic-satellite-photos-reveal-impact-hurricane-florence-north>.

⁴⁶⁹ Exhibit 14 ¶ 9.

⁴⁷⁰ As noted above, these releases of pollutants into groundwater require permits under the CWA so long as they reach navigable waters and are the functional equivalent of direct discharges to navigable waters, which CAFO operators can address to rebut the presumption. See *Cnty. of Maui*, 140 S. Ct. at 1477.

⁴⁷¹ *Cnty. Ass’n for Restoration of the Env’t, Inc. v. Cow Palace, LLC*, 80 F. Supp. 3d 1180, 1223 (E.D. Wash. 2015).

⁴⁷² Nat. Res. Conservation Serv., *Design and Construction Guidelines for Impoundments Lined with Clay or Amendment-Treated Soil* 10D-15 (2008), <https://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17767.wba>.

⁴⁷³ See Anchor QEA, LLC, *H&S Bosma Dairy Lagoon No. 3 Abandonment Plan 4* (2022), attached as Exhibit 24.

⁴⁷⁴ See R.L. Huffman & Phillip W. Westerman, *Estimated Seepage Losses from Established Swine Waste Lagoons in the Lower Coastal Plain of North Carolina*, 38 Transactions Am. Soc’y Agric. & Biological Eng’rs 449 (1995).

results led researchers to conclude that “about half of the older, unlined swine lagoons in the lower coastal plain of North Carolina are inadvertently contributing to local contamination of the surficial aquifer,” and “[t]his could also be true of swine lagoons constructed in a similar manner in the lower coastal plain of other states in the Atlantic Coastal Plain.”⁴⁷⁵ As explained above, 99 percent of swine CAFOs in North Carolina do not have NPDES permits authorizing the discharge of pollutants.

Evidence of soil, groundwater, and aquifer contamination from waste pits is unsurprising, because studies show that widely used waste pit construction features are insufficient to prevent, and may in fact exacerbate, leaching of pollutants. For instance, a study of waste pits constructed in sandy soil without liners found that the pits continued to leach pollutants into groundwater even after 3.5 to 5 years of receiving waste, which contradicts the common assumption that, over time, animal waste creates a natural liner.⁴⁷⁶ Another study of waste pits in Iowa concluded that most waste pits in the state were constructed to sit at least partially below the water table, increasing the likelihood that pollutants leaching from the pits reach groundwater.⁴⁷⁷

EPA has acknowledged that wet manure storage causes discharges in a variety of circumstances. As EPA has explained, “[d]ry weather discharges to surface waters associated with CAFOs have been reported to occur through spills or other accidental discharges from lagoons and irrigation systems, or through intentional releases. Other reported causes of discharge to surface waters are overflows from containment systems following rainfall, catastrophic spills from failure of manure containment systems, and washouts from floodwaters when lagoons are sited on floodplains.”⁴⁷⁸ As this quote shows, storing large quantities of liquid waste in vast pits and tanks presents numerous threats to surface waters.

2. CAFOs Using Wet Manure Management Systems Discharge from Waste Transport Pipes.

Not only do CAFOs using wet manure management systems discharge from waste storage structures, but they also discharge from waste transport pipes. As shown below, there is ample evidence that transport pipes cause spills—and, often, repeated spills occur at the same facilities. Provided that spills from transport pipes reach navigable waters, which CAFO operators can address to rebut the presumption, they constitute discharges that require a permit

⁴⁷⁵ *Id.* at 453.

⁴⁷⁶ See Philip Wayne Westerman et al., *Swine-Lagoon Seepage in Sandy Soil*, 38 Transactions Am. Soc’y Agric. & Biological Eng’rs 1749 (1995).

⁴⁷⁷ See William W. Simpkins et al., *Potential Impact of Earthen Waste Storage Structures on Water Resources in Iowa*, 38 J. Am. Water Res. Ass’n 759, 769 (2002).

⁴⁷⁸ 68 Fed. Reg. at 7,236–37.

under the CWA.⁴⁷⁹ Thus, there is a sound and rational connection between transporting liquid waste through pipes and water pollution discharges.

CAFOs regularly spill waste from transport pipes, and this waste regularly contaminates waterbodies. For example, in February 2022, a pipe at a dairy cow CAFO in New York burst and discharged waste to a nearby stream.⁴⁸⁰ In 2018, a pipe at a Michigan dairy cow CAFO released up to 10,000 gallons of waste to a tributary of the Coldwater River, a popular trout-fishing stream.⁴⁸¹ And in 2013, a pipe at a Wisconsin dairy cow CAFO ruptured, releasing 300,000 gallons of waste into a creek.⁴⁸²

The report on CAFOs owned by Smithfield Foods in Missouri confirms that waste transport pipe spills are common, recurring events. Of the 21 CAFOs analyzed, all but one reported at least one waste spill due to a broken or blocked pipe over a thirty-year period.⁴⁸³ Many of the facilities reported repeated spills from waste transport pipes. For example, a facility in Daviess County, Missouri reported at least 32 transport pipe spills between 1991 and 2021, including five spills in a single year.⁴⁸⁴ On at least two occasions, these spills flowed into a tributary of Raccoon Creek.⁴⁸⁵ Similarly, another facility in Daviess County reported at least 19 transport pipe spills between 1991 and 2021.⁴⁸⁶ At least two of the spills entered Hickory Creek or a tributary of the creek,⁴⁸⁷ and one flowed onto a neighboring property.⁴⁸⁸

3. CAFOs Using Wet Manure Management Systems Discharge from Land Application.

In addition to discharging from waste storage structures and transport pipes, CAFOs using wet manure management systems discharge from land application. Indeed, according to EPA, “the runoff from land application of manure at CAFOs is a major route of pollutant

⁴⁷⁹ See 33 U.S.C. § 1362(12) (defining a discharge as “any addition of any pollutant to navigable waters from any point source”); see also *Cnty. of Maui*, 140 S. Ct. at 1477 (holding that the CWA’s permitting requirement extends to “a discharge (from a point source) of pollutants that reach navigable waters after traveling through groundwater if that discharge is the functional equivalent of a direct discharge from the point source into navigable waters”).

⁴⁸⁰ See Lucas Day, *DEC Monitor Manure Spill in Skaneateles*, Finger Lakes Daily News (Feb. 10, 2022), <https://www.fingerlakesdailynews.com/2022/02/10/1330882/>.

⁴⁸¹ See Garrett Ellison, *Kent County Dairy CAFO Pipeline Spills Manure into River*, M Live (May 1, 2018), https://www.mlive.com/news/grand-rapids/2018/05/coldwater_river_manure_spill.html.

⁴⁸² See Lee Bergquist & Kevin Crowe, *Manure Spills in 2013 the Highest in Seven Years Statewide*, Milwaukee Journal Sentinel (Dec. 5, 2013), <https://archive.jsonline.com/news/wisconsin/manure-spills-in-2013-the-highest-in-seven-years-statewide-b99157574z1-234701931.html>.

⁴⁸³ See Dye, *supra* note 307.

⁴⁸⁴ See *id.*

⁴⁸⁵ *Id.* at 15, 16.

⁴⁸⁶ *Id.* at 12–71.

⁴⁸⁷ *Id.* at 30, 58.

⁴⁸⁸ *Id.* at 33.

discharges from CAFOs.”⁴⁸⁹ This is true for at least four reasons. *First*, CAFOs applying waste at recommended application rates allowed by states likely cause discharges because those rates often cause CAFOs to apply nutrients in excess of crop needs. *Second*, CAFOs commonly apply waste during the winter, which causes discharges. *Third*, CAFOs regularly apply waste shortly before or during wet weather, which also causes discharges. And *fourth*, CAFOs often apply waste to fields with tile drainage systems, which causes discharges as well. In each of these situations, provided that the activities release pollutants to navigable waters, which CAFO operators can address to rebut the presumption, the releases constitute discharges that require a permit under the CWA.⁴⁹⁰ As shown below, not only are these practices common, but they also are often allowed under state laws and permits. Ample evidence of CAFO pollutants in waterbodies near land application sites supports the conclusion that land application results in the discharge of water pollution. Thus, there is a sound and rational connection between land application and discharges.

a. Land Application at Recommended Rates Causes Discharges.

When CAFOs land apply manure, a certain amount of nitrogen and phosphorus from the manure will be taken up by living organisms, including plant roots, or retained in the soil. However, when CAFO operators apply more nitrogen and phosphorus than living organisms can take up and the soil can retain, the excess nutrients almost certainly will cause water pollution, either directly or indirectly. Nitrogen and phosphorus that is not taken up by plants or retained in soil pollutes water directly by running off into surface water or percolating into groundwater, which is hydrologically connected to surface water.⁴⁹¹ Nitrogen also pollutes water indirectly, by volatilizing—that is, entering the atmosphere as ammonia—and then depositing from the air into surface water.⁴⁹²

⁴⁸⁹ 68 Fed. Reg. at 7,196.

⁴⁹⁰ See 33 U.S.C. § 1362(12) (defining a discharge as “any addition of any pollutant to navigable waters from any point source”); see also *Cnty. of Maui*, 140 S. Ct. at 1477 (holding that the CWA’s permitting requirement extends to “a discharge (from a point source) of pollutants that reach navigable waters after traveling through groundwater if that discharge is the functional equivalent of a direct discharge from the point source into navigable waters”). As discussed below, the wet weather discharges described in this section do not constitute agricultural stormwater discharges.

⁴⁹¹ See *Cnty. of Maui*, 140 S. Ct. at 1470 (explaining that groundwater, like “[v]irtually all water, polluted or not, eventually makes its way to navigable water”). As noted above, these releases of pollutants require permits under the CWA so long as they reach navigable waters or are the functional equivalent of direct discharges to navigable waters, which CAFO operators can address to rebut the presumption. See *id.* at 1477.

⁴⁹² Volatilized ammonia that is deposited into surface waters constitutes a discharge that requires an NPDES permit in at least one state. See *In re. Assateague Coastal Tr.*, No. 482915-V (Md. Cir. Ct. Mar. 11, 2021). Another state court has concluded that the state agency has the authority to require NPDES permits for depositions of ammonia and other pollutants into surface waters. See *Rose Acre Farms Inc. v. N.C. Dep’t of Env’t*, No. 12-CVS-10, 2013 WL 459353 ¶ 56 (N.C. Super. Ct. Jan. 4, 2013).

In an effort to reduce the likelihood that land application will cause water pollution, USDA and other entities establish recommended nutrient application rates.⁴⁹³ However, well-established scientific evidence demonstrates that even at recommended rates, land application of manure leads to the addition of more nutrients than plants can take up and soil can retain, posing a serious threat of water pollution. In fact, recommended rates assume that some nutrients will be “lost” to the environment, even under ideal conditions.⁴⁹⁴ Researchers analyzing recommended application rates for Coastal bermudagrass, a crop commonly grown on CAFO land application fields, found that “[n]itrogen application at the recommended rate . . . resulted in [phosphorus] application at nearly *three times* the recommended rate.”⁴⁹⁵ The researchers concluded that, due to the difficulty of balancing application rates for multiple nutrients, continued application at the recommended rate would result in phosphorus discharges, because eventually, more phosphorus would be added than the soil could retain.⁴⁹⁶ Another recent study found that “standard operating procedures for land application of swine wastes create significant potential for nutrient overloads of soils and potential export of excess nutrients from CAFOs to the surrounding environment.”⁴⁹⁷ And numerous other studies have reached similar conclusions.⁴⁹⁸

Given the massive amount of animal urine and feces that CAFOs generate, many CAFOs have no alternative for waste disposal other than land application *above* recommended rates. As an individual with nearly 20 years of experience documenting water pollution from CAFOs explains, “most CAFOs don’t have enough land to absorb the volume of waste they generate, and it’s expensive to move liquid waste very far,” so CAFOs “typically overapply waste to the land they have.”⁴⁹⁹ This also holds true for Large CAFOs. As discussed below, most Large

⁴⁹³ Recommended rates are often referred to as “agronomic” rates—that is, rates that meet but do not exceed the crops’ nutrient needs. However, as shown in this section, these rates are not always agronomic, as they can lead to the application of excess nutrients.

⁴⁹⁴ See Thomas F. Morris et al., *Strengths and Limitations of Nitrogen Rate Recommendations for Corn and Opportunities for Improvement*, 110 *Agronomy J.* 1, 1–2 (2018).

⁴⁹⁵ R. O. Evans et al., *Subsurface Drainage Water Quality from Land Application of Swine Lagoon Effluent*, 27 *Am. Soc’y Agric. Eng’rs* 473, 479 (1984) (emphasis added).

⁴⁹⁶ *Id.*

⁴⁹⁷ Kimberley A. Rosov et al., *Waste Nutrients from U.S. Animal Feeding Operations: Regulations are Inconsistent Across States and Inadequately Assess Nutrient Export Risk*, 269 *J. Env’t Mgmt.* 1, 8 (2020).

⁴⁹⁸ See Philip Wayne Westerman et al., *Swine Manure and Lagoon Effluent Applied to a Temperate Forage Mixture: II. Rainfall Runoff and Soil Chemical Properties*, 16 *J. Env’t Quality* 106 (1987) (finding that manure application to tall fescue at “acceptable maximum application rates” led to “much higher applications of [nitrogen, phosphorus, potassium], and other nutrients than are normally used,” posing “surface and groundwater pollution hazards”); see also Burkholder et al., *supra* note 54, at 308.(citing additional studies showing that land application “even at recommended application rates” can cause pollutants to enter surface water and groundwater).

⁴⁹⁹ Exhibit 6 ¶ 5; see also Exhibit 13 ¶ 8 (“I strongly suspect that CAFO operators commonly overapply manure on fields close to their confinement buildings, because it is too expensive for them to transport the manure to fields that are farther away and might have more need for the nutrients in the manure.”).

CAFOs generate more manure nutrients than they can feasibly apply at recommended rates,⁵⁰⁰ meaning that they are almost certainly applying waste in excess of those rates and, thus, causing discharges. Because standard, authorized land application rates likely lead to discharges, and many CAFOs are likely applying waste above those rates, the connection between land application and water pollution discharges is sound and rational.

b. Winter Land Application Causes Discharges.

In addition to land application at recommended rates, land application during the winter also causes discharges. Winter application poses an especially significant risk of discharges if the ground is frozen or snow-covered, preventing soil from absorbing the waste.⁵⁰¹ But, even if soil can absorb the waste, winter application poses a serious risk because crops typically do not take up a significant amount of nutrients during the winter, meaning that land application during the winter is even more likely to result in discharges of excess nutrients.⁵⁰²

Numerous studies confirm that “winter application of manure is the least desirable from both a nutrient utilization and pollution standpoint.”⁵⁰³ For example, one study involving a watershed in New York found that applying manure to snow-covered fields for five days caused a “significant increase” in phosphorus concentrations in the watershed.⁵⁰⁴ Another study concluded that “[o]ver half of annual runoff can occur during the winter season in temperate regions with snow and frozen soils present.”⁵⁰⁵ And a survey of studies of winter application concluded that “the vast majority of studies suggest that winter application of manure increases loss of nutrients.”⁵⁰⁶ Moreover, another study concluded that climate change-induced warmer

⁵⁰⁰ See *infra* Section III.C.2.v.

⁵⁰¹ See Melanie N. Stock et al., *Fall Tillage Reduced Nutrient Loads from Liquid Manure Application During the Freezing Season*, 48 J. Env’t Quality 889, 889 (2019) (“Winter application . . . can lead to elevated runoff risks from frozen soils, snowmelt, and rain-on-snow events.”); see also Jason S. Smith et al., *Winter Manure Application: Management Practices and Environmental Impact* 12 (2017), <https://soilhealthnexus.org/files/2018/02/ncrwn-winter-manure-app-mngmt-practices-enviro-impact-report-FINAL.pdf> (“Most frozen soils have been shown to be impervious. Impervious soils carry a greatly increased risk of snowmelt causing a runoff event capable of carrying particulate matter, pathogens, and soluble compounds contained in winter spread manure.”).

⁵⁰² See Jian Liu et al., *Seasonal Manure Application Timing and Storage Effects on Field- and Watershed-Level Phosphorus Losses*, 46 J. Env’t Quality 1403 (2017) (“Winter manure applications, which experience minimal, if any, nutrient crop uptake, often coincide with active transport pathways created by frozen and water-saturated soils.”).

⁵⁰³ Theodore W. Lewis & Joseph C. Makarewicz, *Winter Application of Manure on an Agricultural Watershed and its Impact on Downstream Nutrient Fluxes*, 35 J. Great Lakes Res. 43 (2009).

⁵⁰⁴ *Id.* Similarly, another study found that fall and winter land applications increased total phosphorus losses by 12 to 16 percent as compared to spring land applications. See Liu et al., *supra* note 502, at 1403.

⁵⁰⁵ Stock et al., *supra* note 501, at 889.

⁵⁰⁶ Smith et al., *supra* note 501, at 11.

winter temperatures are exacerbating winter runoff.⁵⁰⁷ As a result, “[t]he assumption that discharge and nutrient transport remains low during the winter months no longer holds.”⁵⁰⁸

Despite these serious risks, state laws and permits in many states allow CAFO operators to apply waste to frozen or snow-covered ground.⁵⁰⁹ Although some of these states have taken steps to reduce the risks associated with winter application, the following evidence makes clear that those steps are insufficient to prevent discharges. As a result, winter application and resulting discharges are common. Indeed, during the early part of 2014, the New York Department of Environmental Conservation investigated at least forty incidents of water pollution following winter land applications.⁵¹⁰ Because New York continues to allow winter application,⁵¹¹ numerous incidents like those that took place in 2014 almost certainly have continued to occur.⁵¹²

Similar incidents are also common in other states. In November 2019 in Wisconsin, a CAFO operator applied manure to cold, stiff soil, and the manure ran off into a nearby creek, causing a fish kill.⁵¹³ In March 2019 in Michigan, a CAFO operator applied manure to frozen, snow-covered ground, and the manure ran off into Coldwater River, turning the prized trout

⁵⁰⁷ See Erin C. Seybold et al., *Winter Runoff Events Pose an Unquantified Continental-Scale Risk of High Wintertime Nutrient Export*, 17 *Env’t Rsch. Letters* 1 (2022).

⁵⁰⁸ *Id.* at 10.

⁵⁰⁹ See, e.g., Idaho Dairy Nutrient Management Standard 3 (providing exceptions to prohibition on applying waste to frozen or snow-covered ground); 510 Ill. Comp. Stat. 77/20(f)(9) (allowing application on frozen and snow-covered ground under certain circumstances); Iowa Admin. Code r.567-65.3(4) (same); N.Y. Dep’t of Env’t Conservation, ECL SPDES General Permit for Concentrated Animal Feeding Operations § III.A.8.c. (July 22, 2022) (same); Ohio Admin. Code 901:10-2-14(G)(1)(same).

⁵¹⁰ See N.Y. Dep’t of Env’t Conservation, Partial Response to FOIL Requests 14-1526 and 14-1658 (July 8, 2014), Summary of New York State Contamination Incidents Related to CAFOs in Winter and Spring of 2014, attached as Exhibit 25. In one 2014 incident in New York, snowmelt caused manure to run off fields and into Owasco Lake, creating a 75-by-25-foot plume of liquid manure. See Carrie Chantler, *Owasco Lake Advocates Decry Runoff of Manure into Water*, Auburn Citizen (Apr. 6, 2014), https://auburnpub.com/news/local/owasco-lake-advocates-decry-runoff-of-manure-into-water/article_498bd2fe-a7ec-5994-b4ed-005111da2e89.html.

⁵¹¹ See N.Y. Dep’t of Env’t Conservation, ECL SPDES General Permit for Concentrated Animal Feeding Operations § III.A.8.c. (July 22, 2022).

⁵¹² For example, in February 2017 in New York, a structural issue with a waste pit required a CAFO operator to land apply waste, and snowmelt then caused the waste to run off the field and into nearby waterbodies. See Kelsey O’Connor, *Manure Spill Impacts Salmon Creek and Cayuga Lake; Municipal Water Supplies Not Affected*, The Ithaca Voice (Feb. 20, 2017), <https://ithacavoice.com/2017/02/manure-spill-impacts-salmon-creek-cayuga-lake-municipal-water-supplies-not-affected/>.

⁵¹³ See Greg Seitz, *Factory Farm Runoff Contaminates Creek in St. Croix River Watershed, Killing Fish*, St. Croix 360 (Jan. 9, 2020), <https://www.stcroix360.com/2020/01/factory-farm-runoff-contaminates-creek-in-st-croix-river-watershed-killing-fish/>.

stream murky and black.⁵¹⁴ And in February 2011 in Illinois, thawing caused manure to run off a field and into tributaries of Panther Creek.⁵¹⁵ Community members also report that they have witnessed CAFOs applying waste during the winter.⁵¹⁶ The Dodge County, Minnesota resident describes seeing “pooled manure sit[ting] on top of the frozen ground, while dozens of birds pick at dead and decomposing pig body parts mixed in with the manure.”⁵¹⁷ In the many states that allow winter application, CAFOs very likely cause discharges.

c. Wet Weather Land Application Causes Discharges.

Like land application during the winter, land application during wet weather also causes discharges. The CWA exempts “agricultural stormwater discharges,”⁵¹⁸ which EPA has defined as “precipitation-related discharge[s] . . . where the manure, litter, or process wastewater has been land applied in accordance with site-specific nutrient management practices that *ensure appropriate agricultural utilization of the nutrients*.”⁵¹⁹ However, as the Second Circuit has explained, “there can be no escape from liability for agricultural pollution simply because it occurs on rainy days.”⁵²⁰ Thus, “the real issue [with respect to liability] is not whether the discharges occurred during rainfall or were mixed with rain water run-off, but rather, whether the discharges were the *result* of precipitation.”⁵²¹

To fall within the regulatory agricultural stormwater exemption, a release of pollutants must be the result of precipitation and must follow land application carried out in accordance with site-specific nutrient management practices that ensure appropriate agricultural utilization of nutrients—that is, practices that ensure nutrients are utilized by crops, not discharged.⁵²² But CAFOs routinely cause precipitation-related discharges following land application at rates that *exceed* those set out in their nutrient management plans and, therefore, fail to ensure appropriate agricultural utilization of the nutrients.⁵²³ Those precipitation-related discharges are subject to the CWA.

⁵¹⁴ See Michael Kransz, *Manure Spill Turns Portions of West Michigan Stream ‘Ink Black,’* M Live (Mar. 21, 2019), <https://www.mlive.com/news/grand-rapids/2019/03/manure-spill-turns-portions-of-west-michigan-trout-stream-ink-black.html>.

⁵¹⁵ Jackson & Marx, *supra* note 90.

⁵¹⁶ See Exhibit 9 ¶ 10; Exhibit 3 ¶ 6; Exhibit 15 ¶ 5; Exhibit 12 ¶ 5.

⁵¹⁷ Exhibit 2 ¶ 7.

⁵¹⁸ 33 U.S.C. § 1362(14).

⁵¹⁹ 40 C.F.R. § 122.23(e)(1) (emphasis added).

⁵²⁰ *Concerned Area Residents for the Env’t v. Southview Farm*, 34 F.3d 114, 120 (2d Cir. 1994).

⁵²¹ *Id.* at 120–21 (emphasis added); see also *CARE I*, 54 F. Supp. 2d at 981 (“The agricultural stormwater . . . exemption . . . does not act to relieve CAFO farmers from responsibility for over applications and misapplications of CAFO animal wastes to fields in amounts or locations which will then discharge into the waters of the United States.”).

⁵²² *Id.*; see also 40 C.F.R. § 122.23(e)(1).

⁵²³ See *infra* Section IV.B.5.

CAFOs commonly apply manure at rates that exceed those set out in their nutrient management plans. As detailed below, most Large CAFOs generate more manure nutrients than they can feasibly apply at recommended rates,⁵²⁴ meaning that their most convenient, affordable strategy for waste disposal likely involves land application in excess of those rates. In addition, studies show that CAFOs routinely apply manure above recommended rates. A study of 13 CAFOs in Michigan over a three-year period found 256 applications that exceeded recommended rates for nitrogen and 111 applications that exceeded recommended rates for phosphorus.⁵²⁵ Four of the CAFOs averaged six or seven nitrogen overapplications per year, three averaged 11 or 12 per year, and one averaged 20 per year.⁵²⁶ People living near CAFOs also report numerous instances of CAFOs applying excess manure, occasionally resulting in manure left to pool on fields.⁵²⁷ Even if this over-applied manure reaches surface waters “during rainfall or . . . mixed with rainwater runoff,” those discharges are subject to the CWA because they result from excessive application, not precipitation alone.

In addition, CAFOs routinely cause precipitation-related discharges following land application before or during wet weather—which also does not ensure appropriate agricultural utilization of nutrients⁵²⁸—and those discharges are subject to the CWA. In states that prohibit land application during wet weather, any such applications necessarily are not in accordance with site-specific practices that ensure appropriate agricultural utilization of nutrients, and thus, precipitation-related discharges following those applications are subject to the CWA. For example, North Carolina’s state permit—under which nearly all Large CAFOs in North Carolina operate⁵²⁹—prohibits land application during precipitation and requires CAFO operators to stop land application within 12 hours after the National Weather Service issues a Hurricane Warning, Tropical Storm Warning, Flood Warning, or Flash Flood Watch.⁵³⁰ Yet community members in

⁵²⁴ See *infra* Section IV.B.5.

⁵²⁵ See Colleen M. Long et al., *Use of Manure Nutrients from Concentrated Animal Feeding Operations*, 44 J. Great Lakes Rsch. 245, 248 (2018).

⁵²⁶ *Id.*

⁵²⁷ See, e.g., Exhibit 2 ¶¶ 7–8.

⁵²⁸ See, e.g., Pierre Gérard-Marchant et al., *Simple Models for Phosphorus Loss from Manure during Rainfall*, 34 J. Env’t Quality 872 (2005) (noting that phosphorus losses are greatest when precipitation occurs shortly after land application); Seth Laurenson & D.J. Houlbrooke, *Nutrient and Microbial Loss in Relation to Timing of Rainfall Following Surface Application of Dairy Farm Manure Slurries to Pasture*, 52 Soil Rsch. 513 (2014) (finding that the “[g]reatest risk to water quality occurred when rainfall was received within 2 days of manure slurry application”); Philip Wayne Westerman et al., *Swine Manure and Lagoon Effluent Applied to a Temperate Forage Mixture: II. Rainfall Runoff and Soil Chemical Properties*, 16 J. Env’t Quality 106, 106 (1987) (“Pollution by runoff was more likely when rainfall occurred soon after manure or fertilizer application.”).

⁵²⁹ See EPA, *NPDES CAFO Permitting Status Report: National Summary, Endyear 2021, completed 07/20/22*, *supra* note 5.

⁵³⁰ See N.C. Dep’t of Env’t Quality, *Swine Waste Management System General Permit § II(23)* (April 12, 2019). Illinois also prohibits land application during rainfall events. Ill. Admin. Code tit. 8, § 900.803(u).

North Carolina report that CAFOs routinely apply waste during wet weather and before hurricanes and tropical storms,⁵³¹ which cause waste pits and land application areas to flood, releasing massive amounts of waste into waterways.⁵³² Indeed, in 2018, the North Carolina Pork Council admitted that CAFO operators “*prepared* for [Hurricane Florence] by lowering the levels of the[ir] lagoons to accommodate more rainwater [and] using the manure as fertilizer in nearby fields.”⁵³³ Because North Carolina prohibits land application during precipitation or more than 12 hours after the state has issued a storm or flood warning, applying waste under those conditions cannot constitute a site-specific practice that ensures appropriate agricultural utilization of nutrients. Thus, precipitation-related discharges following applications under those conditions are subject to the CWA.

Even in states that allow land application before and during wet weather, this practice fails to ensure appropriate agricultural utilization of nutrients, so precipitation-related discharges following this practice are subject to the CWA. Ample scientific and anecdotal evidence makes clear that application before and during wet weather leads to discharges.⁵³⁴ For example, researchers studying runoff following land applications of dairy manure found that the amount of nutrients and E. coli in the runoff was highest when rainfall occurred within two days after application.⁵³⁵ Reports from community members confirm that wet weather land application causes discharges. A resident of Henry County, Iowa—who used to live just 2,200 feet from a swine CAFO—recalls that the CAFO operator once applied waste before heavy rains, which caused “green and foamy” liquid to run off the field and spill into a creek on the resident’s property.⁵³⁶ Water samples from the creek showed levels of E. coli and nitrates that were just under the state’s maximum acceptable level.⁵³⁷ Yet, in Indiana, Iowa, and New York, CAFOs may apply waste before and during wet weather.⁵³⁸ Because wet-weather application—which causes discharges and, thus, does not ensure appropriate agricultural utilization of nutrients—is

⁵³¹ See Exhibit 11 ¶ 8.

⁵³² See Pierre-Louis, *supra* note 466.

⁵³³ See Chris Megerian, *Environmentalists Worry that Florence Will Leave Behind a Toxic Mess in North Carolina*, L.A. Times (Sept. 18, 2018), <https://www.latimes.com/nation/la-na-florence-environment-20180918-story.html> (emphasis added).

⁵³⁴ See *supra* note 8.

⁵³⁵ Laurenson & Houlbrooke, *supra* note 528, at 513.

⁵³⁶ Exhibit 17 ¶ 3; see also Exhibit 15 ¶ 5 (describing runoff following rainfall, which “formed a froth on top of the water”).

⁵³⁷ See *id.*

⁵³⁸ See 327 Ind. Admin. Code Rule 14 (allowing wet weather application so long as it will not “likely result in runoff”); see also Iowa Admin. Code 567-65.3(2)(b) (allowing wet weather application so long as the CAFO operator uses practices to “minimize” groundwater or surface water pollution); N.Y. Dep’t of Env’t Conservation, ECL SPDES General Permit for Concentrated Animal Feeding Operations § III.A.8.c. (July 22, 2022) (allowing wet weather application so long as the CAFO operator follows certain recommendations).

allowed in these states, CAFOs there are almost certainly causing discharges that are subject to the CWA.

d. Land Application to Fields with Tile Drains Causes Discharges.

Land application to fields with tile drains—perforated pipes that run under fields to transport water and other liquids out of the soil and into surrounding ditches, streams, and rivers—is a significant source of discharges. As discussed below, ample evidence shows that when CAFO operators apply liquid waste to fields with tile drains, the waste often moves rapidly into the drains, which transport it to ditches that flow into surface water. And industry-standard, government-authorized waste disposal practices exacerbate discharges from tile drains. Numerous instances of discharges from tile drains to surface water confirm that they are a common source of discharges.

A robust body of evidence shows that liquid waste often moves rapidly into tile drains, which carry it to surface water, causing discharges. Indeed, the Natural Resources Conservation Service’s Conservation Practice Standard for nutrient management—on which many states rely to develop guidelines for CAFO nutrient management plans⁵³⁹—states that “[w]hen applied to fields with subsurface drains, the liquid can follow soil macropores directly to the tile drains[,] creating a surface water pollution hazard from direct tile discharge.”⁵⁴⁰ In other words, rather than remaining in the soil or being taken up by plants, the liquid waste follows pathways through the soil directly to the tile drains. As a result, “even a field with one subsurface drainage line may present a risk of manure/wastewater movement to subsurface drains and cause a direct discharge.”⁵⁴¹ Scientific studies support this conclusion. For instance, a study of a tile-drained field at a swine CAFO in Ohio found that earthworm burrows created pathways through the soil, which rapidly transported liquid to the tile drain.⁵⁴² After applying dyed water to the field, researchers observed the water emerging from the tile drain outlet after only 14 minutes.⁵⁴³ They concluded that “a substantial portion of the dyed water must have entered the tile.”⁵⁴⁴ Additional

⁵³⁹ See, e.g., N.Y. Dep’t of Env’t Conservation, ECL SPDES General Permit for Concentrated Animal Feeding Operations § III.A.4.a. (July 22, 2022).

⁵⁴⁰ Nat. Res. Conservation Serv., Conservation Practice Standard, Nutrient Management, Code 590, at 590-CPS-6 (2020), https://agri.ohio.gov/wps/wcm/connect/gov/3dd2869c-32d2-4dd7-84d7-5c21f2f3b74b/Ohio_590_Standard_November_2012.pdf?MOD=AJPERES&CONVERT_TO=url&CACHEID=ROOTWORKSPACE.Z18_M1HGGIK0N0JO00QO9DDDDM3000-3dd2869c-32d2-4dd7-84d7-5c21f2f3b74b-n4cuBr3.

⁵⁴¹ *Id.*

⁵⁴² See Martin J. Shipitalo & Frank Gibbs, *Potential for Earthworm Burrows to Transmit Injected Animal Wastes to Tile Drains*, 64 Soil Sci. Soc. Am. J. 2103, 2107 (2000).

⁵⁴³ *Id.* at 2105.

⁵⁴⁴ *Id.*

studies demonstrate that tile-drained fields around the country pose similar threats of discharge.⁵⁴⁵

Industry-standard, government-authorized waste disposal practices can exacerbate discharges from tile drains. For example, some states allow CAFO operators to apply waste to fields that are not tilled.⁵⁴⁶ Studies show that no-till fields tend to have more pathways through the soil because they are not disturbed through soil turning.⁵⁴⁷ Thus, applying waste to no-till fields with tile drains is particularly likely to cause discharges.

Numerous instances of discharges confirm that applying liquid waste to fields with tile drains commonly causes discharges. For example, reports from agencies in Ohio show that from January 2000 to December 2003, animal waste entered tile drains and contaminated surface waters at least 98 times.⁵⁴⁸ Most of the violations occurred on swine and dairy CAFOs, which was attributed to their use of wet manure management systems.⁵⁴⁹

e. Ample Evidence of CAFO Pollutants in Waterbodies Near Land Application Sites Indicates that Land Application Causes Discharges.

Extensive scientific evidence of CAFO pollutants—including ions, nutrients, bacteria, antibiotic residue, and pathogens—in waterbodies near CAFO land application sites confirms that land application causes discharges. For example, a study of a stream in a North Carolina watershed that, at the time of the study, contained 13 swine CAFOs and 11 poultry CAFOs found fecal coliform bacteria, ammonium, and nitrate in the stream and concluded that “the stream pollution is chronic and a result of normal CAFO operations and presently accepted waste disposal techniques.”⁵⁵⁰ Similarly, a study of multiple North Carolina watersheds found higher median values of ions and nutrients in watersheds that contain CAFOs than in those without CAFOs; the study concluded that “land applications of waste manure at swine CAFOs influenced ion and nutrient chemistry in many of the . . . streams that were studied.”⁵⁵¹ Another

⁵⁴⁵ See, e.g., Laurent Ahiablame et al., *Nutrient Content at the Sediment-Water Interface of Tile-Fed Agricultural Drainage Ditches*, 2 Water 411 (2010).

⁵⁴⁶ See Generally Accepted Agricultural and Management Practices for Manure Management and Utilization, Mich. Comm’n on Agric. & Rural Dev. 41 – 42 (Jan. 2021) (including no-till among recommended conservation practices on Michigan fields) and *Nutrient Management Basics*, Wisc. Dep’t of Ag. And Consumer Prot. (detailing no-till as a method of managing nutrient loss).

⁵⁴⁷ See N.K. Patni et al., *Tile Effluent Quality and Chemical Losses Under Conventional and no Tillage—Part 1: Flow and Nitrate*, 39 Transactions of Am. Soc’y Agric. & Biological Eng’rs 1665 (1996).

⁵⁴⁸ See James J. Hoorman & Martin J. Shipitalo, *Subsurface Drainage and Liquid Manure*, 61 J. Soil & Water Conservation 94A, 95A (2006).

⁵⁴⁹ *Id.*

⁵⁵⁰ Michael A. Mallin et al., *Industrial Swine and Poultry Production Causes Chronic Nutrient and Fecal Microbial Stream Pollution*, 226 Water, Air, and Soil Pollution 407 (2015).

⁵⁵¹ Stephen L. Harden, *supra* note 378 at 1, 50 (2015).

study of water samples taken near swine and poultry CAFOs found high levels of antimicrobial compounds in the samples, which “suggests that animal waste applied to agricultural fields as fertilizer may act as a . . . source of antimicrobial residues in water resources.”⁵⁵² And two studies of waterways in Wisconsin also link CAFOs with discharges. One study found that total phosphorus concentrations in waterways increased with proximity to dairy operations, and concentrations downstream from CAFOs were 19 percent higher than upstream concentrations.⁵⁵³ The second study concluded that increasing the number of CAFOs in an area also increases the levels of total phosphorus and ammonia in surface water in the area.⁵⁵⁴ Similar results have been found in studies of antibiotic-resistant bacteria and viruses in waterbodies near land application sites.⁵⁵⁵

4. Discharges from Land Application and Waste Storage Structures Are Likely to Occur with Increasing Frequency Due to Climate Change.

As a result of climate change, many areas of the country where CAFOs are concentrated are experiencing, or are predicted to experience, increased precipitation and stronger, more frequent storms. For example, since 1999, Eastern North Carolina has experienced at least four 100-year storms—that is, storms once determined to have a one percent chance of occurring in a given year.⁵⁵⁶ In the Midwest, the average annual amount of precipitation has increased by five to 10 percent over the last half century, with rainfall during the four wettest days of the year increasing by about 35 percent.⁵⁵⁷ And in California’s Central Valley, intense storms known as “atmospheric rivers,” which have contributed to most of the state’s largest floods, are expected to become more frequent due to climate change.⁵⁵⁸

⁵⁵² Enzo R. Campagnolo et al., *Antimicrobial Residues in Animal Waste and Water Resources Proximal to Large-Scale Swine and Poultry Feeding Operation*, 299 *Sci. Total Env’t* 89, 94 (2002).

⁵⁵³ See Donald M. Waller et al., *Shifts in Precipitation and Agricultural Intensity Increase Phosphorus Concentrations and Loads in an Agricultural Watershed*, 284 *J. Env’t Mgmt.* 112019 (2021).

⁵⁵⁴ See Zach Raff & Andrew Meyer, *CAFOs and Surface Water Quality: Evidence from Wisconsin*, 104 *Am J. Agric. Econ.* 161 (2022).

⁵⁵⁵ See Elizabeth Christenson et al., *A Watershed Study Assessing Effects of Commercial Hog Operations on Microbial Water Quality in North Carolina, USA*, 838 *Sci. Total Env’t* 1 (2022); see also Jennifer Gentry-Shields et al., *Hepatitis E Virus and Coliphages in Waters Proximal to Swine Concentrated Animal Feeding Operations*, 505 *Sci. Total Env’t* 487, 487 (2015); Sarah M. Hatcher et al., *Occurrence of Methicillin-Resistant Staphylococcus Aureus in Surface Waters Near Industrial Hog Operation Spray Fields*, 565 *Sci. Total Env’t* 1028, 1033 (2016); Amy R. Sapkota et al., *Antibiotic-Resistant Enterococci and Fecal Indicators in Surface Water and Groundwater Impacted by a Concentrated Swine Feeding Operation*, 115 *Env’t Health Persps.* 1040, 1040–41, 1045 (2007).

⁵⁵⁶ See Surrusco, *supra* note 467.

⁵⁵⁷ See EPA, *What Climate Change Means for Iowa* (2016), <https://19january2017snapshot.epa.gov/sites/production/files/2016-09/documents/climate-change-ia.pdf>.

⁵⁵⁸ Central Valley Regional Water Quality Control Bd., *Central Valley Region Climate Change Work Plan* 10 (2017).

Stronger and more frequent storms will exacerbate discharges from waste storage structures and land application. These storms increase the likelihood that waste pits will overflow or breach. In addition, storm-related precipitation will cause waste pits to fill more quickly than anticipated, requiring CAFO operators to land apply waste more frequently or in larger amounts to lower the waste level in the pits and, thereby, reduce the likelihood of overflows and breaches.⁵⁵⁹ As explained above, the North Carolina Pork Council acknowledged that CAFO operators prepared for Hurricane Florence by land applying waste so that storage pits could accommodate more rainwater.⁵⁶⁰ But, as one resident who lives near at least 30 CAFOs in North Carolina explains, “[b]ecause the workers’ main concern is reducing the waste in the lagoons, . . . it’s likely that they overapply it on the fields,”⁵⁶¹ creating a certain or near certain risk of discharges.

5. Large CAFOs Using Wet Manure Management Systems Are Especially Significant Sources of Discharges.

For over 20 years, EPA has recognized that Large CAFOs “produce quantities of manure that can be a risk to water quality and public health” and, thus, “are a priority for permit issuance.”⁵⁶² Given the massive amount of urine and feces that Large CAFOs generate,⁵⁶³ it is not surprising that Large CAFOs using wet manure management systems are especially significant sources of discharges through waste storage, transport, and disposal practices. Thus, there is a sound and rational connection between Large CAFOs using wet manure management systems and discharges.

Large CAFOs using wet manure management systems are especially likely to discharge from land application. According to USDA, in 2012, the majority of Large CAFOs generated more manure nutrients than they could feasibly apply at USDA-recommended rates.⁵⁶⁴ In fact, USDA found that at least 64 percent of Large CAFOs produced “farm-level” excess manure

⁵⁵⁹ See Mo. Code Regs. Ann. tit. 10, § 20-6.300(4)(A)(5) (“When wastewater storage structures are in danger of an overflow due to a chronic weather event, CAFO owners shall take reasonable steps to lower the liquid level in the structure through land application[.]”); see also N.C. Dep’t of Env’t Quality, Swine Waste Management System General Permit § II(29) (“[A]n operator may temporarily lower lagoon levels . . . to provide additional temporary storage for excessive rainfall during the hurricane season[.]”); see also Barry Yeoman, *‘It Smells Like a Decomposing Body’: North Carolina’s Polluting Pig Farms*, The Guardian (Aug. 27, 2019), <https://www.theguardian.com/environment/2019/aug/27/it-smells-like-a-decomposing-body-north-carolinas-polluting-pig-farms> (reporting that at least 35 CAFOs in North Carolina were seen land applying waste shortly before Tropical Storm Hermine hit the state).

⁵⁶⁰ See Megerian, *supra* note 533.

⁵⁶¹ Exhibit 11 ¶ 8.

⁵⁶² U.S. Dep’t Agric. & EPA, *Unified National Strategy for Animal Feeding Operations* (1999), <https://www3.epa.gov/npdes/pubs/finafost.pdf>.

⁵⁶³ See *supra* Section I.C.

⁵⁶⁴ See Gollehon et al., *supra* note 18, at 19, Tbl. 7. USDA’s calculations include Large swine, dairy, poultry, and beef CAFOs.

nutrients—that is, more manure nutrients than they could possibly apply at recommended rates on the cropland and pastureland available at each CAFO.⁵⁶⁵ USDA estimated that, in total, Large CAFOs generated 1,365 million pounds of farm-level excess manure nitrogen and 594 million pounds of farm-level excess manure phosphorus in 2012.⁵⁶⁶ This excess manure nitrogen *alone* exceeds the amount of nitrogen used to fertilize over nine million acres of corn fields, and it is nearly equivalent to the amount used to fertilize all 80 million acres of soybean fields in the United States.⁵⁶⁷ By contrast, Large CAFOs reported applying manure to only 2.4 million acres in the 2012 Census of Agriculture.⁵⁶⁸

Large CAFOs with farm-level excess manure nutrients—that is, at least 64 percent of Large CAFOs, according to USDA’s study—are almost certain to cause discharges. These CAFOs are unlikely to apply their excess manure nutrients *off-farm*, because it is costly and inconvenient to do so.⁵⁶⁹ As Dr. John Ikerd, Professor Emeritus of Agricultural Economics at the University of Missouri, explains, when the cost of transporting manure exceeds its value as a fertilizer, it is more economical for a CAFO operator to overapply the waste closer to the CAFO than to transport it.⁵⁷⁰ According to figures from Iowa State University, the cost of transporting manure exceeds its value as a fertilizer at [an average] transportation distance of just one mile.⁵⁷¹ In addition, USDA notes that “[o]ff-farm application[] . . . is not a universally accepted practice because of the potential for the spread of diseases between farms.”⁵⁷² Given the cost, inconvenience, and risk of spreading diseases associated with transporting manure, Large CAFOs with farm-level excess manure nutrients are likely applying the excess manure on-farm and causing discharges as a result.⁵⁷³

⁵⁶⁵ *Id.*

⁵⁶⁶ *Id.*

⁵⁶⁷ On average, farmers apply 149 pounds of nitrogen per acre of corn, and 17 pounds of nitrogen per acre of soybeans. There are 83.1 million acres of soybeans in the United States. See USDA Nat’l Agric. Statistics Serv., *Agricultural Chemical Use Survey: Corn*, https://www.nass.usda.gov/Surveys/Guide_to_NASS_Surveys/Chemical_Use/2018_Peanuts_Soybeans_Corn/ChemUseHighlights_Corn_2018.pdf; see also USDA Nat’l Agric. Statistics Serv., *Agricultural Chemical Use Survey: Soybeans*, https://www.nass.usda.gov/Surveys/Guide_to_NASS_Surveys/Chemical_Use/2020_Soybeans/soybean-chem-highlights.pdf.

⁵⁶⁸ See Gollehon et al., *supra* note 18, at 33, Tbl. B1.

⁵⁶⁹ See April B. Leytem et al., *Cycling Phosphorus and Nitrogen through Cropping Systems in an Intensive Dairy Production Region*, 11 *Agronomy* 1, 15 (2021) (“[Nitrogen], as well as [phosphorus], are concentrated around dairies due to the cost and inconvenience of transporting manures away from the facility.”).

⁵⁷⁰ See Interview by Kara Goad, Associate Attorney, Earthjustice with Dr. John Ikerd, Professor Emeritus of Agric. Economics at the Univ. of Missouri (July 15, 2022).

⁵⁷¹ See Greg Brenneman, *You Can’t Afford Not to Haul Manure* (1995), <https://store.extension.iastate.edu/Product/You-Cant-Afford-Not-to-Haul-Manure-Livestock-Industry-Facilities-and-Environment-PDF>.

⁵⁷² Gollehon et al., *supra* note 18 at 18 n.10.

⁵⁷³ See *supra* Section IV.B.3.a.

Large CAFOs were responsible for a significant majority of all farm-level excess manure nutrients. As of 2012, Large CAFOs were responsible for 71 percent of farm-level excess manure nitrogen and 70 percent of farm-level excess manure phosphorus.⁵⁷⁴ In other words, Large CAFOs were responsible for a significant majority of manure nutrients that almost certainly cause water pollution.

Not only do most Large CAFOs lack sufficient *on-farm* land application areas, but they also frequently lack adequate *off-farm* alternatives, because together with other CAFOs, they often generate more manure than can be applied at recommended rates to all the cropland and pastureland available in their county or, in some cases, in their shared hydrologic basins. According to USDA, in 2012, there were 205 counties with county-level excess manure, meaning that CAFOs in those counties together produced more manure than could be applied at recommended rates to all the cropland in the counties.⁵⁷⁵ In addition, there were at least twelve hydrologic basins with basin-level excess manure, meaning that CAFOs in those hydrologic basins together produced more manure than could be applied at recommended rates to all the cropland in the basins.⁵⁷⁶ A number of the counties with county-level excess manure were in North Carolina and California's Central Valley,⁵⁷⁷ and one of the hydrologic basins with basin-level excess manure was in North Carolina,⁵⁷⁸ where pollution disproportionately harms communities of color and low-income communities.

In the many areas with excess manure nutrients at the county or hydrologic basin level, Large CAFOs with farm-level excess manure are especially likely to cause discharges. Not only do they lack adequate on-farm cropland, but they are also more likely to lack adequate off-farm cropland. This is because, together with other CAFOs in the county or basin, they generate more manure than can be applied at recommended rates across all the cropland in the area.

The actual amount of excess manure nutrients generated at Large CAFOs, across counties, and across hydrologic basins is likely even higher than USDA's estimates. USDA assumed that land application areas did not receive any additional nutrients from applications of synthetic fertilizer, which also contains nitrogen and phosphorus.⁵⁷⁹ However, that is often not the case. Rather, cropland that receives CAFO manure also commonly receives synthetic

⁵⁷⁴ See Gollehon et al., *supra* note 18 at 18.

⁵⁷⁵ See Gollehon et al., *supra* note 18, at 25, Tbl. 8.

⁵⁷⁶ See Robert L. Kellogg et al., *Database of Estimates by 6-Digit HUC of Animal Units and Recoverable and Non-Recoverable Manure Nutrients Based on the Census of Agriculture* 36, Tbl. S7, https://www.nrcs.usda.gov/wps/PA_NRCSCconsumption/download?cid=nrcseprd1360816&ext=pdf. "Basins" correspond to 6-digit Hydrologic Unit Codes.

⁵⁷⁷ See Gollehon et al., *supra* note 18, at 27, Map 8.

⁵⁷⁸ See Kellogg et al., *supra* note 576, at 36, Tbl. S7.

⁵⁷⁹ See Gollehon et al., *supra* note 18, at 33.

fertilizer,⁵⁸⁰ often in excess of crop needs and without accounting for manure application.⁵⁸¹ Application of synthetic fertilizer likely leads to excess nutrients when manure is applied to the land, as the crops and soil may already be saturated with nutrients from the synthetic fertilizer. For example, a 2020 study found that, “[i]n almost all of Minnesota’s farm counties, the combination of manure plus commercial fertilizer is likely to load too much nitrogen or phosphorus or both onto crop fields, threatening drinking water and fouling the state’s iconic lakes and rivers[.]”⁵⁸²

USDA likewise did not account for other CAFO practices that likely lead to excess nutrients. For example, North Carolina’s state permit allows CAFO operators to leave hay harvested from land application fields on the fields for up to two years.⁵⁸³ An individual who has nearly 20 years of experience monitoring CAFOs in North Carolina reports seeing baled hay left on fields or even “dumped in wetlands.”⁵⁸⁴ When hay remains on application fields, the nutrients taken up by the hay remain as well, and as the hay decomposes over time, those nutrients can return to the soil. Thus, crops allowed to decompose on fields increase the likelihood that land applying manure will result in excess nutrients. For all these reasons, Large CAFOs likely generate even more excess nutrients than USDA has estimated.

A new study of the Western Lake Erie Basin demonstrates that the problem of excess manure nutrients across entire watersheds has persisted. The study found that in nine watersheds within the basin, more than 90 percent of the cropland is required to avoid applying excess nutrients.⁵⁸⁵ In those nine watersheds, there is a high risk that CAFOs will overapply nutrients—

⁵⁸⁰ See Sarah Porter & Craig Cox, Env’t Working Grp., *MANURE OVERLOAD: Manure Plus Fertilizer Overwhelms Minnesota’s Land and Water* (2020), <https://www.ewg.org/interactive-maps/2020-manure-overload/#:~:text=In%20almost%20all%20of%20Minnesota's,an%20Environmental%20Working%20Group%20investigation>; see also Kenneth C. Stone et al., *Water Quality Status of a USDA Water Quality Demonstration Project in the Eastern Coastal Plain*, 50 J. Soil & Water Conservation 567 (1995) (“Although swine and poultry operations produce sufficient quantities of waste to supply more than half of the needed nutrients, 90% of the nutrients applied to cropland are supplied by commercial fertilizers.”).

⁵⁸¹ See Yushu Xia et al., *Developing County-Level Data of Nitrogen Fertilizer and Manure Inputs for Corn Production in the United States*, 309 J. Cleaner Production 1, 11 (2021); see also Long et al., *supra* note 525, at 249.

⁵⁸² Porter & Cox, *supra* note 580.

⁵⁸³ See N.C. Dep’t of Env’t Quality, Swine Waste Management System General Permit § II(28) (April 12, 2019).

⁵⁸⁴ Exhibit 6 ¶ 8.

⁵⁸⁵ See Ethan Bahe et al., Env’t Working Grp., *EWG Analysis: In the Western Lake Erie Basin, Newly Identified Animal Feeding Operation Hot Spots Produce Excess Manure, Threatening Waterways and Human Health* (2022), <https://www.ewg.org/research/ewg-analysis-western-lake-erie-basin-newly-identified-animal-feeding-operation-hot-spots>. A study of excess nutrients in Wisconsin adds to the evidence that excess nutrients remain a problem. The study found that in nine Wisconsin counties, “commercial fertilizer and animal manure are overapplied to farmland at rates that are causing a water pollution crisis.” Sarah Porter et al., *Double Trouble: Wisconsin’s Land and Water are Inundated with Pollution from Animal Manure and Excess Farm Fertilizer* (Feb 2, 2022),

and, thus, very likely cause discharges—because so much of the cropland is at its capacity for nutrients. The study also found that 116 animal feeding operations in the basin would need to use cropland farther than three miles from the operations to avoid overapplying phosphorus, and 55 operations would need to use cropland farther than five miles from the operations to avoid overapplying phosphorus.⁵⁸⁶ Given the cost and inconvenience of transporting liquid manure,⁵⁸⁷ waste disposal at these CAFOs likely involves overapplication on fields closer to the operations.

Since 2012, the problem of excess nutrients generated at Large CAFOs has likely worsened. Indeed, USDA found that, in 2012, the amount of excess nutrients generated by Large CAFOs was trending upward, and Large CAFOs were the driving force behind an increase in excess manure nutrients generated by all CAFOs. USDA found that the total amount of farm-level excess manure nitrogen generated at Large CAFOs was nearly 5 times greater in 2012 than it was in 1982, and the total amount of farm-level excess manure phosphorus generated at Large CAFOs more than tripled over the same time period.⁵⁸⁸ In 1982, Large CAFOs accounted for 45 percent of total excess manure nitrogen; by 2012, they accounted for over 71 percent of it.⁵⁸⁹

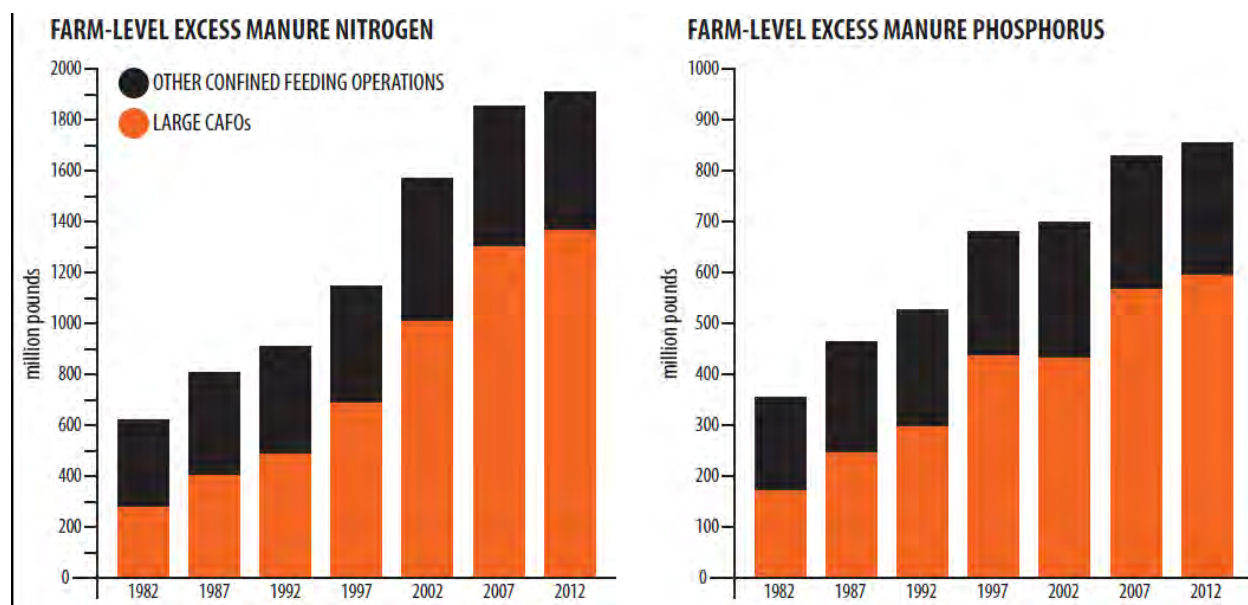


Figure Eleven. Farm-level excess manure nitrogen and farm-level excess manure phosphorus generated by Large CAFOs between 1982 and 2012.⁵⁹⁰

<https://www.ewg.org/research/double-trouble-wisconsins-land-and-water-are-inundated-pollution-animal-manure-and-excess>.

⁵⁸⁶ *Id.*

⁵⁸⁷ See Long et al., *supra* note 525, at 247 (“In many cases, cost remains a barrier to [manure] redistribution because it is expensive to haul manure long distances.”).

⁵⁸⁸ See Gollehon et al., *supra* note 18, at 31, Tbl. A-4.

⁵⁸⁹ *Id.*

⁵⁹⁰ *Id.* at 20, Fig.11 & Fig.12.

Because the number of animals confined in Large CAFOs has continued to increase, these trends in excess manure nutrients have almost certainly continued. As a result, the connection between Large CAFOs using wet manure management systems and discharges has also almost certainly grown stronger.

* * *

Taken together, the evidence presented above makes clear that there is a sound and rational connection between Large CAFOs using wet manure management systems and actual discharges from, at a minimum, waste storage structures, waste transport pipes, and land application. As an official with the Michigan Department of Environmental Quality reported to EPA more than a decade ago in 2008, “virtually all CAFOs with lagoons and/or land application have discharges.”⁵⁹¹ And EPA itself has acknowledged that, “based on EPA’s and the States’ own experience in the field . . . all or virtually all large CAFOs have had a discharge in the past, [or] have a current discharge.”⁵⁹² The evidence presented above provides ample support for a rebuttable presumption that Large CAFOs using wet manure management systems actually discharge pollutants.

C. The Presumption Is a Sensible and Timesaving Device.

A presumption that Large CAFOs using wet manure management systems actually discharge water pollution is a sensible and timesaving device because proving discharges on a CAFO-by-CAFO basis is a difficult and time-consuming endeavor, and Large CAFO operators are well-positioned to rebut the presumption in the rare instances in which no discharges occur.⁵⁹³ As discussed below, at least five factors make it difficult for EPA to prove discharges on a CAFO-by-CAFO basis. *First*, EPA and state agencies lack facility-specific information about CAFOs. *Second*, CAFO discharges are generally unplanned and intermittent. *Third*, EPA and state agencies lack the resources necessary to prove discharges on a CAFO-by-CAFO basis. *Fourth*, EPA should not place the burden on community members or researchers to investigate and prove discharges. And *fifth*, EPA cannot rely on CAFO self-reporting to prove discharges. In contrast, however, these factors will not prevent Large CAFO operators from rebutting the presumption of discharge, if appropriate.

First, EPA and state agencies lack facility-specific information about CAFO locations, sizes, animal types, manure storage structures, and land application areas. EPA has recognized the importance of this information for proving CAFO discharges.⁵⁹⁴ For instance, EPA has

⁵⁹¹ Letter from Richard A. Powers, Chief, Water Bureau, Mich. Dep’t Env’t Quality to U.S. EPA Docket Center 2 (Apr. 4, 2008), attached as Exhibit 26.

⁵⁹² 66 Fed. Reg. at 3,007.

⁵⁹³ See *USX Corp.*, 395 F.3d at 172.

⁵⁹⁴ See National Pollutant Discharge Elimination System (NPDES) Concentrated Animal Feeding Operation (CAFO) Reporting Rule, 76 Fed. Reg. 65,431, 65,436–38 (Oct. 21, 2011).

acknowledged that “knowing the location of the CAFO’s production area . . . is essential for determining sources of water quality impairments.”⁵⁹⁵ And knowing “the number and type of animals provides an indication of the quantity and characteristics of the CAFOs’ manure . . . which then informs EPA as to the possible environmental effects of that manure.”⁵⁹⁶

Despite recognizing the importance of this information, however, EPA frequently does not have it. Indeed, a 2019 report found that EPA lacked facility-specific information for the majority of U.S. CAFOs.⁵⁹⁷ Because CAFOs frequently operate under state laws and permits, rather than NPDES permits, the availability of information about the locations of these facilities and their application fields varies significantly by state.⁵⁹⁸ Many state agencies do not collect facility-specific information, making it more difficult for the agencies and the public to prove discharges.⁵⁹⁹ The difficulty of obtaining facility-specific information about land application is made worse by the fact that CAFOs are often allowed to transfer their waste to third parties for disposal,⁶⁰⁰ and even less information is collected from these third parties. Moreover, the meat and dairy industries compound the difficulty of obtaining facility-specific information by aggressively pursuing and defending privacy protections rarely afforded to other industrial polluters.⁶⁰¹

Second, the nature of CAFO discharges makes it difficult to prove discharges on a CAFO-by-CAFO basis. As EPA has explained, “[o]perations in other industries are typically designed to routinely discharge after appropriate treatment; this is not the case at CAFOs, where discharges are largely unplanned and intermittent.”⁶⁰² In addition, CAFO discharges often occur in remote locations or adjacent to private land. Moreover, in areas where CAFOs are highly

⁵⁹⁵ *Id.* at 65,438.

⁵⁹⁶ *Id.*

⁵⁹⁷ See Devine & Baron, *supra* note 418; see also U.S. Gov’t Accountability Off., *Concentrated Animal Feeding Operations: EPA Needs More Information and a Clearly Defined Strategy to Protect Air and Water Quality from Pollutants of Concern* (2008), <https://www.gao.gov/assets/gao-08-944.pdf> (finding that “EPA does not have data on the number and location of CAFOs nationwide and the amount of discharges from these operations” and that “[w]ithout this information and data . . . , it is difficult to estimate the actual discharges occurring and to assess the extent to which CAFOs may be contributing to water pollution”).

⁵⁹⁸ *Id.* at 5, 12.

⁵⁹⁹ See *id.* at 12; see also David Jackson & Gary Marx, *State Officials Defend Hog Confinement Regulations*, Chicago Tribune (Nov. 7, 2017), <https://www.chicagotribune.com/investigations/ct-pork-met-20171107-story.html> (noting that an official with the Illinois Environmental Protection Agency “acknowledged his agency does not know how many large hog confinements exist in the state, or where many of them are located”).

⁶⁰⁰ See Minn. R. 7020.2225(D) (allowing CAFOs to transfer ownership of manure or process wastewater).

⁶⁰¹ See Ohio Rev. Code Ann § 940.42(A) (generally excluding “[d]ata or records of a person’s agricultural operations” from disclosure to the public).

⁶⁰² 68 Fed. Reg. at 7,201; see also Exhibit 6 ¶ 6 (explaining that identifying discharges from CAFOs “is challenging, in part, because discharges from land application sites to surface water are often intermittent”).

concentrated—such as Duplin County, North Carolina, where there are over 520 swine CAFOs⁶⁰³—it may be difficult to identify the CAFO responsible for a particular discharge based on water samples alone, because there frequently are multiple CAFOs discharging to a river or stream.⁶⁰⁴ These aspects of CAFO discharges mean that, even if EPA knew the location of every CAFO, it would remain difficult for EPA to prove discharges on a CAFO-by-CAFO basis.

Third, EPA and state agencies lack the resources and, often, the political will necessary to identify discharges on a CAFO-by-CAFO basis. Indeed, EPA recently acknowledged that “EPA and state permitting agencies lack the resources to regularly inspect [CAFOs] to assess [CAFO operators’ claims that they do not discharge], particularly since discharges often only occur during certain weather conditions.”⁶⁰⁵ State agencies also are unable to dedicate the resources necessary to identify discharges. In Washington, for example, CAFO inspections occur approximately once every 22 months, and they typically last only a few hours.⁶⁰⁶ In Indiana, there were only seven inspectors available to visit the state’s 796 CAFOs as of 2017, and CAFOs are only inspected once every five years.⁶⁰⁷ Illinois likewise aims to inspect Large CAFOs only once every five years.⁶⁰⁸

Fourth, EPA cannot and should not place the burden on community members or scientists to investigate and prove discharges. Many people who have made complaints about CAFOs in their communities have experienced intimidation or harassment from government employees, industry representatives, and neighbors with financial ties to CAFOs. For example, the Dodge County, Minnesota resident has experienced harassment and intimidation that she perceives as “signs of the power imbalance” between community members and CAFO operators.⁶⁰⁹ And the Duplin County, North Carolina resident explains that he was contacted by a CAFO operator after anonymously reporting the operator’s permit violation to the North Carolina Department of Environmental Quality (“NC DEQ”), leading the resident to conclude that NC DEQ had not kept his report anonymous. As he explains, “[i]f complaints aren’t kept anonymous, it deters people from reporting permit violations.”⁶¹⁰ In light of experiences like

⁶⁰³ See Exhibit 11 ¶ 3.

⁶⁰⁴ See, e.g., Christopher D. Heaney et al., *Source Tracking Swine Fecal Waste in Surface Water Proximal to Swine Concentrated Animal Feeding Operations*, 511 *Sci. of the Total Env’t* 676, 680 (2015) (reporting “overall diffuse and poor microbial quality of surface waters proximal to swine CAFO liquid waste land application sites in [North Carolina],” including the presence of fecal bacteria both upstream and downstream of land application sites, and concluding that upstream sampling locations were potentially contaminated by “numerous upstream swine CAFO liquid waste land application sites as well as poultry CAFO dry litter land application sites”).

⁶⁰⁵ See EPA, *EPA Legal Tools to Advance Environmental Justice*, *supra* note 2, at 75.

⁶⁰⁶ See Exhibit 20.

⁶⁰⁷ See Ind. Dep’t of Env’t Mgmt., *Indiana Confined Feeding Program 25* (2017), https://www.in.gov/idem/cfo/files/about_cfo_presentation.pdf.

⁶⁰⁸ See Danielle J. Diamond, *Illinois’ Failure to Regulate Concentrated Animal Feeding Operations in Accordance with the Federal Clean Water Act*, 11 *Drake J. Agric L.* 185, 209 (2006).

⁶⁰⁹ Exhibit 2 ¶ 16.

⁶¹⁰ Exhibit 11 ¶ 19.

this, EPA has expressed “grave concerns about . . . a potential hostile and intimidating environment for anyone seeking to provide relevant information to [NC DEQ] or EPA.”⁶¹¹

CAFO industry representatives also have sought to intimidate scientists by publicly impugning their motives, threatening aggressive legal action, and attempting to undermine employment and research funding. For example, in response to research by Dr. Steve Wing of the University of North Carolina (“UNC”) at Chapel Hill, finding that swine CAFOs in North Carolina are “differentially sited in areas populated by poor African-Americans” and CAFO neighbors reported more respiratory and gastrointestinal complaints than residents of agricultural communities without CAFOs, the North Carolina Pork Council issued news releases accusing Dr. Wing of engaging in biased, “irresponsible,” and “immoral” “pseudo-science.”⁶¹² Even though Dr. Wing was a “respected scientist at a high-status institution, someone who had won state and federal funding for his work,” the North Carolina pork industry and allied state legislators nonetheless “expressed concerns about [Dr. Wing’s] research through every level of his institutional superiors, from his dean to the Chapel Hill chancellor’s office, the UNC-system president’s staff, and the Board of Trustees (where the pork industry was prominently represented).”⁶¹³ Dr. Wing understood these actions to be efforts at “harassment and intimidation.”⁶¹⁴

Similarly, Dr. JoAnn Burkholder of North Carolina State University has reported that she experienced harassment after discovering a toxic organism linked to water pollution from CAFOs. According to Dr. Burkholder, on the day her research was released, her employer received over “160 messages sent in by various representatives of the concentrated swine industry demanding that [she] be fired.”⁶¹⁵ In addition, Dr. Burkholder received multiple death threats.⁶¹⁶ She has expressed concern that “the backlash that resulted from her research on swine pollution has damaged her reputation and hurt her ability to receive grants.”⁶¹⁷ As a result of these intimidation and harassment tactics, scientists who might otherwise study the effects of CAFOs on public health have chosen to pursue different research interests,⁶¹⁸ and “[i]n some

⁶¹¹ EPA Letter of Concern, *supra* note 354, at 8.

⁶¹² See S. Holly Stocking & Lisa W. Holstein, *Manufacturing Doubt: Journalists’ Roles and the Construction of Ignorance in a Scientific Controversy*, 18 *Pub. Understand. Sci.* 23, 30, Fig. 2 (2009).

⁶¹³ *Id.* at 27, 36.

⁶¹⁴ Steve Wing, *Social Responsibility and Research Ethics in Community-Driven Studies of Industrial Hog Production*, 110 *Env’t Health Persp.* 437, 441 (2002).

⁶¹⁵ Alicia Allen, *ISU Graduate Claims Backlash Hurt Career*, *Iowa State Daily* (Dec. 4, 2002), <https://iowastatedaily.com/198794/news/isu-graduate-claims-backlash-hurt-career/>.

⁶¹⁶ See Perry Beeman, *Ag Scientists Feel the Heat*, *Inst. Agric. & Trade Pol’y* (Feb. 2, 2003), <https://www.iatp.org/news/ag-scientists-feel-the-heat>.

⁶¹⁷ Allen, *supra* note 615.

⁶¹⁸ See Wing et al., *supra* note 349, at 443.

areas, community members have been fearful of participating in the research because of the influence of the hog industry in local affairs.”⁶¹⁹

Fifth, EPA cannot rely on CAFO self-reporting to prove discharges. Multiple courts have recognized that self-reporting schemes allow regulated entities, or entities that should be regulated, to escape oversight.⁶²⁰ And EPA has acknowledged that self-reporting has failed to ensure that CAFO operators obtain appropriate permits. Indeed, according to EPA, “[m]any CAFOs are not regulated and continue to discharge without NPDES permits” and “many waters are affected by pollutants from CAFOs,” but nonetheless, “many CAFOs often claim that they do not discharge.”⁶²¹ Similarly, Jim Werntz, EPA’s former director in Idaho, has recognized that “[w]e know we have large CAFO . . . facilities, but they have made the business decision to not participate” in NPDES permitting.⁶²² As advocates have long recognized, “[g]iven the costs of permitting and the relatively low likelihood of an enforcement action, it is not surprising that many CAFOs [opt not to report their discharges].”⁶²³ For these reasons, EPA stated *over 20 years ago* that “[w]ithout [a] rebuttable presumption, EPA believes it could not effectuate proper permitting of CAFOs because of operations that would claim to be excluded from the CWA because they do not discharge.”⁶²⁴ The intervening decades have borne out EPA’s conclusion. As discussed above, in four of the top five swine-producing states and two of the top five dairy cow-confining states, less than ten percent of CAFOs have CWA permits.⁶²⁵ Yet, ample evidence shows that CAFOs in these states are discharging.⁶²⁶ As the resident of Jefferson County, Iowa puts it, “This self-policing policy is like allowing the fox to guard the hen house, with serious consequences for our waterways.”⁶²⁷

In contrast to the difficulties EPA faces in proving discharges on a CAFO-by-CAFO basis, CAFO operators are well-positioned to rebut the presumption of discharge, if they truly do

⁶¹⁹ See *id.* at 441–42.

⁶²⁰ See *U.S. v. EME Homer City Generation L.P.*, 823 F. Supp. 2d 274, 283–85 (W.D. Pa. 2011), *aff’d*, 727 F.3d 274 (3d Cir. 2013) (explaining that CAA regulations that impose a permitting requirement only after the regulated entity self-reports are “reliant on the proverbial fox to guard the henhouse” and give rise to “efforts to evade the [permitting] program”); see also *Lana’ians for Sensible Growth v. Land Use Comm’n*, 463 P.3d 1153, 1164 (Haw. 2020) (noting that there is a “conflict of interest inherent in self-reporting”); *Riverkeeper, Inc. v. Seggos*, 75 N.Y.S.3d 854 (N.Y. Sup. Ct. 2018) (concluding that a state’s general permit for CAFOs failed to provide for sufficient agency oversight because it made CAFO operators and third-parties hired by CAFO operators solely responsible for certifying nutrient management plans).

⁶²¹ See EPA, *EPA Legal Tools to Advance Environmental Justice*, *supra* note 2, at 75.

⁶²² Richard Manning, *Idaho’s Sewer System is the Snake River*, High Country News (Aug. 11, 2014), https://www.hcn.org/issues/46.13/idahos-sewer-system-is-the-snake-river?b_start:int=2#body.

⁶²³ See Devine & Baron, *supra* note 418, at 10.

⁶²⁴ 66 Fed. Reg. at 3,009.

⁶²⁵ See *supra* Section III.A.1.

⁶²⁶ See *supra* Section III.A.3.

⁶²⁷ Exhibit 15 ¶ 12.

not discharge. CAFO operators possess all of the facility-specific information—such as the CAFO’s location, design, and operating practices—necessary to show that they do not discharge. And because CAFO operators have this information, as well as access to discharge locations, the unplanned and intermittent nature of CAFO discharges does not prevent operators from assessing whether they discharge. For the same reason, CAFO operators do not suffer from a lack of resources necessary to assess whether they discharge. And CAFO operators certainly will not experience intimidation that would prevent them from proving that they do not discharge, if that is the case. Similarly, concerns about self-reporting do not apply when CAFO operators are required to present evidence that they do not discharge and, thus, are not required to operate under an NPDES permit.

D. The Presumption Will Help Ensure the Objectives of the CWA and Environmental Justice Executive Orders.

Not only is there a sound and rational connection underlying the presumption, but the presumption also will help ensure the objectives of the CWA and Executive Orders 12,898 and 14,008.⁶²⁸ For the reasons that follow, the presumption will better allow EPA to ensure that discharging CAFOs obtain NPDES permits, thereby aligning with the CWA’s express statement that CAFOs are point sources under the Act, as well as advancing the CWA’s goal of restoring and maintaining water quality. The presumption will also improve EPA’s compliance with the environmental justice initiatives in Executive Orders 12,898 and 14,008.

1. The Presumption Will Help Ensure the Objectives of the CWA.

The presumption will improve EPA’s ability to ensure that discharging CAFOs obtain NPDES permits. As shown above, EPA’s approach to CAFO permitting allows many CAFOs to discharge without NPDES permits.⁶²⁹ EPA’s approach undermines the CWA’s express statement that CAFOs are point sources and, as such, must have NPDES permits for their discharges. The presumption will help correct this problem by requiring Large CAFOs using wet manure management systems—which are an especially significant source of discharges—to apply for NPDES permits or present evidence showing that they do not actually discharge pollutants.

The presumption will also better support the CWA’s goal of restoring and maintaining water quality by subjecting Large CAFOs using wet manure management systems to more stringent permit requirements. Large CAFOs using wet manure management systems “are important contributors to water pollution.”⁶³⁰ Despite their significant contribution to water pollution, however, Large CAFOs have “improperly tried to circumvent the [NPDES] permitting

⁶²⁸ See *NLRB v. Tahoe Nugget, Inc.*, 584 F.2d at 303–04.

⁶²⁹ See *supra* Section III.A.1.

⁶³⁰ *Waterkeeper All., Inc.*, 399 F.3d at 506, n.22.

process.”⁶³¹ When Large CAFOs fail to obtain NPDES permits, they perpetuate and exacerbate water pollution. As discussed above, Large CAFOs operating without NPDES permits operate instead under state laws or state permits that are generally less protective of water quality than NPDES permits.⁶³² Adopting a presumption that Large CAFOs using wet manure management systems actually discharge will correct this problem by shifting these CAFOs to more-protective NPDES permits. And EPA’s ability to object to inadequate NPDES permits will further ensure that these CAFOs’ permits contain the protections that the CWA requires.⁶³³

Shifting Large CAFOs to more-protective NPDES permits is even more necessary in light of recent efforts by states to undermine local regulations that impose more stringent requirements on CAFOs. In response to community concerns about the threats CAFOs pose to local waterways and public health, local governments across the country have enacted CAFO regulations that are more stringent than state requirements.⁶³⁴ These local regulations reflect the communities’ desire and need for increased protections against CAFO pollution, including in states like Iowa⁶³⁵ and Missouri,⁶³⁶ where the vast majority of Large CAFOs operate without more-protective NPDES permits.⁶³⁷ However, state legislatures have responded to the local regulations by enacting sweeping laws aimed at thwarting all local efforts to increase regulation and oversight of CAFOs.⁶³⁸ In several cases, state courts have held that the state laws override the more stringent local rules.⁶³⁹ As additional states consider adopting expansive laws that

⁶³¹ *Id.*; see also 68 Fed. Reg. at 7,201 (“[S]ince the inception of the NPDES permitting program in the 1970s, only a small number of Large CAFOs have actually sought permits.”)

⁶³² See *supra* Section III.A.3.

⁶³³ See 33 U.S.C. § 1342(d).

⁶³⁴ See, e.g., Cooper Cnty., Missouri Health Ctr. Reg. 2019-6 (prohibiting land application in areas with karst formations under certain circumstances, setting limitations on where CAFOs can construct subsurface manure confinement structures, and providing for inspections by county officials upon receipt of a community member’s complaint); Austin Huguelet, *Judge Halts New Missouri Law Blocking Local Regulations on CAFOs*, Springfield News-Leader (Aug. 20, 2019), <https://www.news-leader.com/story/news/local/ozarks/2019/08/20/judge-cole-county-blocks-missouri-cafos-law/2065806001/>.

⁶³⁵ See *Worth Cnty. Friends of Agric. v. Worth Cnty.*, 688 N.W.2d 257 (2004) (discussing a Worth County, Iowa ordinance that set limits on CAFO air pollution and required CAFOs to install systems for water quality monitoring).

⁶³⁶ See Cooper Cnty., Missouri Health Ctr. Reg. 2019-6.

⁶³⁷ See EPA, *NPDES CAFO Permitting Status Report: National Summary, Endyear 2021, completed 07/20/22*, *supra* note 5.

⁶³⁸ See, e.g., Mo. Ann. Stat. § 192.300 (providing that local governments may not “[i]mpose standards or requirements on [CAFOs] . . . that are inconsistent with, in addition to, different from, or more stringent than” state law); 3 Pa. Con. Stat. Ann. § 519(a) (providing that state law “occup[ies] the whole field of regulation regarding nutrient management . . . to the exclusion of all local regulations”); Iowa Code Ann. § 331.304A (similar); Wis. Stat. Ann. § 93.90 (similar).

⁶³⁹ See, e.g., *Cedar Cnty. Comm. v. Parson*, Case No. 19AC-CC00373 (Mo. Cir. Ct. Dec. 23, 2021) (holding local ordinance preempted by Missouri state law); *Com., Off. of Atty. Gen. ex rel. Corbett v. Locust Twp.*, 49 A.3d 502 (Pa. Commw. Ct. 2012) (similar, Pennsylvania); *Adams v. State Livestock*

would stifle local attempts to increase protections against CAFO pollution,⁶⁴⁰ EPA must ensure that discharging CAFOs are operating under the more protective requirements in NPDES permits.

The presumption will also restore water quality by subjecting Large CAFOs using wet manure management systems to increased public participation and transparency, as well as to citizen suits. Allowing the public to review and comment on a CAFO's application for coverage under a NPDES permit, including its nutrient management plan, will help restore water quality. The public can identify aspects of the nutrient management plan that are insufficient to protect water quality, and it can draw attention to the plan's potential impact on local waterways. For example, the Cape Fear Riverkeeper explains: “[I]f I had the opportunity to comment on nutrient management plans, I would encourage [NC DEQ] to include numeric limitations on the amount of nutrients that CAFOs can discharge, which could help reduce algal blooms in waterways.”⁶⁴¹

In addition, increasing transparency regarding nutrient management plans will facilitate enforcement, as it will allow the public to identify violations of the plans and pursue citizen suits.⁶⁴² The Grant County, South Dakota resident explains, “I’ve looked at the state’s online record of complaints against CAFOs, and I’ve seen complaints that they applied manure on the same field two years in a row or that they applied too much manure on a field. Without seeing the nutrient management plans, I can’t make sure that those things aren’t happening on the fields near our home and our drinking well.”⁶⁴³ Similarly, the Executive Director of Snake River Waterkeeper explains that “[w]ithout access to information on where a CAFO is land applying its waste, the amount of waste it is applying, and the guidelines it should be following to prevent discharges, it is difficult for the public to monitor CAFOs and hold them accountable for causing discharges.”⁶⁴⁴ Increasing the public’s ability to bring citizen suits will, in turn, help address and deter permit violations that cause water pollution.

Facilities Siting Rev. Bd., 820 N.W.2d 404 (2012) (similar, Wisconsin); *Worth Cnty. Friends of Agric. v. Worth Cnty.*, 688 N.W.2d 257 (2004) (similar, Iowa); *David v. Bd. of Comm'rs of Norton Cnty.*, 89 P.3d 893 (2004) (similar, Kansas).

⁶⁴⁰ See, e.g., Animal Enterprise and Working Animal Regulation, Utah H.B. 746 (2022) (proposed Utah legislation that would prohibit political subdivisions from regulating CAFOs).

⁶⁴¹ Exhibit 14 ¶ 17.

⁶⁴² See Terence J. Centner, *Challenging NPDES Permits Granted Without Public Participation*, 38 B.C. Env't Affs. L. Rev. 1, 20 (2011) (explaining that “citizen suits can only be successful if people have sufficient information to learn about violations”); see also Exhibit 2 ¶ 20 (“As a result of self-reporting and lack of oversight, no one in our community knows where or how much manure is applied to the land. This lack of information makes it very difficult for our community to understand—let alone fight back against—pollution near our homes.”).

⁶⁴³ Exhibit 4 ¶ 10.

⁶⁴⁴ Exhibit 21 ¶ 13; see also Exhibit 14 ¶ 17 (“If community members had access to nutrient management plans, they would know whether certain risky practices are allowed, which would help them identify and report permit violations.”).

Shifting CAFOs to permits that allow for citizen suits is especially important in light of recent state legislation and judicial decisions that limit citizens' ability to bring nuisance suits against CAFOs. For example, shortly after CAFO neighbors in North Carolina brought nuisance suits alleging that odors, pests, and noises from nearby CAFOs interfered with their use and enjoyment of their homes, the North Carolina legislature enacted bills that capped the amount of damages that plaintiffs can receive from nuisance suits against CAFOs and restricted the conditions under which neighbors can bring nuisance suits against a CAFO.⁶⁴⁵ Following North Carolina's lead, other states have also proposed or enacted legislation restricting citizens' ability to sue CAFOs for causing nuisances.⁶⁴⁶ And a recent decision by the Iowa Supreme Court similarly makes it more difficult for CAFO neighbors in Iowa to bring nuisance suits against CAFOs.⁶⁴⁷ As a recent article explains, limiting the availability of nuisance suits "enabl[es] industrial agribusiness entities to pollute and escape accountability at the expense of rural people and the environment."⁶⁴⁸ Given these restrictions on nuisance suits and the lack of accountability they entail, it is all the more important for citizens to have the ability to use citizen suits to hold CAFOs accountable for the water pollution they cause.

2. The Presumption Will Help Ensure the Objectives of Executive Order 12,898.

The presumption will improve EPA's compliance with Executive Order 12,898, which requires EPA to collect data on and address environmental justice issues and ensure that environmental justice communities are able to participate in EPA's activities.⁶⁴⁹ The presumption will better allow EPA to collect the data necessary to show that CAFOs disproportionately harm environmental justice communities—and, thereby, enable EPA to act to protect human health in those communities—because NPDES permits require CAFO operators to submit uniform, facility-specific information to EPA.⁶⁵⁰ The presumption will also help address the disproportionate harms CAFOs impose, as it will shift CAFOs that are an especially significant source of discharges to more protective permits. And the presumption will help ensure that environmental justice communities are able to participate in EPA's CAFO permitting process, because it will move CAFOs to a permitting scheme that allows the public to review and comment on permit applications. Although "public participation by itself is not the solution to

⁶⁴⁵ See Leah Douglas, *Big Ag is Pushing Laws to Restrict Neighbors' Ability to Sue Farms*, NPR (Apr. 12, 2019), <https://www.npr.org/sections/thesalt/2019/04/12/712227537/big-ag-is-pushing-laws-to-restrict-neighbors-ability-to-sue-farms>.

⁶⁴⁶ *Id.*

⁶⁴⁷ See David Pitt, *Iowa Court Reverses Precedent on Iowa Pig Farm Lawsuits*, AP News (June 30, 2022), <https://apnews.com/article/lawsuits-iowa-pollution-water-718f84c3cce75fdf0bb2ed16daf27df8>.

⁶⁴⁸ Danielle Diamond et al., *Agricultural Exceptionalism, Environmental Injustice, and U.S. Right-to-Farm Laws* 52 ELR 10727, 10747 (2022).

⁶⁴⁹ See Exec. Order 12,898.

⁶⁵⁰ See 40 C.F.R. § 122.21(h)(8)(i) (requiring CAFO operators to submit information on their facility's location, size, animal type, manure storage structures, and land application areas).

environmental justice problems, . . . such problems cannot be resolved without improved public participation.”⁶⁵¹

3. The Presumption Will Help Ensure the Objectives of Executive Order 14,008.

Lastly, the presumption will improve EPA’s compliance with Executive Order 14,008, which requires EPA to strengthen enforcement of environmental violations that disproportionately harm environmental justice communities.⁶⁵² Shifting Large CAFOs using wet manure management systems to NPDES permits will make those CAFOs subject to citizen suits. Citizen suits will, in turn, allow members of environmental justice communities to “both spur and supplement government enforcement actions”⁶⁵³ against CAFOs that violate their permits.

E. Non-Discharging CAFOs Can Rebut the Presumption.

In general, a presumption may be rebutted by evidence indicating that the presumption does not apply in a specific instance.⁶⁵⁴ Here, an operator of a Large CAFO using a wet manure management system can rebut the presumption by presenting evidence showing that the CAFO does not discharge. In light of the sound and rational connection between discharges and waste storage, transport, and land application, EPA should require the CAFO operator to present evidence showing that the CAFO does not discharge from its waste storage structures, its waste transport pipes, or its land application areas, including any tile drains and ditches. Evidence sufficient to show that a CAFO does not discharge might include evidence that the CAFO’s waste pit is synthetically lined and designed, constructed, operated, and maintained to prevent discharges and contain all process-generated wastewater plus the runoff from a 100-year, 24-hour rain event; the CAFO has access to enough land application areas to apply its waste at rates that ensure that no more nutrients are applied than are necessary for the crops to achieve

⁶⁵¹ EPA, Nat’l Acad. of Pub. Admin., *Environmental Justice in EPA Permitting: Reducing Pollution in High-Risk Communities is Integral to the Agency’s Mission*, at 63 (2001).

⁶⁵² See Exec. Order No. 14,008.

⁶⁵³ *Waterkeeper All., Inc.*, 399 F.3d at 503 (quoting S. Rep. No. 50, 99th Cong., 1st Sess. 28 (1985)).

⁶⁵⁴ See 40 C.F.R. § 279.10(b)(1)(ii) (“Used oil containing more than 1,000 ppm total halogens is presumed to be a hazardous waste because it has been mixed with halogenated hazardous waste listed in subpart D of part 261 of this chapter. Persons may rebut this presumption by demonstrating that the used oil does not contain hazardous waste (for example, by showing that the used oil does not contain significant concentrations of halogenated hazardous constituents listed in appendix VIII of part 261 of this chapter.)”; 49 C.F.R. § 173.31(d)(2) (“In any action brought to enforce this section, the lack of securement of any closure to a tool-tight condition, detected at any point, will establish a rebuttable presumption that a proper inspection was not performed by the offeror of the car. That presumption may be rebutted by any evidence indicating that the lack of securement resulted from a specific cause not within the control of the offeror.”) (underline added).

reasonable yield goals;⁶⁵⁵ the CAFO relies on off-farm land application areas to apply its waste at those rates; the CAFO has implemented all necessary best management practices; the CAFO conducts upstream, downstream, and groundwater water monitoring; any water pollution caused by the CAFO will not reach navigable waters; and any groundwater pollution caused by the CAFO is not a functional equivalent of a direct discharge to navigable waters.⁶⁵⁶

F. The Presumption Comports with Relevant Caselaw.

EPA has repeatedly concluded that CAFOs discharge and, thus, must obtain NPDES permits. As a result, EPA has made multiple attempts at revising its regulations governing CAFO permitting to increase NPDES permit coverage. As discussed below, EPA's past attempts at revising its regulations have led to two decisions clarifying when EPA may require a CAFO to apply for a NPDES permit. The requested presumption complies with both of those decisions.

1. EPA's Past CAFO Regulations Reflect the Need to Improve CAFO Permitting.

In 2001, EPA proposed to revise its regulations governing CAFO permitting and effluent limitations for the first time since 1976. EPA explained that it had "bec[o]me apparent that the regulation and permitting of CAFOs needed review due to changes in the livestock industry, specifically the consolidation of the industry into fewer, but larger operations."⁶⁵⁷ In addition, "[d]espite more than twenty years of regulation, there [were] persistent reports of discharge and

⁶⁵⁵ To ensure that no more nutrients are applied than are necessary for crops to achieve a reasonable yield goal, rates should be determined based on land grant university fertility rates, soil testing for available nutrients, manure nutrient analyses, and other planned nutrient applications.

⁶⁵⁶ The evidence sufficient to rebut the presumption may be more stringent than the requirements that a CAFO would have to satisfy under a NPDES permit. For example, CAFOs operating under NPDES permits need only have a production area designed to withstand a 25-year, 24-hour rain event, *see* 40 C.F.R. § 412.31(a)(1)(i), while EPA may require a CAFO seeking to rebut the presumption to have a production area designed to withstand a 100-year, 24-hour rain event. In the case of this storm standard, EPA should require CAFOs seeking to rebut the presumption to meet the more stringent standard because NPDES permits contemplate and, indeed, allow discharges due to storms that exceed the 25-year, 24-hour standard. *Id.* However, CAFOs operating without NPDES permits may not discharge at all. Thus, the more stringent storm standard is necessary to ensure that those CAFOs do not discharge. And, more generally, because CAFOs operating without NPDES permits are often not subject to agency and public oversight meant to ensure that they do not discharge, *see supra* Section III.A.3., it is appropriate and necessary for EPA require CAFOs seeking to rebut the presumption and avoid operating under NPDES permits to show that they have adopted more stringent operating standards and, thus, do not need that oversight.

⁶⁵⁷ 66 Fed. Reg. at 2,965.

runoff of manure and manure nutrients from livestock and poultry operations.”⁶⁵⁸ Yet, “[u]nder the existing regulations, few operations [had] obtained NPDES permits.”⁶⁵⁹

To remedy the problem of CAFOs discharging without NPDES permits, in 2003, EPA promulgated revised CAFO permitting regulations. As relevant here, EPA’s 2003 regulations required all CAFO owners or operators to apply for a NPDES permit, except “in very limited situations where they make an affirmative demonstration of ‘no potential to discharge.’”⁶⁶⁰ EPA explained that there was a “sound basis in the administrative record for the presumption that all CAFOs have a *potential* to discharge to the waters of the United States such that they should be required to apply for a permit, unless they can show no potential to discharge.”⁶⁶¹

A court found that requiring all CAFO owners or operators to apply for a NPDES permit violated the CWA. In *Waterkeeper Alliance, Inc. v. EPA*, the court explained that “unless there is a ‘discharge of any pollutant,’ there is no violation of the Act, and point sources are, accordingly, neither statutorily obligated to comply with EPA regulations for point source discharges, nor are they statutorily obligated to seek or obtain an NPDES permit.”⁶⁶² This is because “the [CWA] gives the EPA jurisdiction to regulate and control only *actual* discharges—not potential discharges, and certainly not point sources themselves.”⁶⁶³ Because the 2003 regulations imposed obligations on CAFOs regardless of whether they actually discharge, the court found that the regulations violated the Act’s statutory scheme.⁶⁶⁴

In response to the *Waterkeeper* decision, EPA promulgated revised regulations aimed at “continu[ing] to maintain the focus on regulating discharges” from CAFOs.⁶⁶⁵ EPA’s 2008 regulations required CAFOs that “discharge or propose to discharge” to apply for NPDES permits.⁶⁶⁶ A CAFO proposed to discharge if it was “designed, constructed, operated, or maintained such that a discharge will occur, not simply such that it might occur.”⁶⁶⁷ Whether a CAFO proposed to discharge was based on the CAFO operator’s objective assessment of the

⁶⁵⁸ *Id.* at 2,972.

⁶⁵⁹ *Id.* at 2,976.

⁶⁶⁰ 68 Fed. Reg. at 7,200.

⁶⁶¹ *Id.* at 7,201 (emphasis added).

⁶⁶² *Waterkeeper All., Inc.*, 399 F.3d at 504.

⁶⁶³ *Id.* at 505.

⁶⁶⁴ *Id.*

⁶⁶⁵ Revised National Pollutant Discharge Elimination System Permit Regulation and Effluent Limitation Guidelines for Concentrated Animal Feeding Operations in Response to Waterkeeper Decision, 71 Fed. Reg. 37,744-01, 37,746 (June 30, 2006).

⁶⁶⁶ Revised National Pollutant Discharge Elimination System Permit Regulation and Effluent Limitations Guidelines for Concentrated Animal Feeding Operations in Response to the Waterkeeper Decision, 73 Fed. Reg. 70,418, 70,423 (Nov. 20, 2008).

⁶⁶⁷ *Id.*

manmade aspects of the CAFO, along with the climatic, hydrological, and topographical characteristics of the area where the CAFO was located.⁶⁶⁸

A court again found that EPA’s regulation violated the CWA. In *National Pork Producers Council v. EPA*, the court held that EPA’s definition of CAFOs that “propose to discharge” ran afoul of the rule that “there must be an actual discharge into navigable waters to trigger the CWA’s requirements and the EPA’s authority.”⁶⁶⁹ The court explained that, rather than applying to CAFOs that “form or declare a plan or intention” to discharge, the 2008 regulation applied to CAFOs “regardless of whether the operator wants to discharge or is presently discharging.”⁶⁷⁰ Because the 2008 regulation imposed an obligation to obtain a permit in the absence of an actual discharge, EPA had exceeded its authority under the Act.⁶⁷¹

Following the decision in *National Pork Producers*, EPA’s CAFO permitting regulations returned to their reliance on self-reporting. CAFO operators determine whether they discharge or plan to discharge and, thus, whether they must apply for a NPDES permit. As detailed above, the problems that EPA identified in its past CAFO regulations—persistent reports of discharges from CAFOs, yet few CAFOs operating under NPDES permits—have not been resolved.⁶⁷²

2. The Presumption Comports with *Waterkeeper* and *National Pork Producers*.

The requested presumption does not suffer from the same flaws as the rules at issue in *Waterkeeper* and *National Pork Producers*. Whereas those rules applied to CAFOs that had not yet discharged—including CAFOs that had a *potential* to discharge⁶⁷³ and those that *proposed* to discharge⁶⁷⁴—the requested presumption applies to CAFOs that *actually* discharge. And, because the presumption is properly supported by a proven sound and rational connection between Large CAFOs using wet manure management systems and actual discharges, it operates as a stand-in for the inferred fact: actual discharge.⁶⁷⁵ Therefore, the presumption regulates

⁶⁶⁸ *Id.* at 70, 424.

⁶⁶⁹ *Nat’l Pork Producers Council v. EPA*, 635 F.3d 738, 751 (5th Cir. 2011).

⁶⁷⁰ *Id.* at 750.

⁶⁷¹ *Id.* at 751.

⁶⁷² *See supra* Section III.A.1.

⁶⁷³ *Waterkeeper All., Inc.*, 399 F.3d at 505 (noting that in the rule at issue, “[t]he ‘duty to apply’ provision is based on the presumption that every CAFO has a potential to discharge” (emphasis added)).

⁶⁷⁴ *Nat’l Pork Producers Council*, 635 F.3d at 750 (noting that the rule at issue defined CAFOs that propose to discharge as CAFOs that are “designed, constructed, operated, and maintained in a manner such that the CAFO *will* discharge” (emphasis added)).

⁶⁷⁵ *See Cole v. U.S. Dep’t of Agric.*, 33 F.3d 1263, 1268 (11th Cir. 1994) (explaining that “[t]o the extent that the fact to be presumed (event A) is properly inferred from proof of the predicate fact (event B),” the agency “is *not*, in fact, imposing a penalty on event B”; rather, it is imposing a penalty on event A); *see also Ortiz v. McDonough*, 6 F.4th 1267, 1281 (Fed. Cir. 2021) (“A presumption itself . . . effectively

discharges, not CAFOs. Each CAFO subject to the presumption is deemed to discharge and, as a result, the presumption imposes the obligation to apply for a NPDES permit or present evidence to rebut the presumption only on CAFOs that actually discharge.⁶⁷⁶ For all these reasons, the presumption comports with the CWA, *Waterkeeper*, and *National Pork Producers*.⁶⁷⁷

The *Waterkeeper* court, in fact, expressly raised the prospect of the requested presumption, leaving open the possibility that EPA “might properly presume that Large CAFOs—or some subset thereof—actually discharge.”⁶⁷⁸ The requested presumption fits squarely in this opening. The *Waterkeeper* court observed that “EPA ha[d] marshaled evidence suggesting that such a prophylactic measure may be necessary to effectively regulate water pollution from Large CAFOs.”⁶⁷⁹ In the nearly 20 years since EPA’s 2003 regulations, there has only been an increase in evidence showing that Large CAFOs using wet manure management systems actually discharge and a presumption of discharge is necessary to regulate their

‘supplies the required evidence’ when specified ‘preconditions are satisfied.’” (quoting *Snyder v. McDonough*, 1 F.4th 996, 1004 (Fed. Cir. 2021))).

⁶⁷⁶ Even if the requested presumption were understood to impose an obligation on Large CAFOs using wet manure management systems that do not discharge water pollution, that obligation is neither unreasonable nor unprecedented. *First*, given the sound and rational connection between Large CAFOs using wet manure management systems and actual discharge, any CAFO meeting this description that does *not* discharge plainly has avoided discharge through careful planning and responsible oversight. The owner or operator of such a CAFO could rebut the presumption simply by providing EPA with evidence of the measures they already have implemented to avoid discharge. *Second*, EPA and other federal agencies already require certain entities to establish that they are *not* subject to legal requirements. For instance, under the Clean Air Act, facilities with the potential to emit regulated pollutants at or above certain thresholds can avoid stringent requirements only by agreeing to adhere to enforceable restrictions. *See* EPA, *True Minor Source and Synthetic Minor Source Permits*, <https://www.epa.gov/tribal-air/true-minor-source-and-synthetic-minor-source-permits>.

⁶⁷⁷ In addition, the requested presumption does not implicate the major questions doctrine because it does not reflect an extravagant assertion of regulatory power. Instead, the presumption applies narrowly; it applies only to Large CAFOs using wet manure management systems, and as noted above, all Large CAFOs make up just 0.6 percent of all farms and seven percent of all concentrated feeding operations. *See supra* Section I.C. Nor is the presumption unprecedented. EPA has long required discharging CAFOs to obtain NPDES permits, as the CWA requires, and it has attempted at least twice to ensure that all discharging CAFOs obtain NPDES permits. In addition, the presumption does not reflect a fundamental revision of the CWA. To the contrary, the CWA expressly prohibits CAFOs from discharging to the nation’s waters unless authorized to do so subject to NPDES permits. Moreover, even if the presumption triggered the major questions doctrine, EPA can overcome any skepticism as to its regulatory authority because the CWA contains clear congressional authorization to regulate in this manner. As explained above, the CWA *requires* EPA to either ensure that discharging CAFOs obtain NPDES permits or enforce the Act’s prohibition on unpermitted discharges from CAFOs. *See supra* Section III.A. The presumption is a tool that will help EPA meet Congress’s requirement.

⁶⁷⁸ *Waterkeeper All., Inc.*, 399 F.3d at 506, n.22. 399 F.3d at 506, n.22.

⁶⁷⁹ *Id.*

discharges. As described above, extensive evidence shows that Large CAFOs discharge from waste storage, transport, and disposal, and that CAFOs continue to be under-permitted.

PROPOSED REGULATORY LANGUAGE

All Large CAFOs using wet manure management systems are presumed to actually discharge pollutants and, thus, must apply for an individual NPDES permit or submit a notice of intent for coverage under a general NPDES permit, unless the CAFO presents evidence showing that it does not actually discharge pollutants.

CONCLUSION

EPA has long known that “[d]espite more than [forty] years of regulation, there are persistent reports of discharge[s]”⁶⁸⁰ from CAFOs and that “a growing body of literature suggest[s] that the communities disproportionately impacted by CAFOs are communities of color and economically disadvantaged communities.”⁶⁸¹ Yet, as this petition shows, EPA’s approach to permitting Large CAFOs using wet manure management systems—which are an especially significant source of discharges—*exacerbates*, rather than addresses, these problems. EPA’s failure to adequately regulate these industrial operations violates the CWA and perpetuates environmental injustice. To help correct this failure, Petitioners ask EPA to adopt a rebuttable presumption that Large CAFOs using wet manure management systems actually discharge water pollution and, thus, must apply for NPDES permits.

⁶⁸⁰ 66 Fed. Reg. at 2,972.

⁶⁸¹ EPA, *EPA Legal Tools to Advance Environmental Justice*, *supra* note 2, at 75.



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Kenneth C. Stone et al., *Impact of Swine Waste Application on Ground and Stream Water Quality in an Eastern Coastal Plain Watershed*, 41 *Transactions Am. Soc’y of Agric. & Biological Eng’rs* 1665 (1998). When a facility increased the number of hogs from 3,300 to over 14,000, nitrate concentrations in groundwater increased significantly in three of seven wells tested near a sprayfield.

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Philip Wayne Westerman et al., *Swine-Lagoon Seepage in Sandy Soil*, 38 *Transactions Am. Soc’y of Agric. & Biological Eng’rs* 1749 (1995). Swine lagoons without clay liners and in sandy soils demonstrate significant seepage of contaminants into groundwater, even after 3.5 to 5 years of receiving waste, despite assumptions that manure physically seals the lagoons.

Steve Wing et al., *Community Based Collaboration for Environmental Justice: South-East Halifax Environmental Reawakening*, 8 *Env’t & Urbanization* 129 (1996). Industrial animal facilities are located disproportionately in communities of color and poverty and, thus, among populations more likely to experience detrimental health consequences.

James A. Zahn et al., *Characterization of Volatile Organic Emissions and Wastes from a Swine Production Facility*, 26 *J. Env’t Quality* 1687 (1997). Twenty-seven volatile organic compounds are linked to decreased air quality in the vicinity of an industrial swine facility.

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- M.E. Anderson & M.D. Sobsey, *Detection and Occurrence of Antimicrobially Resistant E. coli in Groundwater on or near Swine Farms in Eastern North Carolina*, 54 *Water Sci. & Tech.* 211 (2006). Antibiotic-resistant *E. coli* is present in groundwater near industrial swine facilities using lagoons and sprayfields.
- Rachel C. Avery et al., *Odor From Industrial Hog Farming Operations and Mucosal Immune Function in Neighbors*, 59 *Archives Env't Health* 101 (2004). Neighbors of industrial swine facilities experienced impaired immune function during periods of odor.
- Julia R. Barrett, *Hogging the Air: CAFO Emissions Reach into Schools*, 114 *Env't Health Persps.* A241 (2006). Children living closer to industrial animal facilities had a higher incidence of asthma symptoms.
- Susan Bullers, *Environmental Stressors, Perceived Control, and Health: The Case of Residents Near Large-Scale Hog Farms in Eastern North Carolina*, 33 *Human Ecology* 1 (2005). Residents living near industrial swine facilities experienced increased psychological distress, nausea, and respiratory and sinus problems.
- JoAnn M. Burkholder & Howard B. Glasgow, *History of Toxic Pfiesteria in North Carolina Estuaries from 1991 to the Present*, 51 *BioScience* 827 (2001). The adverse environmental and health effects caused by *Pfiesteria*, a potentially toxic microbe, are linked to water pollution from industrial swine facilities.
- JoAnn Burkholder et al., *Impacts of Waste from Concentrated Animal Feeding Operations on Water Quality*, 115 *Env't Health Persps.* 308 (2007). Contaminants from industrial animal facilities find pathways into the environment from leaky lagoons, heavy rainfalls that cause overflow, and runoff from waste fields, posing a public health threat, particularly for infants, pregnant women, children, the elderly, and others with weakened immunological states living close to hog farms.
- Enzo R. Campagnolo et al., *Antimicrobial Residues in Animal Waste and Water Resources Proximal to Large-Scale Swine and Poultry Feeding Operations*, 299 *Sci. of the Total Env't* 89 (2002). There can be high levels of antimicrobial compounds in lagoons, and sprayfields can spread antimicrobial residues into water sources.
- Amy Chapin et al., *Airborne Multidrug-Resistant Bacteria Isolated from a Concentrated Swine Feeding Operation*, 113 *Env't Health Persps.* 137 (2005). Multi-drug resistant bacteria are present at levels dangerous to human health in the air within an industrial swine facility.

- Joanne C. Chee-Sanford, *Occurrence and Diversity of Tetracycline Resistance Genes in Lagoons and Groundwater Underlying Two Swine Production Facilities*, 67 *Applied Env't Microbiology* 1494 (2001). Antibiotic-resistant genes from industrial swine facilities can be traced in local groundwater.
- Dana Cole et al., *Concentrated Swine Feeding Operations and Public Health: A Review of Occupational and Community Health Effects*, 108 *Env't Health Persps.* 685 (2000). The human health threats posed by industrial swine facilities include patterns of antimicrobial resistance, the spread of pathogens, and the impacts of airborne contaminants.
- Kelley J. Donham et al., *Community Health and Socioeconomic Issues Surrounding Concentrated Animal Feeding Operations*, 115 *Env't Health Persps.* 317 (2007). Due to factors like low income, inadequate housing, health problems, and insufficient access to medical care, racial discrepancies compound the negative impacts of industrial swine facilities.
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- Kelley J. Donham, *The Concentration of Swine Production: Effects on Swine Health, Productivity, Human Health, and the Environment*, 16 *Veterinary Clinics of N. Am.: Food Animal Practice* 559 (2000). The impacts of industrial swine facilities on water, air, soil, and health have been documented and discussed since the early- and mid-1970s.
- Engeline van Duijkeren et al., *Transmission of Methicillin-Resistant Staphylococcus Aureus Strains Between Different Kinds of Pig Farms*, 126 *Veterinary Microbiology* 383 (2008). The use of standard antimicrobials for pigs is a likely risk factor for finding MRSA-positive pigs on a farm, and MRSA-colonized personnel are found more often at MRSA-positive farms.
- Angela M. Ebeling et al., *Dairy Diet Phosphorus Effects on Phosphorus Losses in Runoff from Land-Applied Manure*, 66 *Soil Sci. Soc'y Am. J.* 284 (2002). High inorganic phosphorus concentrations in dairy cow diets increase the potential for phosphorus loss in runoff from land-applied manure.
- Bob Edwards & Anthony E. Ladd, *Environmental Justice, Swine Production and Farm Loss in North Carolina*, 20 *Sociological Spectrum* 263 (2000). Industrial swine facilities are located disproportionately in communities of color and poverty, and recent patterns of farm loss were more pronounced in Black communities, regardless of income, and low-income communities, regardless of race.

- Shawn G. Gibbs et al., *Airborne Antibiotic Resistant and Nonresistant Bacteria and Fungi Recovered from Two Swine Herd Confined Animal Feeding Operations*, 1 *J. Occupational & Env't Hygiene* 699 (2004). Dangerously high levels of multi-drug resistant bacteria are present both within and downwind of industrial swine facilities.
- Shawn G. Gibbs et al., *Isolation of Antibiotic-Resistant Bacteria from the Air Plume Downwind of a Swine Confined or Concentrated Animal Feeding Operation*, 114 *Env't Health Persps.* 1032 (2006). Bacteria with multidrug and multiple antibiotic resistances can be found both inside and downwind of an industrial swine facility, posing potential health risks for residents nearby such facilities.
- Mary J. Gilchrist, *The Potential Role of Concentrated Animal Feeding Operations in Infectious Disease Epidemics and Antibiotic Resistance*, 115 *Env't Health Persps.* 313 (2006). Industrial swine facilities encourage antibiotic resistance, raising the risk of infectious disease epidemics.
- Joseph D. Grande et al., *Corn Residue Level and Manure Application Timing Effects on Phosphorus Losses in Runoff*, 34 *J. Env't Quality* 1620 (2005). Manure application increased dissolved reactive phosphorus concentrations in spring runoff by two to five times.
- Christopher F. Green et al., *Bacterial Plume Emanating from the Air Surrounding Swine Confinement Operations*, 3 *J. Occupational & Env't Hygiene* 9 (2006). Bacteria from an industrial swine facility traveled both upwind and downwind from the facility.
- Sukhbir K. Grewal et al., *Persistence of Mycobacterium avium subsp. paratuberculosis and Other Zoonotic Pathogens during Simulated Composting, Manure Packing, and Liquid Storage of Dairy Manure*, 72 *Applied & Env't Microbiology* 565 (2006). Pathogens persist in dairy manure stored in liquid form and are detectable for up to 175 days.
- Dick Heederik et al., *Health Effects of Airborne Exposures from Concentrated Animal Feeding Operations*, 115 *Env't Health Persps.* 298 (2007). Air pollutants from industrial animal facilities—including ammonia, hydrogen sulfide, carbon dioxide, malodorous vapors, and particles contaminated with a wide range of microorganisms—cause respiratory and other health impacts.
- Joseph A. Herriges et al., *Living with Hogs in Iowa: The Impact of Livestock Facilities on Rural Residential Property Values*, 81 *Land Econ.* 530 (2005). Proximity to industrial animal facilities has a statistically significant negative effect on property value, particularly for properties located downwind of facilities.

- Rachel Avery Horton et al., *Malodor as a Trigger of Stress and Negative Mood in Neighbors of Industrial Hog Operations*, 99 Am. J. Pub. Health Suppl. S610 (2009). Individuals living in African-American communities near industrial swine facilities in southeastern North Carolina reported high rates of stress and negative mood, which were associated with hydrogen sulfide concentrations.
- Tushar Khanna et al., *Methicillin Resistant Staphylococcus Aureus Colonization in Pigs and Pig Farmers*, 128 Veterinary Microbiology 298 (2008). MRSA is common in pigs in Ontario, Canada, and there is a strong correlation between MRSA presence in humans and pigs on farms, providing further support for transmission of MRSA between pigs and humans.
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- Peter J. A. Kleinman & Andrew N. Sharpley, *Effect of Broadcast Manure on Runoff Phosphorus Concentrations over Successive Rainfall Events*, 32 J. Env't Quality 1072 (2003). Levels of dissolved reactive phosphorus in runoff increased with increasing manure application rates.
- Peter J. A. Kleinman et al., *Effect of Cover Crops Established at Time of Corn Planting on Phosphorus Runoff from Soils before and after Dairy Manure Application*, 60 J. Soil & Water Conservation 311 (2005). Dairy manure application at test sites in a watershed within New York City's drinking water supply system resulted in phosphorus losses through runoff.
- Peter J. A. Kleinman et al., *Effect of Mineral and Manure Phosphorus Sources on Runoff Phosphorus*, 31 J. Env't Quality 2026 (2002). In a study of applications of dairy manure, poultry manure, and swine slurry to soils by surface application or mixing, surface application resulted in the highest rates of phosphorus losses following simulated rainfall.
- I.G. Krapac et al., *Impacts of Swine Manure Pits on Groundwater Quality*, 120 Env't Pollution 475 (2002). Fecal bacteria from swine manure pits can enter shallow groundwater, indicating possible threats to human health through drinking water contamination.
- Hannah C. Lewis et al., *Pigs as Source of Methicillin-Resistant Staphylococcus Aureus CC398 Infections in Humans, Denmark*, 14 Emerging Infectious Diseases 1383 (2008). An emerging subtype of MRSA that was found in humans came from pigs.

- Michael A. Mallin & Lawrence B. Cahoon, *Industrialized Animal Production—A Major Source of Nutrient and Microbial Pollution to Aquatic Ecosystems*, 24 *Population & Env't* 369 (2003). Industrial animal facilities cause phosphorus and nitrogen to enter the environment, contributing to eutrophication in nutrient-sensitive watersheds.
- Donald W. Meals & David C. Braun, *Demonstration of Methods to Reduce E. coli Runoff from Dairy Manure Application Sites*, 35 *J. Env't Quality* 1088 (2006). Bacterial pathogen levels in runoff from fields receiving liquid dairy manure pose a significant risk of pollution, particularly from fields receiving manure before rainfall.
- James A. Merchant et al., *Asthma and Farm Exposures in a Cohort of Rural Iowa Children*, 113 *Env't Health Persps.* 350 (2005). There is a high prevalence of asthma in rural children living on swine farms and swine farms that add antibiotics to feed.
- Katherine Milla et al., *Evaluating the Effect of Proximity to Hog Farms on Residential Property Values: A GIS-Based Hedonic Model Approach*, 17 *J. Urban & Reg'l Info. Systems Ass'n* 1 (2005). Proximity to industrial swine facilities adversely affects residential property values.
- Maria C. Mirabelli et al., *Asthma Symptoms Among Adolescents Who Attend Public Schools that are Located Near Confined Swine Feeding Operations*, 118 *Pediatrics* e66 (2006). High rates of wheezing among schoolchildren in North Carolina are correlated with proximity to industrial swine facilities and noticeable odor.
- Maria C. Mirabelli et al., *Race, Poverty, and Potential Exposure of Middle-School Students to Air Emissions from Confined Swine Feeding Operations*, 114 *Env't Health Persps.* 591 (2006). There is noticeable odor in North Carolina schools located near industrial swine facilities, indicating potential exposure of students to airborne pollutants.
- A.J. de Neeling et al., *High Prevalence of Methicillin Resistant Staphylococcus Aureus in Pigs*, 122 *Veterinary Microbiology* 366 (2007). There are high levels of MRSA among hogs at slaughterhouses and industrial swine facilities.
- Katja Radon et al., *Environmental Exposure to Confined Animal Feeding Operations and Respiratory Health of Neighboring Residents*, 18 *Epidemiology* 300 (2007). Adults living in rural German towns with a high density of industrial animal facilities experience asthma, nasal allergies, and odor annoyance.

- D. Raj Raman et al., *Estrogen Content of Dairy and Swine Wastes*, 38 *Env't Sci. & Tech.* 3567 (2004). Dairy and swine manure in the U.S. contains an order of magnitude more estrogen than that in wastewater treatment plants, which can contaminate surface water and groundwater.
- Noah Rosenblatt-Farrell, *The Landscape of Antibiotic Resistance*, 117 *Env't Health Persps.* A244 (2009). Pig-specific MRSA strains are detectable among farmworkers, and antibiotic-resistant microbes such as MRSA can contaminate the air and water emissions of industrial animal facilities.
- Amy R. Sapkota et al., *Antibiotic-Resistant Enterococci and Fecal Indicators in Surface Water and Groundwater Impacted by a Concentrated Swine Feeding Operation*, 115 *Env't Health Persps.* 1040 (2007). There are elevated levels of fecal indicators and antibiotic-resistant bacteria in water sources situated down gradient from an industrial swine facility compared with up-gradient sources, demonstrating that water contaminated with swine manure could contribute to the spread of antibiotic resistance.
- Susan S. Schiffman et al., *Potential Health Effects of Odor from Animal Operations, Wastewater Treatment, and Recycling of Byproducts*, 9 *J. Agromedicine* 397 (2004). People living near industrial swine facilities reported more tension, depression, anger, fatigue, and confusion, and less vigor.
- Susan S. Schiffman et al., *Quantification of Odors and Odorants from Swine Operations in North Carolina*, 108 *Agric. & Forest Meteorology* 213 (2001). Air pollutants emitted from industrial swine facilities include hydrogen sulfide, ammonia, and other respiratory irritants.
- Susan S. Schiffman et al., *Symptomatic Effects of Exposure to Diluted Air Sampled from a Swine Confinement Atmosphere on Healthy Human Subjects*, 113 *Env't Health Persps.* 567 (2005). People exposed to diluted air from an industrial swine facility were more likely to report eye irritation, nausea, and headaches than a control group exposed to clean air.
- Charles W. Schmidt, *Swine CAFOs & Novel H1N1 Flu: Separating Facts from Fears*, 117 *Env't Health Persps.* A394 (2009). One potential source of the H1N1 influenza virus that led to a global swine flu pandemic in 2009 was confined pigs; swine flu is more likely to persist in larger farms with higher pig densities.
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- M. Tajik et al., *Impact of Odor from Industrial Hog Operations on Daily Living Activities*, 18 *New Solutions* 193 (2008). Within 1.5 miles of industrial swine facilities, odor limits activities that participants either enjoyed doing the most or expected to be able to perform inside and outside their homes, including social interactions, physical activities, energy- and cost-saving activities, relaxing outside or indoors, and sleeping, which can have secondary adverse impacts on health and well-being.
- Kendall M. Thu, *Public Health Concerns for Neighbors of Large-Scale Swine Production Operations*, 8 *J. Agric. Safety & Health* 175 (2002). Industrial animal facilities and the odors they produce adversely affect quality of life in rural communities and produce health effects similar to those experienced by workers in these facilities.
- P.A. Vadas et al., *Transformations of Soil and Manure Phosphorus After Surface Application of Manure to Field Plots*, 77 *Nutrient Cycling in Agroecosystems* 83 (2007). Concentrations of dissolved phosphorus in runoff from fields that have received manure are highest after the first rainfall event, and they remain higher than phosphorus concentrations in runoff from fields that have not received manure even long after the manure application.
- Andreas Voss et al., *Methicillin-Resistant Staphylococcus aureus in Pig Farming*, 11 *Emerging Infectious Diseases* 1965 (2005). MRSA rates were 760 times higher among pig farmers studied than among regular hospital patients, suggesting potential pig-to-human transmission of drug-resistant disease.
- John T. Walker et al., *Atmospheric Transport and Wet Deposition of Ammonium in North Carolina*, 34 *Atmospheric Env't* 3407 (2000). Industrial swine facilities are the primary domestic animal source of ammonia, accounting for 48 percent of all North Carolina ammonia emissions.
- Sacoby M. Wilson & Marc L. Serre, *Examination of Atmospheric Ammonia Levels Near Hog CAFOs, Homes, and Schools in Eastern North Carolina*, 41 *Atmospheric Env't* 4977 (2007). There are high ammonia concentrations near industrial swine facilities in Eastern North Carolina, suggesting dangerous levels of exposure for populations living or attending school near these facilities.

Sacoby M. Wilson & Marc L. Serre, *Use of Passive Samplers to Measure Atmospheric Ammonia Levels in a High-Density Industrial Hog Farm Area of Eastern North Carolina*, 41 *Atmospheric Env't* 6074 (2007). Populations living close to industrial swine facilities have higher exposure to ammonia.

Steve Wing & Susanne Wolf, *Intensive Livestock Operations, Health, and Quality of Life Among Eastern North Carolina Residents*, 108 *Env't Health Persps.* 233 (2000). Residents living near industrial animal facilities are more likely to experience detrimental health consequences, are more likely to have reduced quality of life indicators, and are more susceptible to illness, stress, depression, and physical injury.

Steve Wing et al., *Air Pollution and Odor in Communities Near Industrial Swine Operations*, 116 *Env't Health Persps.* 1362 (2008). Study participants living within 1.5 miles of industrial swine facilities altered or ceased normal daily activities when hydrogen sulfide concentrations, and associated odor, were the highest.

Steve Wing et al., *Environmental Injustice in North Carolina's Hog Industry*, 108 *Env't Health Persps.* 225 (2000). Industrial swine facilities are concentrated in areas with both high poverty and a high percentage of nonwhites, and facilities run by corporate integrators are more concentrated in poor and nonwhite areas than are facilities run by independent growers.

Steve Wing et al., *The Potential Impact of Flooding on Confined Animal Feeding Operations in Eastern North Carolina*, 110 *Env't Health Persps.* 387 (2002). African Americans were more likely than Whites to live in areas where industrial animal facilities flooded during storms, according to satellite estimates.

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Ann M. Arfken et al., *Assessing Hog Lagoon Waste Contamination in the Cape Fear Watershed Using Bacteroidetes 16S rRNA Gene Pyrosequencing*, 99 *Applied Microbiology & Biotechnology* 7283 (2015). A new methodology allows for more accurate assessments of waterways in which contamination previously could not be detected, indicating that contamination of waterways with swine waste may be more extensive than previously thought.

S. Biswas et al., *Effect of Dairy Manure Storage Conditions on the Survival of E. coli O157:H7 and Listeria*, 47 *J. Env't Quality* 185 (2018). Bacterial pathogens survive in stored dairy manure for up to six months and may enter the environment during subsequent land application.

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- Joan A. Casey et al., *High-Density Livestock Operations, Crop Field Application of Manure, and Risk of Community-Associated Methicillin-Resistant Staphylococcus Aureus Infection in Pennsylvania*, 173 *JAMA Internal Med.* 1980 (2014). People living near industrial swine facility waste application sites in Pennsylvania receive treatment for more skin and soft tissue infections and infections caused by MRSA than people living farther away from application sites.
- Zeyou Chen et al., *Antibiotic Resistance Genes and Bacterial Communities in Cornfield and Pasture Soils Receiving Swine and Dairy Manures*, 248 *Env't Pollution* 947 (2019). Compared to soils where animal manure was not applied, soils where pig and cow manure was applied had a greater diversity of antibiotic resistance genes. Cornfield soil frequently receiving raw pig manure had the greatest antibiotic resistance gene abundance.
- Meghan F. Davis et al., *Occurrence of Staphylococcus aureus in Swine and Swine Workplace Environments on Industrial and Antibiotic-Free Hog Operations in North Carolina, USA: A One Health Pilot Study*, 163 *Env't Rsch.* 88 (2018). Workers at industrial swine facilities are exposed to Staphylococcus aureus, including MRSA, through indirect, airborne transmission, as well as direct contact with animals.
- Jennifer Gentry-Shields et al., *Hepatitis E Virus and Coliphages in Waters Proximal to Swine Concentrated Animal Feeding Operations*, 505 *Sci. Total Env't* 487 (2015). Current waste management practices for industrial swine facilities may be associated with the dissemination of viruses of public health concern in waters near sprayfields.
- Michael Greger & Gowri Koneswaran, *The Public Health Impacts of Concentrated Animal Feeding Operations on Local Communities*, 33 *Family & Cmty. Health* 11 (2010). There are demonstrable links between: (1) waste spilled from overflowing lagoons and runoff from application of the waste to fields and (2) outbreaks of harmful pathogens, such as salmonella and *E. coli* in the environment.
- Virginia Guidry & Steve Wing, *A Longitudinal Study of Exposure to Livestock Odor and Symptom Reports in Children*, *Env't Health Persps.* (2011). Reported presence of livestock odor within the previous 24 hours is associated with increased reports of respiratory and irritation issues among children.

- Virginia T Guidry et al., *Hydrogen Sulfide Concentrations at Three Middle Schools Near Industrial Livestock Facilities*, 27 J. Exposure Sci. & Env't Epidemiology 167 (2017). Off-site migration of pollutants like hydrogen sulfide from industrial animal facilities can decrease air quality at nearby schools.
- Virginia T. Guidry et al., *Connecting Environmental Justice and Community Health Effects of Hog Production in North Carolina*, 79 N.C. Med. J. 324 (2018). Industrial swine facilities, which are associated with adverse health effects, including respiratory conditions, irritation symptoms, mental health problems, and infectious disease risk, disproportionately impact communities of color and low-income communities in North Carolina.
- Sarah M. Hatcher et al., *Occurrence of Methicillin-Resistant Staphylococcus Aureus in Surface Waters Near Industrial Hog Operation Spray Fields*, 565 Sci. Total Env't 1028 (2016). Antibiotic-resistant Staphylococcus aureus, including MSSA, MRSA, and MDRSA, are present in surface waters adjacent to swine waste sprayfields in southeastern North Carolina.
- Sarah M. Hatcher et al., *The Prevalence of Antibiotic-Resistant Staphylococcus aureus Nasal Carriage Among Industrial Hog Operation Workers, Community Residents, and Children Living in Their Households: North Carolina, USA*, 125 Env't Health Persps. 560 (2017). Children under the age of seven living in households with industrial swine facility workers are more likely to carry antibiotic-resistant Staphylococcus aureus than children in a reference community, especially if industrial swine facility workers take their personal protective equipment home with them.
- Christopher D. Heaney et al., *Source Tracking Swine Fecal Waste in Surface Water Proximal to Swine Concentrated Animal Feeding Operations*, 511 Sci. Total Env't 676 (2015). Where industrial swine facility density is high, surface waters have poor sanitary quality.
- Mariëtte Hooiveld et al., *Odour Annoyance in the Neighbourhood of Livestock Farming –Perceived Health and Health Care Seeking Behaviour*, 22 Annals Agric. & Env't Med. 55 (2015). The number of pigs, poultry, and cattle are equally associated with odor annoyance, which in turn, is associated with reduced general health.
- Keisha N. Johnson et al., *Effect of Dairy Manure Slurry Application in a No-Till System on Phosphorus Runoff*, 90 Nutrient Cycling in Agroecosystems 201 (2011). Total phosphorus losses following rainfall simulation on fields with reduced tillage vary by dairy manure slurry application method, with particularly high rates of dissolved reactive phosphorus in runoff following broadcast manure slurry application.

- Alexander P. Keil et al., *Suitability of Public Records for Evaluating Health Effects of Treated Sewage Sludge in North Carolina*, 72 N.C. Med. J. 98 (2011). Eastern North Carolina communities near industrial swine facilities that apply waste to land demonstrate human exposure to airborne pollutants and dose-response relationships between pollutant levels, symptoms of illness, and stress levels.
- Kaye H. Kilburn, *Human Impairment from Living near Confined Animal (Hog) Feeding Operations*, 2012 J. of Env't & Pub. Health 56,5690 (2012). Neighbors of industrial swine facilities and manure lagoons who experienced offensive odors had impaired neurobehavioral and pulmonary functions, and these effects extended to people thought to be the study control group.
- Julia Kravchenko et al., *Mortality and Health Outcomes in North Carolina Communities Located in Close Proximity to Hog Concentrated Animal Feeding Operations*, 79 N.C. Med. J. 278 (2018). North Carolina residents living near industrial swine facilities had higher all-cause mortality, infant mortality, kidney disease, septicemia, tuberculosis, and higher hospital and emergency room visits for infants with low birth weights.
- Gopi Krishna Kafle & Lide Chen, *Emissions of Odor, Ammonia, Hydrogen Sulfide, and Volatile Organic Compounds from Shallow-Pit Pig Nursery Rooms*, 39 J. Biosystems Eng'g 76 (2014). The gas and odor concentrations of emissions from industrial swine facilities indicate an acute need for using gas and odor mitigation technologies in these facilities.
- Jesper Larsen et al., *Meticillin-Resistant Staphylococcus Aureus CC398 Is an Increasing Cause of Disease in People with No Livestock Contact in Denmark, 1999 to 2011*, 20 Eurosurveillance (2015). The spatial and temporal distribution of MRSA infections among patients with and without livestock exposure suggests that MRSA spreads from livestock facilities into surrounding communities.
- Zifei Liu et al., *Ammonia and Hydrogen Sulfide Emissions from Swine Production Facilities in North America: A Meta-Analysis*, 92 J. Animal Sci. 1656 (2014). Swine hoop facilities have significantly higher ammonia emissions, and deep-pit facilities have the highest hydrogen sulfide emissions, compared to other manure-handling systems.

- K.M. Lockhart et al., *Identifying Sources of Groundwater Nitrate Contamination in a Large Alluvial Groundwater Basin with Highly Diversified Intensive Agricultural Production*, 151 *J. Contaminant Hydrology* 140 (2013). Over 40 percent of well water samples from Tulare, Kings, Stanislaus, and Merced counties in San Joaquin Valley, California exceeded EPA's maximum contaminant level for nitrate. In Stanislaus and Merced counties, elevated nitrate levels in domestic wells most strongly correlated with shallow water table depths and the presence of either CAFO-derived animal waste applications or deciduous fruit and nut crops.
- David C. Love et al., *Dose Imprecision and Resistance: Free-Choice Medicated Feeds in Industrial Food Animal Production in the United States*, 119 *Env't Health Persps.* 279 (2010). Providing antibiotics to animals, including swine, for purposes besides treating disease can cause the development of antimicrobial-resistant microorganisms.
- Michael A. Mallin & Matthew R. McIver, *Season Matters When Sampling Streams for Swine CAFO Waste Pollution Impacts*, 16 *J. Water & Health* 78 (2018). Seasonal spraying of animal waste on fields in North Carolina aligns with seasonal differences in adjacent stream water quality for concentrations of conductivity, nitrate, total nitrogen, total organic carbon, and fecal bacteria.
- Michael A. Mallin et al., *Industrial Swine and Poultry Production Causes Chronic Nutrient and Fecal Microbial Stream Pollution*, 226 *Water, Air, Soil & Pollution* 407 (2015). Industrial-scale swine and poultry production leads to chronic surface water and groundwater pollution that is both a human health and ecosystem hazard, and current waste management protocols for this form of animal production fail to protect freshwater and estuarine ecosystems.
- Chad W. McKinney et al., *Occurrence and Abundance of Antibiotic Resistance Genes in Agricultural Soil Receiving Dairy Manure*, 94 *FEMS Microbiology Ecology* fty010 (2018). Dairy manure application increases clinically relevant antibiotic resistance gene abundances, with higher manure application rates leading to greater abundances of resistance genes.
- Jennifer S. Meyer et al., *Reproductive Physiology in Eastern Snapping Turtles (Chelydra serpentina) Exposed to Runoff from a Concentrated Animal Feeding Operation*, 49 *J. Wildlife Diseases* 996 (2013). Eastern snapping turtles exposed to runoff from CAFO manure application sites show differences in reproductive physiology.
- Maya Nadimpalli et al., *Persistence of Livestock-Associated Antibiotic-Resistant Staphylococcus Aureus Among Industrial Hog Operation Workers in North Carolina over 14 Days*, 72 *Occupational & Env't Med.* 90 (2015). Workers at industrial swine facilities had persistent nasal carriage of MRSA, including after a period of 96 hours away from work.

- Maya Nadimpalli et al., *Face Mask Use and Persistence of Livestock-Associated Staphylococcus aureus Nasal Carriage Among Industrial Hog Operation Workers and Household Contacts, USA*, 126 *Env't Health Persps.* 127,005 (2018). Industrial swine facility workers may persistently carry antibiotic-resistant, livestock-associated *Staphylococcus aureus* in their nasal cavities. Consistent face mask use was associated with reduced exposure to antibiotic-resistant, livestock-associated *S. aureus* among industrial swine facility workers and their household members.
- Wendee Nicole, *CAFOs and Environmental Justice: The Case of North Carolina*, 121 *Env't Health Persps.* A182 (2013). The pervasive presence of odors in communities on North Carolina's coastal plain affects quality of life, use of property, water quality, and public health. Even without lagoon spills, ammonia and nitrates may seep into groundwater, especially in North Carolina's coastal plain, where the water table is near the surface.
- Yelena Ogneva-Himmelberger et al., *CALPUFF and CAFOs: Air Pollution Modeling and Environmental Justice Analysis in the North Carolina Hog Industry*, 4 *Int'l J. Geo-Info.* 150 (2015). At locations downwind of industrial swine facilities, modeled ammonia concentrations are up to three times higher than the average concentration in the entire watershed, exposing around 3,500 people in the study area to ammonia concentrations greater than the minimal risk level.
- Patrick T. O'Shaughnessy & Ralph Altmaier, *Use of AERMOD to Determine a Hydrogen Sulfide Emission Factor for Swine Operations by Inverse Modeling*, 45 *Atmospheric Env't* 4617 (2011). Hydrogen sulfide emitted from industrial swine facilities can travel up to six kilometers (3.7 miles).
- Brian T. Pavilonis et al., *Relative Exposure to Swine Animal Feeding Operations and Childhood Asthma Prevalence in an Agriculture Cohort*, 122 *Env't Rsch.* 74 (2013). There is a significant relationship between poor respiratory health among children and environmental exposure to the cumulative impacts of all industrial swine facilities within 4.8 kilometers (2.98 miles) of their homes.
- Anne T. Pollard & Matthew J. Morra, *Fate of Tetracycline Antibiotics in Dairy Manure-Amended Soils*, 26 *Env't Revs.* 102 (2018). Tetracycline antibiotics in dairy manure applied to soils may encourage development of antibiotic resistance.
- Pranay R. Randad et al., *Comparison of Livestock-Associated and Community-Associated Staphylococcus Aureus Pathogenicity in a Mouse Model of Skin and Soft Tissue Infection*, 9 *Scientific Reps.* 6774 (2019). Industrial swine facility workers are at increased risk of carrying *Staphylococcus aureus* in their nostrils, particularly strains that are livestock-associated and multidrug-resistant.

Miranda M. L. van Rijen et al., *Livestock-Associated MRSA Carriage in Patients Without Direct Contact with Livestock*, 9 PLoS ONE e100294 (2014). There is a significant association between individuals residing in communities with pigs and livestock-associated MRSA; pig-associated MRSA is present even in people without direct contact with swine.

Jessica L. Rinsky et al., *Livestock-Associated Methicillin and Multidrug Resistant Staphylococcus Aureus Is Present Among Industrial, Not Antibiotic-Free Livestock Operation Workers in North Carolina*, 8 PLoS ONE e67641 (2013). Nasal swabs from individuals exposed to industrial animal facilities tested positive for livestock-associated MRSA and MDRSA, while those from people exposed to antibiotic-free livestock operations did not.

Günther Schaubberger et al., *Empirical Model of Odor Emission from Deep-Pit Swine Finishing Barns to Derive a Standardized Odor Emission Factor*, 66 Atmospheric Env't 84 (2013). Odor emissions from swine facilities increase with indoor temperature, barn ventilation rate, and animal activity.

Leah Schinasi et al., *A Case Control Study of Environmental and Occupational Exposures Associated with Methicillin Resistant Staphylococcus Aureus Nasal Carriage in Patients Admitted to a Rural Tertiary Care Hospital in a High Density Swine Region*, 13 Env't Health 54 (2014). MRSA carriers identified at a local hospital had higher odds of reporting that they could smell odor from farms while at home and of living in areas with medium densities of swine.

Leah Schinasi et al., *Air Pollution, Lung Function, and Physical Symptoms in Communities Near Concentrated Swine Feeding Operations*, 22 Epidemiology 208 (2011). The odors and chemicals emitted from industrial swine facilities, including hydrogen sulfide and endotoxins, lead to acute eye, nose, and throat irritation; increased incidents of difficulty breathing; increased wheezing; chest tightness; and nausea among adults living in eastern North Carolina.

Amy A. Schultz et al., *Residential Proximity to Concentrated Animal Feeding Operations and Allergic and Respiratory Disease*, 130 Env't Int'l 104911 (2019). Residential proximity to dairy CAFOs is associated with reduced lung function and self-reported asthma. The adjusted odds of lung allergies were consistently more than two-fold higher among those living one to three miles from a CAFO as compared to those living five miles from a CAFO, and reports of current asthma were nearly two-fold more common among those living one to three miles versus five miles from a CAFO.

- Jochen Schulz et al., *Longitudinal Study of the Contamination of Air and of Soil Surfaces in the Vicinity of Pig Barns by Livestock-Associated Methicillin-Resistant Staphylococcus Aureus*, 78 *Applied & Env't Microbiology* 5666 (2012). MRSA can be detected 300 feet from a pig barn in which animals, air, and workers' plastic boots tested positive for MRSA.
- Steven Trabue et al., *Odorous Compounds Sources and Transport from a Swine Deep-Pit Finishing Operation: A Case Study*, 233 *J. Env't Mgmt.* 12 (2019). An industrial swine facility in Iowa emitted odorous chemical classes, including volatile sulfur compounds, volatile fatty acids, and phenol and indole compounds. Two odorous compounds were detected above their odor threshold values 1.5 kilometers (almost one mile) downwind from the facility.
- David A. Verbree et al., *Runoff Losses of Sediment and Phosphorus from No-Till and Cultivated Soils Receiving Dairy Manure*, 39 *J. Env't Quality* 1762 (2010). No-till can reduce phosphorus runoff from dairy manure on well-drained soils; however, no-till on poorly drained soils can exacerbate phosphorus losses in the absence of dairy manure incorporation.
- Joshua S. Wallace et al., *Occurrence and Transformation of Veterinary Antibiotics and Antibiotic Resistance Genes in Dairy Manure Treated by Advanced Anaerobic Digestion and Conventional Treatment Methods*, 236 *Env't Pollution* 764 (2018). Tetracycline antibiotics persist in manure solids following anaerobic digestion.
- Carl Wepking et al., *Exposure to Dairy Manure Leads to Greater Antibiotic Resistance and Increased Mass-Specific Respiration in Soil Microbial Communities*, 284 *Proc. Royal Soc'y B* 20162233 (2017). Microbial communities in sites exposed to dairy manure have higher abundances of antibiotic resistance genes.
- Bridgett M. West et al., *Antibiotic Resistance, Gene Transfer, and Water Quality Patterns Observed in Waterways near CAFO Farms and Wastewater Treatment Facilities*, 217 *Water, Air, & Soil Pollution* 473 (2011). Waterways near CAFOs have elevated total phosphorus levels, increased turbidity, and greater abundances of multi-drug-resistant bacteria.
- Fabienne Wichmann et al., *Diverse Antibiotic Resistance Genes in Dairy Cow Manure*, 5 *MBIO* e01017-13 (2014). Dairy cow manure is a significant reservoir of antibiotic resistance genes, including resistance to beta-lactams, phenicols, aminoglycosides, and tetracyclines.
- Steve Wing et al., *Air Pollution from Industrial Swine Operations and Blood Pressure of Neighboring Residents*, 121 *Env't Health Persps.* 92 (2013). Malodors from industrial swine facilities may be associated with acute blood pressure increases and, in turn, could contribute to chronic hypertension.

2020s

- Renys E. Barrios et al., *Fate and Transport of Antibiotics and Antibiotic Resistance Genes in Runoff and Soil as Affected by the Timing of Swine Manure Slurry Application*, 712 *Sci. Total Env't* 136505 (2020). Antibiotics and antibiotic resistance genes persist in runoff for two weeks following swine manure application, and antibiotic resistance genes persist in soil for at least four weeks.
- Colleen N. Brown et al., *Tracing Nutrient Pollution from Industrialized Animal Production in a Large Coastal Watershed*, 192 *Env't Monitoring Assessment* 515 (2020). CAFO-derived nutrients can be detected many kilometers downstream from CAFOs. Nitrogen inputs in the Northeast Cape Fear River, Black River, and Cape Fear River are largely derived from CAFO swine effluent. Samples taken during months when waste application occurs have maximum nitrate concentrations, and these concentrations can be attributed to waste effluent.
- Patricia M. Glibert, *From Hogs to HABs: Impacts of Industrial Farming in the US on Nitrogen and Phosphorus and Greenhouse Gas Pollution*, 150 *Biogeochemistry* 139 (2020). Waste from CAFOs contributes substantially to nutrient pollution when spread on fields, and waste is often applied to fields at higher nitrogen and phosphorus rates than commercial fertilizer.
- Maria C. Hall et al., *Influence of Setback Distance on Antibiotics and Antibiotic Resistance Genes in Runoff and Soil Following the Land Application of Swine Manure Slurry*, 54 *Env't Sci. & Tech.* 8 (2020). A setback distance of 34 to 67 meters between a manure application area and surface water may mitigate concentrations of manure-borne antibiotics and antibiotic resistance genes in runoff from swine manure.
- Danika Hill et al., *Dairy Manure As a Potential Source of Crop Nutrients and Environmental Contaminants*, 100 *J. Env't Sci.* 117 (2021). Dairy manure contains hormones, antibiotics, heavy metals, antibiotic resistance genes, and veterinary drugs.
- Jason P. Oliver et al., *Invited Review: Fate of Antibiotic Residues, Antibiotic-Resistant Bacteria, and Antibiotic Resistance Genes in US Dairy Manure Management Systems*, 103 *J. Dairy Sci.* 1051 (2020). Over 60 antibiotic resistance genes are found in dairy manure, along with antibiotic residues and antibiotic-resistant bacteria, contributing to the spread of antibiotic resistance.

Zach Raff & Andrew Meyer, *CAFOs and Surface Water Quality: Evidence from Wisconsin*, 104 Am. J. Agric. Econ. 161 (2022). Adding one CAFO to a hydrological Unit Code-8 (HUC8) region leads to a 1.7 percent increase in total phosphorus levels and a 2.7 percent increase in ammonia levels in surface waters, relative to sample mean levels.

Pranay R. Randad et al., *Transmission of Antimicrobial-Resistant Staphylococcus aureus Clonal Complex 9 Between Pigs and Humans, United States*, 27 Emerging Infectious Diseases 740 (2021). In the top 10 pig-producing counties in North Carolina, there is a high degree of relatedness between isolates of livestock-associated Staphylococcus aureus clonal complex 9 from pigs in industrial swine facilities and isolates from humans, supporting potential transmission between pigs and humans. There is also evidence of household-level transmission between industrial swine facility workers and their children, who are at higher risk of developing invasive infections.

Kelly Shea et al., *Using Remote Sensing to Identify Liquid Manure Applications in Eastern North Carolina*, 317 J. Env't Mgmt. 115334 (2022). Using satellite-based radar to identify the location and timing of liquid manure application reveals that soil saturation in corn sprayfields is highest during the winter months, indicating that manure application may be occurring during those months.

Donald M. Waller et al., *Shifts in Precipitation and Agricultural Intensity Increase Phosphorus Concentrations and Loads in an Agricultural Watershed*, 284 J. Env't Mgmt. 112019 (2021). Total phosphorus concentrations in an agricultural watershed often exceeded EPA surface water standards, increased as the volume of water flowing through river channels increased, and increased with proximity to dairy operations. Total phosphorus concentrations downstream from newly permitted CAFOs increased, and total daily phosphorus loads downstream from CAFOs increased by 91 percent following CAFO expansions.

Fengxia Yang et al., *Swine Liquid Manure: A Hotspot of Mobile Genetic Elements and Antibiotic Resistance Genes*, 10 Sci. Reports 15037 (2020). Liquid swine manure is a reservoir for antibiotic-resistant genes, and a high prevalence of these genes persists even in treated effluent.

Xiaorong Zhang et al., *Environmental Risks Caused by Livestock and Poultry Farms to the Soils: Comparison of Swine, Chicken, and Cattle Farms*, 317 J. Env't Mgmt. 115320 (2022). Heavy metals, including copper and zinc; antibiotics; and antibiotic resistance genes are enriched in soils amended with swine manure.

Sample of Grey Literature Supplementing Peer-Reviewed Publications

1990s

R.L. Huffman & Phillip W. Westerman, *Seepage and Electromagnetic Terrain Conductivity Around New Swine Lagoons*, 47 Transactions Am. Soc’y Agric. & Bio. Eng’g 1507 (1991). Contaminants in unlined lagoons built in deep sands in North Carolina’s coastal region seep significantly into the soil and groundwater.

Michael A. Mallin et al., Water Res. Rsch. Inst., Univ. of N.C., *Effect of Organic and Inorganic Nutrient Loading on Photosynthetic and Heterotrophic Plankton Communities in Blackwater Rivers* (1998). Pollution from lagoons could contribute to toxic algae outbreaks in blackwater stream systems in the Coastal Plain of North Carolina.

James P. Murphy & Joseph P. Harner, *Lagoon Seepage Through Soil Liners*, Swine Day 1997 Report of Progress (1997), <https://krex.k-state.edu/dspace/bitstream/handle/2097/2769/Swine97pg1-4.pdf?sequence=1&isAllowed=y>. Lagoons can leach wastewater into soil, potentially leading to groundwater contamination.

Melva Okun, Univ. of N.C. at Chapel Hill, *Human Health Effects Associated with the Hog Industry* (1999). Effects of industrial swine facilities include odors, waste, flies, poor air quality, and the contamination of drinking water supplies.

Susan S. Schiffman et al., *Mood Changes Experienced by Persons Living Near Commercial Swine Operations*, in *Pigs, Profits, and Rural Communities* (Kendall M. Thu & E. Paul Durrenberger eds., 1998). Odor can have a deleterious health effect, including a physiological pathway between the olfactory lobe and the immune system, which directly implicates odor as a health risk.

Understanding the Impacts of Large-Scale Swine Production: Proceedings from an Interdisciplinary Scientific Workshop, June 29-30, 1995, Des Moines, Iowa (Kendall M. Thu & Kelley J. Donham eds., 1996). Research has found that industrial animal facilities adversely impact water and air quality and harm community members’ quality of life.

2000s

Policy Statement, Am. Pub. Health Ass'n, *Precautionary Moratorium on New Concentrated Animal Feed Operations* (2003), <https://www.apha.org/policies-and-advocacy/public-health-policy-statements/policy-database/2014/07/24/11/17/precautionary-moratorium-on-new-concentrated-animal-feed-operations>.

A precautionary moratorium on new industrial animal facilities may be necessary based on evidence of the health hazards from over 400 volatile compounds emitted by manure.

Brother David Andrews & Timothy J. Kautza, Pew Comm'n on Indus. Farm Animal Prod., *Impact of Industrial Farm Animal Production on Rural Communities* (2008), http://www.pcifapia.org/images/212-8_PCIFAP_RuralCom_Finaltc.pdf. Industrial animal facilities produce recurrent strong odors, degrade water bodies, and increase fly populations, making it intolerable for neighbors and their guests to participate in normal outdoor recreational activities and social activities in and around their homes.

Adam Driscoll & Bob Edwards, *From Farms to Factories: The Social and Environmental Consequences of Industrial Swine Production in North Carolina*, in *Twenty Lessons in Environmental Sociology* (Kenneth A. Gould & Tammy L. Lewis eds., 2015). In North Carolina, the increase in industrial swine facilities has led to a range of externalities, including farm loss, reduced quality of life, adverse impacts on health, and environmental degradation.

Rolf U. Halden & Kellogg J. Schwab, Pew Comm'n on Indus. Farm Animal Prod., *Environmental Impact of Industrial Farm Animal Production* (2008), https://www.pewtrusts.org/-/media/legacy/uploadedfiles/wwwpewtrustsorg/reports/industrial_agriculture/pcfifapenvimpactpdf.pdf. All industrial animal facilities impact public health and quality of life in rural America due to odors and interference with neighbors' ability to spend time outdoors.

Iowa State Univ. & Univ. of Iowa Study Grp., *Iowa Concentrated Animal Feeding Operations Air Quality Study* (2002). Air emissions from industrial animal facilities cause odors that are of major concern to residents living nearby, and they may constitute a public health hazard. The report calls for recognition of the effects of industrial animal facilities on surrounding communities in permitting decisions.

Michael A. Mallin, *Impacts of Industrial-Scale Swine and Poultry Production on Rivers and Estuaries*, 88 *Am. Scientist* 26 (2000). Lagoons and sprayfields located near aquatic environments can harm public health and degrade water quality.

James Merchant et al., *Pew Commission on Industrial Farm Animal Production (PCIFAP) Staff Summary of Occupational and Community Public Health Impacts* (2008), http://www.pcifapia.org/images/PH_FINAL.pdf. Bacterial agents that spread contagious diseases between animals and humans can travel downwind as spray aerosols and infect local populations, as can disease-transmitting flies and pests.

N.C. Council of Churches, *Hog Lagoons Policy Statement* (Nov. 9, 2000), <https://www.ncchurches.org/2000/11/hog-lagoons/>. Contaminated water supplies and air emissions from industrial swine facilities adversely affect the health of those who live in the surrounding neighborhoods, causing respiratory problems, exposure to disease-causing bacteria, and psychological problems.

Brian C. Murray et al., RTI Int'l, *Benefits of Adopting Environmentally Superior Swine Waste Management Technologies in North Carolina: An Environmental and Economic Assessment* (2003). The costs of health effects and premature deaths linked to ammonia emissions from industrial swine facilities total hundreds of millions of dollars.

James A. Zahn et al., *Air Pollution from Swine Production Facilities Differing in Waste Management Practice*, *Proceedings of the Odors and Emission 2000 Conference* (2000). Odor intensity and the concentration of volatile organic compounds emitted from swine manure management systems are strongly correlated. The concentration of ammonia and methane in air samples was highest with systems that stored waste in lagoons.

2010s

Thijs Bosch & Leo M. Schouls, *Livestock-Associated MRSA: Innocent or Serious Health Threat?*, *10 Future Microbiology* 445 (2015). A review of past studies links the spread of MRSA to industrial swine facilities and finds that livestock-associated MRSA can successfully colonize human hosts, pointing to a potentially serious health threat and the possibility that livestock-associated MRSA could persist and spread in communities without contact with hogs.

Univ. of N.C. at Chapel Hill, *Identifying Opportunities and Impacts for New Uses of Hog Waste in Eastern North Carolina* (2013), <https://ncgrowth.unc.edu/wp-content/uploads/2014/06/OpportunitiesAndImpactsOfHogWasteInEasternNC.pdf>. Proximity to an industrial swine facility lagoon in Sampson County, North Carolina resulted in a \$10,382-per-lagoon decline in the value of residential parcels with homes and an assessed property value loss of anywhere from \$5,443 to \$15,563, depending on the type of residential parcel.

Stephen L. Harden, U.S. Geological Surv., Scientific Investigations Report 2015-5080, *Surface-Water Quality in Agricultural Watersheds of the North Carolina Coastal Plain Associated with Concentrated Animal Feeding Operations* (2015). North Carolina watersheds with industrial animal facilities have significantly higher concentrations of ammonium, nitrate, and total nitrogen than those without industrial animal facilities.

Carrie Hribar, Nat'l Ass'n of Local Bds. of Health, *Understanding Concentrated Animal Feeding Operations and Their Impact on Communities* (2010), https://www.cdc.gov/nceh/ehs/docs/understanding_cafos_nalboh.pdf. The impacts of odors from industrial animal facilities include preventing children from playing outside or going to school; causing negative mood states, tension, anger, and depression; increasing asthma rates in neighboring communities; and elevating levels of fly populations in homes close to the facilities.

Steve Wing & Jill Johnston, *Industrial Hog Operations in North Carolina Disproportionately Impact African-Americans, Hispanics and American Indians*, N.C. Pol'y Watch (2014), <http://www.ncpolicywatch.com/wp-content/uploads/2014/09/UNC-Report.pdf>. Industrial swine facilities in North Carolina disproportionately affect Black, Hispanic, and American Indian residents, and North Carolina's industrial swine facilities are relatively absent from low-poverty White communities.

Exhibit 2

DECLARATION OF SONJA TROM EAYRS

I, SONJA TROM EAYRS, declare and state as follows:

1. My name is Sonja Trom Eayrs, and I am actively involved in the day-to-day operation of our family farm located in Dodge County, Minnesota. I am uncomfortable sharing our farm's address because, as explained in greater detail below, my family has faced repeated harassment and intimidation for speaking out against industrial agriculture pollution in our community. I am also an attorney and am licensed to practice law in Minnesota, Wisconsin, and Florida.

2. Our family farm has long been a source of pride for my family. My grandparents, Elmer and Marie Trom, moved to the farm in 1925 and raised their 10 children there. My father, Lowell Trom, was born on the farm in 1929 and eventually assumed ownership of it. My father devoted his entire life to farming the land. As children, my siblings and I grew up on the farm, where we helped with farm chores and played outside. With its perfect park-like atmosphere, the farm served as a special gathering place for our aunts, uncles, and cousins—a home where we would come together for family reunions on Father's Day, picnics, graduations, baptisms, communions, birthday parties, and other family celebrations. In 1979, my husband and I held our wedding reception here at the farm.

3. My family cherishes our ability to enjoy the rural countryside and time outdoors. For many years, my mother maintained a beautiful garden on the farm, planting hundreds of flowers each year. My father, prior to his death in October 2019, loved to work in the open air. Almost every aspect of his work happened outdoors, from preparing the machinery for planting and harvesting, to tilling the land, filling the planter boxes with seed, and harvesting soybeans and corn each fall.

4. In the early 1990s, we witnessed significant changes to the rural countryside around our farm, as concentrated animal feeding operations (“CAFOs”) began to disrupt the quiet community. In 1993, the first pig CAFO was constructed approximately one mile north of our farm, confining approximately 4,000 pigs. Since then, numerous pig CAFOs have been constructed in the immediate area, including one located a half-mile west of our farm and another located a mile north of our farm. Today, there are 12 pig CAFOs within a three-mile radius of our farm, housing an estimated 30,000 pigs.

5. These facilities generate an incredible amount of waste. One pig produces approximately 10 times more fecal waste than a human,¹ so the pigs right around our farm generate the same amount of waste as a city of 300,000 people. That’s *15 times* the population of Dodge County.² This waste contains antibiotics, nitrogen, phosphorus, and other contaminants.³

6. This accumulation of fecal waste is incredibly disruptive to our lives. At the nearby CAFOs, the confinement barns are located over manure pits capable of holding hundreds of thousands of gallons of urine and feces. Each evening, the facilities raise the curtains that close off parts of the confinement barns, and the putrid stench from the manure pits rolls across the countryside. During the fall, the CAFO operators pump the urine and feces out of the manure pits. During pump-out, the manure pits are agitated, which causes them to release

¹ See Mark Sobsey & Vicent Hiil, *Hog Waste Treatment to Control Microbial Contamination* (2008), Water Res. Rsch. Inst. Univ. of N.C., <https://repository.lib.ncsu.edu/bitstream/handle/1840.4/4110/NC-WRRI-380.pdf?sequence=1&isAllowed=y>.

² See U.S. Census Bureau, Quickfacts, Dodge County, Minnesota, <https://www.census.gov/quickfacts/fact/table/dodgecountyminnesota,MN/PST045219%20>.

³ See Michael A. Mallin et al., *Industrial Swine and Poultry Production Causes Chronic Nutrient and Fecal Microbial Stream Pollution*, 226 *Water, Air, Soil & Pollution* 407 (2015).

Hydrogen sulfide, ammonia, methane, and other dangerous gases. CAFO operators then apply the manure pumped from the pits on neighboring fields by injecting it into the soil.

7. Immediately adjacent to our farm, I have personally witnessed application of manure onto frozen ground that cannot absorb the manure, as well as over-application of manure. These are dangerous practices, as manure frequently pools and eventually runs off into area drainage ditches, rivers, and road ditches, which in turn increases the risk of water pollution. Over the course of two days in November 2017, I took multiple photographs to document these practices adjacent to our farm, one of which is reproduced below. In the bottom left corner of the field, pooled manure sits on top of the frozen ground, while dozens of birds peck at dead and decomposing pig body parts mixed in with the manure.



Source: Sonja Trom Eayrs

8. A local waterway, the Westfield-Ripley Drainage Ditch, cuts through our farm and joins the Cedar River two miles to the south. The Cedar River then flows through southern

Minnesota and Iowa, eventually connecting with the Mississippi River. The Cedar River is an important waterway, and I am concerned that the CAFOs concentrated in close proximity to it have already polluted the river and will continue to do so, absent more thorough government oversight. According to the Minnesota Pollution Control Agency (“MPCA”), “improper application of manure can contaminate surface or groundwater.”⁴ The MPCA lists the Cedar River as an impaired water that is “non-supporting of aquatic life for aquatic macroinvertebrate communities,” in part because of high concentrations of nitrogen and phosphorus, two pollutants often present in animal waste.⁵ I believe that the Cedar River is impaired, at least in part, because of water pollution from CAFOs.

9. This belief was confirmed in 2017, when our citizens group, Dodge County Concerned Citizens, worked with the Izaak Walton League on the Cedar River Watershed Project, which documented water pollution in our community. Over a 19-week period, 40 volunteers collected 498 samples from 83 sites across the Cedar River watershed.⁶ Of the samples collected, 70 percent indicated the presence of *E. coli* exceeding health standards for safe recreational uses, such as swimming, wading, and boating.⁷ Throughout the watershed, DNA testing also indicated contamination from pig and cattle fecal waste. After major rainstorms, testing consistently found high *E. coli* readings, indicating that “the rain is flushing *E. coli* on the land, and in tile lines and ditches into the streams,” raising concerns “about the health of children and adults who enjoy our streams, rivers and lakes.”⁸ According to the U.S.

⁴ Minn. Pollution Control Agency, *Mississippi River – Sartell Watershed E. coli and Phosphorus Total Maximum Daily Load 29* (2020), <https://www.pca.state.mn.us/sites/default/files/wq-iw8-61e.pdf>.

⁵ Minn. Pollution Control Agency, *Cedar River Watershed Stressor Identification 46* (2016), <https://www.pca.state.mn.us/sites/default/files/wq-ws5-07080201a.pdf>.

⁶ Izaak Walton League, *Cedar River Watershed Project Report* (2018), <https://nebula.wsimg.com/16b21fe4f708157573df19349576f6?AccessKeyId=41762AA0E44EDC919738&disposition=0&alloworigin=1>.

⁷ *Id.*

Geological Survey, exposure to E. coli-contaminated water can cause “health problems and sickness,” including “urinary tract infections, respiratory illness, and pneumonia.”⁹

10. CAFOs in Dodge County also pollute area private wells. One of our neighbors, Dale, whose farm is also surrounded by nearly 30,000 pigs within a two-mile radius, has not been able to drink the water at his farm for years. Dale’s well tested positive for coliform bacteria on several occasions, which he believes is due to manure application on the land adjacent to his farm.

11. Local wells also often have high levels of nitrate, a chemical component of manure that can run off fields, seep into groundwater, and cause serious health problems, including an increased risk of cancer and birth defects.¹⁰ Recently, Dodge County officials acknowledged that 21 percent of local private wells contained nitrate and were potentially unsafe for supplying drinking water.¹¹ According to the Minnesota Department of Health, nitrate pollution has been detected “in more than 8,000 [] drinking water wells” across the state, and the agency’s testing showed that “[m]ore than 1,000 had nitrate levels deemed unsafe for infants and pregnant women.”¹² Due to the proliferation of CAFOs in Minnesota, which now ranks as

⁸ *Id.*

⁹ Water Sci. School, U.S. Geological Surv., *Bacteria and E. Coli in Water* (June 5, 2018), <https://www.usgs.gov/special-topics/water-science-school/science/bacteria-and-e-coli-water#:~:text=coli%20is%20a%20type%20fecal,type%20of%20disease%20causing%20organisms.>

¹⁰ See Minn. Dep’t of Health, Nitrate in Drinking Water Fact Sheet, <https://www.health.state.mn.us/communities/environment/water/docs/contaminants/nitratefactsht>; see also Sara Porter, Tap Water for 500,000 Minnesotans Contaminated With Elevated Levels of Nitrate, Env’t Workin Grp. (Jan. 14, 2020), <https://www.ewg.org/interactive-maps/2020-nitrate-in-minnesota-drinking-water-from-groundwater-sources/>.

¹¹ *Nitrogen in Dodge County Ground and Surface Waters*, Dodge Cnty. Env’t Servs.

¹² Mark Zdechlik, *Trouble in the Water: Can Minnesota Stop Polluting its Lakes, Rivers?*, MPRNews (May 16, 2016), <https://www.mprnews.org/story/2016/05/16/water-can-minnesota-stop-polluting-lakes-rivers>.

second in the nation in pig production, I believe that CAFOs are in large part responsible for this statewide problem.

12. Not only do area CAFOs create serious water contamination problems, but they also degrade the air quality and produce a horrifying odor. In November 2017, my father was combining his last several acres of corn. Despite keeping the cabin of his combine closed, odors caused by manure application from a nearby CAFO penetrated the cabin interior. Forced to stop the combine, my father stepped out onto the platform and vomited. He immediately experienced symptoms commonly associated with hydrogen sulfide poisoning, including headache, dizziness, and nausea.¹³ He suffered from these symptoms for weeks thereafter.

13. My father and brothers, Brad and Jim, have experienced other physical reactions to emissions from CAFOs near our farm. Following construction of several neighboring CAFOs, my father suffered frequent headaches, felt a burning sensation in his eyes and nose, and often got sick to his stomach if he stayed outside for extended periods. My brother Brad has repeatedly suffered nosebleeds while cutting weeds, picking rock, mowing the lawn, or performing other outdoor tasks on our farm.

14. At my father's funeral visitation in October 2019, my brother Brad walked from his car to the funeral home, choking from the stench of manure that had been applied to the land just steps from the funeral home. Brad immediately got a bloody nose—undoubtedly from the air pollution released during manure application. Manure spreading interfered not only with the funeral visitation, but also with the graveside service the following day. As we gathered

¹³ See Erica Rogers, The Dangers of Manure Gas and Strategies for Mitigation, Mich. State Univ. Farm Mgmt. (Sept. 18, 2018), <https://www.canr.msu.edu/news/the-dangers-of-manure-gas-and-strategies-for-mitigation>.

graveside at the nearby rural cemetery, several family members retreated to their vehicles, unable to bear the stench and fumes.

15. CAFOs have completely changed life in Dodge County and throughout southern Minnesota. While our farm traditionally served as a gathering place for multiple generations, children, grandchildren, and great-grandchildren have not been able to gather at our farm for years. The risk that a family gathering will be ruined by the overwhelming stench from area CAFOs is just too great.

16. With a front row seat, my family has witnessed the destructive power of the agriculture industry. While fighting back against CAFOs, my family has faced repeated harassment and intimidation: bullet holes shot in the stop sign near our farm, constant garbage dumped in our roadside ditches and driveway, a large piece of metal hidden in the tall grass that damaged our mower, pure Roundup sprayed on the corn field that caused thousands of dollars of damage, harassing late-night phone calls to my elderly father—all signs of the power imbalance tearing at the fabric of our community. Other farm families who have opposed CAFOs have experienced similar harassment and intimidation. In the face of these tactics, we continue to speak up because we are fighting for our homes and our families.

17. While the industry tries to silence our voices, local government officials—many of whom have industry ties—do not want to hear what we have to say. In 2014, the Dodge County Planning Commission recommended construction of a CAFO a half-mile from our farm. At a public hearing on the issue, I was given just three minutes to voice my concerns, and the Planning Commission quickly shut down public comments, even though it had set aside several hours for community discussion. Several of my family members—including my mother, who suffers from advanced Parkinson's disease and struggles to speak—had requested that I speak on

their behalf, but when I requested additional time to address our family's concerns, counsel for Dodge County stated that I was disrupting the meeting and threatened to call the Sheriff's Office. The entire approval process, in my opinion, was nothing more than a rubber stamp.

18. Our concerns also do not receive the attention of state regulators. I have personally filed several complaints with the MPCA regional office in Rochester, Minnesota. I initially contacted the MPCA office in November 2017, as I was concerned about the overapplication of manure on frozen ground near our farm. I also reported that my father had likely suffered from hydrogen sulfide poisoning. I filed an online complaint and subsequently followed up with a phone call to MPCA staff. Despite my repeated outreach, the MPCA took no action to investigate my complaint. Through a records request filed in accordance with the Minnesota Data Practices Act, I obtained copies of notes on file with the MPCA and discovered that the MPCA staff member who I spoke to had left for vacation following our phone call. When he returned from vacation several days later, he concluded that investigation of my complaint was no longer necessary because any harmful emissions had likely already dissipated.

19. Recently, I received an alarming call from a resident of my hometown, Blooming Prairie, Minnesota. Area CAFO operators had spread manure onto the same small parcel of land—within feet of a local water treatment facility—for several days in a row. A horrifying stench cloaked the town for several days afterwards. I immediately filed a complaint with the MPCA using the Agency's online portal. A few days later, a MPCA staff member contacted me, but instead of listening to my concerns, he hung up on me.

20. Our community needs transparency to adequately address CAFO pollution. The industry fights all attempts at transparency, and people like us who have seen their hometowns invaded by industrial polluters are continually left in the dark. When our local citizens group

sought to audit manure management plans on file with Dodge County, we discovered only 37 plans, even though, by our estimate, at least 100 local operators should have filed manure management plans given their size. As a result of self-reporting and lack of oversight, no one in our community knows where or how much manure is applied to the land. This lack of information makes it very difficult for our community to understand—let alone fight back against—pollution near our homes.

21. All CAFOs should be required to obtain a Clean Water Act (“CWA”) permit, and community members should be able to access CAFO manure management plans. We need to make sure that CAFOs adhere to more rigorous environmental and reporting requirements. People in my community need to know where and how much manure is being applied to the land. We also need to know that if we see CAFOs polluting the water, we can take action to enforce the CWA. Without these protections, it’s much harder to keep our community safe.

22. The lack of oversight by the Environmental Protection Agency (“EPA”) is compounding the problems in rural America. We rely on the EPA to protect our air and water from CAFO pollution. Despite repeated cries for help, the EPA has not taken any action. If the regulators will not act, where are we supposed to turn for help?

I declare under penalty of perjury that, to the best of my knowledge, the foregoing is true and correct. Executed this 1st day of February, 2022.


Sonja Trom Eayrs

Exhibit 3

DECLARATION OF DAVID CARTER

I, DAVID CARTER, declare and state as follows:

1. I am 44 years old, and I live with my wife and three kids at [REDACTED] Jefferson County, Iowa. My wife and I have lived here for 15 years, and we have raised our kids here. Our home is on 24 acres of land. We have a small tree farm and a few animals, including sheep, a llama, some chickens, and a duck. The area around our property is relatively rural. We live about five miles from the nearest town, which has a population of roughly 9,600 people.

2. The land where I live now was passed down from my grandparents to my parents and then to my wife and me; we hope to pass it on to our children when the time comes. We love the culture and the people here, and we really enjoy being outside. We are surrounded by family, and many of our neighbors have lived in the area for generations. It's quiet and spacious, and living here, we can truly enjoy the great seasons that we have in the Midwest.

3. Over the past decade or two, our area has seen an explosion in the number of concentrated animal feeding operations ("CAFOs").¹ There are now 66 CAFOs in Jefferson County, including 12 CAFOs within five miles of our home. As the map below shows, five of those 12 CAFOs are only three miles away or closer. According to the Iowa Department of Natural Resources ("IA DNR"), the five closest CAFOs confine a total of 16,718 swine.² By a

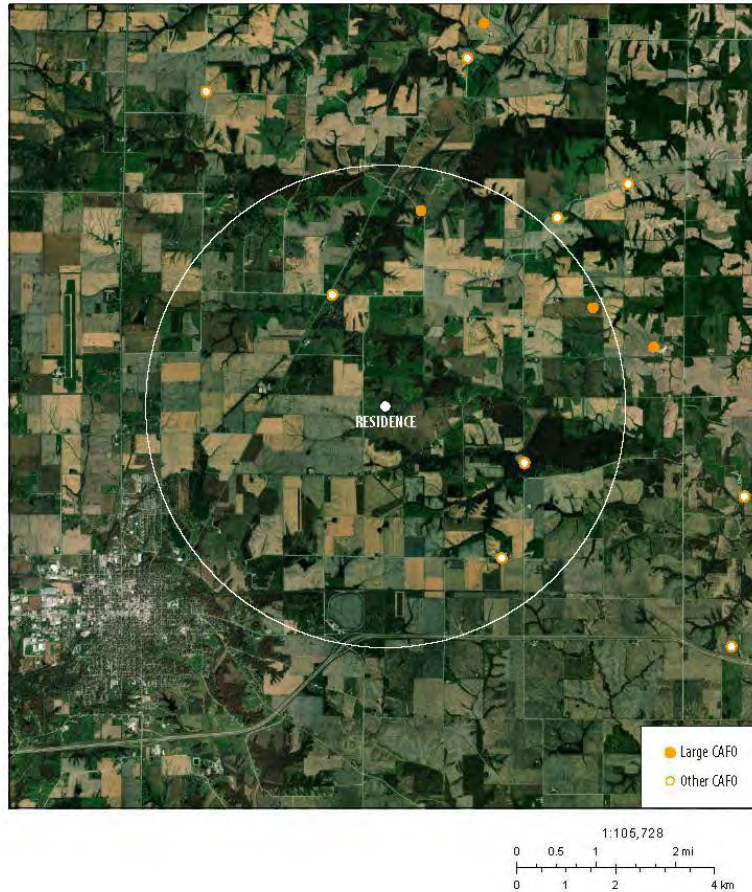
¹ See Jamie Konopacky, *EWG Study and Mapping Show Large CAFOs in Iowa Up Fivefold Since 1990*, Env't Working Grp. (Jan. 21, 2020), <https://www.ewg.org/interactive-maps/2020-iowa-cafos/#methodology> (reporting that the number of Large CAFOs in Iowa increased more than fivefold from 1990 to 2019, from 789 Large CAFOs in 1990 to 3,963 Large CAFOs in 2019).

² See Iowa Dep't of Nat. Res., *Animal Feeding Operations Databases*, <https://programs.iowadnr.gov/animalfeedingoperations/>.

conservative estimate, these swine produce 45.2 million pounds of manure every year.³ That is 84 percent more manure than the amount of sanitary waste produced annually by the entire human population of Jefferson County, all within a three-mile radius of our home.⁴ Based on information made available by IA DNR, I do not believe that any of the 12 CAFOs within five miles of our home have federal permits authorizing them to discharge water pollution.

³ According to IA DNR, the average weight of the swine confined at these five CAFOs is 130-150 pounds. At least one study has determined that 150-pound swine produce 7.4 pounds of manure per day—that is, 2,701 pounds per year. See Lorimor et al., *Manure Characteristics - Manure Management Systems Series* (2004), https://www.canr.msu.edu/uploads/files/ManureCharacteristicsMWPS-18_1.pdf. According to this estimate, 16,718 150-pound swine produce 45.2 million pounds of manure each year. Other studies yield less-conservative estimates, including one study finding that 135-pound swine produce 4,139 pounds of manure each year. See John P. Chastain et al., *Swine Manure Production and Nutrient Content* (2003), https://www.clemson.edu/extension/camm/manuals/swine/sch3a_03.pdf. This less conservative estimate suggests that 16,718 135-pound swine produce 69.2 million pounds of manure annually.

⁴ Based on the 2020 U.S. Census, 18,153 people live in Jefferson County. The U.S. Government Accountability Office estimates that humans produce 3.72 pounds of sanitary waste per person per day. See U.S. Gov't Accountability Off., *Concentrated Animal Feeding Operations: EPA Needs More Information and a Clearly Defined Strategy to Protect Air and Water Quality from Pollutants of Concern*, GAO-08-944 at 58 (Sept. 2008), <https://www.gao.gov/assets/gao-08-944.pdf>. Thus, the human population in Jefferson County produces 24.6 million pounds of sanitary waste per year.



Source: Iowa Department of Natural Resources, Animal Feeding Operations Databases, <https://programs.iowadnr.gov/animalfeedingoperations/>; Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community.

4. My wife and I worry that, any day, a CAFO could be built even closer to us. If a CAFO were built very close to our house, we would move. Even though we love our community and feel tied to this land, the odor and other pollution would be too much to endure. Already, CAFOs inject and spray manure on the farmland surrounding our property, including fields just a few hundred feet from our house. The manure spreading has been going on most of the time we have lived here, and it has increased over the years.

5. I am concerned that the disposal of manure from nearby CAFOs has degraded water quality near my home. I know that farm runoff is a huge source of water pollution, and

Iowa now has some of the worst water quality in the country.⁵ In fact, I've experienced Iowa's declining water quality firsthand. My aunt and uncle live just north of us, and they have a large pond that is fed by runoff from cropland to the west. Fifteen years ago, my family and I would go over to the pond and swim; it was a nice place to cool down and have fun. These days, however, we will not go anywhere near that pond because the water quality has degraded. I am not an expert, but I believe the degradation at least partly results from the overapplication of CAFO manure to nearby cropland.

6. I blame CAFOs for declining water quality, in part, because I have seen nearby CAFOs engaging in risky manure disposal practices. For example, I understand that it is not advisable to spread manure on fields when the ground is frozen, because doing so poses a high risk of water pollution. But I have noticed that a lot of the manure spraying and injecting near my home occurs in the late fall, including in November, when the ground often freezes. As a result, I believe that the CAFOs near me are applying manure to frozen ground.

7. Not only am I concerned that CAFOs degrade water quality, but I am also concerned about air pollution from CAFOs. This is an agricultural area, and like most people who live here, I am used to the natural smells that come from being around animals. But the smell of CAFO manure is different. It is not a natural, organic smell, like the smell of waste from animals on our farm. Instead, it is a very sharp and pungent industrial-type odor. It smells toxic. It permeates everywhere, and it sticks around. Sometimes, when I drive through nearby

⁵ See Env't Integrity Project, *The Clean Water Act at 50: Promises Half Kept at the Half Century Mark* 7 (2022), <https://environmentalintegrity.org/wp-content/uploads/2022/03/CWA@50-report-EMBARGOED-3.17.22.pdf> (finding that 93 percent of Iowa's river and stream miles are impaired for swimming and recreation—more than all but three other states—and 83 percent of its lake acres are impaired for swimming and recreation—more than all but two other states).

Washington County, where CAFOs are even more densely concentrated than they are in Jefferson County, the smell is unbearable.

8. On days when CAFO manure is applied to fields around my home, I literally cannot be outside because the smell is so disgusting. Instead, I stay inside, and I make sure that all the doors and windows are closed to keep out the smell. If it's a warm day, I turn on the air conditioning to stay cool, and I just try to think about something else. It is incredibly upsetting to me that my family and I have to shut ourselves up inside our home to avoid breathing an unbearably awful and unsafe odor. It prevents us from being outside and enjoying our land, which is one of the main reasons why we love living here.

9. I believe that it would be incredibly valuable for my community if the U.S. Environmental Protection Agency were to improve transparency about CAFO activities, especially the timing and location of manure disposal. Right now, CAFOs are very polarizing, and I do not think that the secrecy about CAFO activities fosters good communication between neighbors. If I had more information about the manure-disposal practices used by CAFO operators near me, I would be in a better position to consider whether there are any solutions or agreements we could reach that would help CAFOs and the community co-exist. For instance, we could explore whether it's possible to limit the window of time each year when CAFOs are allowed to spread manure, so people know what to expect. It might also be possible to agree to adjust application practices to reduce odors and minimize the risk of water pollution.

10. Increasing access to information about CAFO activities also could help community members determine whether particular CAFOs are violating the law. In general, I do not think it is a good idea for community members to bear primary responsibility for watching and policing CAFOs. Neighbors reporting on neighbors results in a lack of trust. Federal and

state agencies should be in charge of overseeing industry and protecting the water, but right now, those agencies simply are not doing their jobs.

11. Typically, I think the less bureaucracy there is, the better. However, CAFOs are having a real, harmful effect on people that needs to be taken seriously, existing laws are incredibly biased in favor of industrial agriculture, and there's not enough enforcement. We need the government to do better. At the same time, increasing transparency and giving more information to the community would be helpful because there are no other weapons left for us to use to defend our families.

I declare under penalty of perjury that, to the best of my knowledge, the foregoing is true and correct. Executed this 25th day of October, 2022.

A handwritten signature in black ink, appearing to read "David Carter", written over a horizontal line.

David Carter

Exhibit 4

DECLARATION OF KATHY TYLER

I, KATHY TYLER, declare and state as follows:

1. I am 69 years old, and I live with my husband at [REDACTED] Grant County, South Dakota. We have lived here since 1974. Our home is on nine acres of land, and we also own about 640 additional acres in Grant and Marshall counties. We have gardens, horses, and pastureland. We live about nine miles from the nearest town, which has a population of about 3,100 people, so our area is very rural. Living in a rural environment is very important to me and my husband. We both grew up on farms, and we wanted our family to experience the same way of life.

2. When we first moved to the land where we live now, there were a lot of small dairies in the area, but you don't see small dairies anymore. Now, there are six huge concentrated animal feeding operations ("CAFOs") in Grant County. I'm not sure whether the CAFOs are operating under South Dakota's state permit or under its Clean Water Act National Pollutant Discharge Elimination System ("CWA NPDES") permit. Three of the CAFOs have at least 5,000 dairy cows, and two more have over 10,000 dairy cows. There is also a hog CAFO with 6,500 pigs, and it's just a half-mile from our home. When I look out my window, I can see the roofs of its three huge confinement barns.

3. The pig CAFO next to our home stores the animals' urine and feces in concrete pits below the confinement barns. These pits hold millions of gallons of the waste. To get rid of the waste, manure hauling contractors use huge machinery to inject it into fields near the facility via a system of pumps and hoses. One of the fields is only about 300 feet from our home.

4. I am concerned that the CAFO's current methods for manure disposal will contaminate nearby waterbodies. When the workers are applying the waste, they're supposed to

turn off the equipment each time they turn around at the end of a field, but I've seen them leave the equipment on while turning, which causes huge pools of manure to form at the end of the fields. The manure just sits there and is slowly absorbed by the soil, or it drains off the field. In addition, the fields where the waste is applied have drain tiles, which are underground pipes with holes in them that take excess water out of the soil. Many of the fields are near creeks, and research has shown that manure applied inappropriately will work its way into the tiles and then go into local waterways.¹ Although South Dakota's state permit includes some guidelines for the application of manure, I don't think the guidelines are sufficient to prevent water pollution, based on what I've seen on the fields near my home.

5. CAFO waste has contaminated drinking wells in other parts of South Dakota. Here, our well is deep, so it may not become contaminated with CAFO waste during my lifetime, but I think there will come a time when our water is no longer safe to drink.

6. In addition to threatening water, the CAFO also produces a horrendous smell. The urine and feces in the waste pits below the confinement barns produce fumes that can kill the pigs. The CAFO uses fans and an HVAC system to push clean air into the confinement barns and to remove the toxic air. That means we breathe the garbage air that the pigs wouldn't be able to live with. If this air can kill the pigs, how is it affecting our health? When my husband is outside and the smell is present, it gives him a headache, and he has to go inside. There are no air quality regulations for CAFOs. We breathe the same air that kills the pigs.

7. The smell from the pig CAFO has disrupted our lives. The odor is so bad that I can't enjoy horseback riding and my husband can't enjoy going for walks. The smell has also

¹ See Heather E. Gall et al., *Hormone Discharges from a Midwest Tile-Drained Agroecosystem Receiving Animal Wastes*, 45 *Env't Sci. & Tech.* 8755 (2011).

affected my daily mood because I can't guarantee myself a free day outside. You never know when the smell is going to hit you. We moved to this rural area to enjoy the fresh air and be able to go outside anytime we want, but we can't do these things anymore.

8. What bothers me most about the CAFOs is that they don't support small communities. They have destroyed the small farms; their employee turnover is tremendous; they bring in their own management staff; and they have very little to do with local, small businesses. But worst of all, they pit the big boys against the little guys—breaking up communities. Instead of supporting the community, the CAFOs, their pollution, and their business plans drive people away from it. Our children have moved away from Big Stone City, and they won't be back. Our neighborhood CAFO and what it took away from us is a factor. CAFOs stink—in more ways than one.

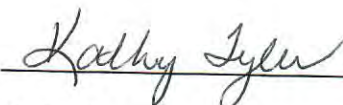
9. There is little oversight of CAFOs in South Dakota. A major spill needs to be reported, but there are little or no inspections or monitoring to detect spills. But, we have almost no rules, so I guess why inspect? The Environmental Protection Agency (“EPA”) and state agencies need to do more to identify and regulate the CAFOs that are polluting our water and air. There should be inspections for the manure pits because, eventually, they are going to crack and break. There should also be soil and water monitoring around the pits, so that we can be sure they're not already leaking pollution.

10. It is also important to me to be able to see the CAFOs' nutrient management plans. I know that CAFO operators are supposed to apply manure to fields on a rotational basis, but without seeing the nutrient management plans, I don't know which fields they're supposed to be using each year. I've looked at the state's online record of complaints against CAFOs, and I've seen complaints that they applied manure on the same field two years in a row or that they

applied too much manure on a field. Without seeing the nutrient management plans, I can't make sure that those things aren't happening on the fields near our home and our drinking well.

11. For CAFOs that operate under South Dakota's state permit, rather than its CWA NPDES permit, it is more difficult to access information on CAFO locations, sizes, and nutrient management plans. The South Dakota Department of Agriculture and Natural Resources ("SD DANR") maintains a database of information on operations that have CWA NPDES permits,² but, to my knowledge, it does not provide similar information on operations that have state permits. To get information on CAFOs operating under state permits, I think I would have to submit a public records request to SD DANR, which is a time-consuming process. EPA should increase transparency around CAFOs by ensuring that CAFOs that cause water pollution have CWA NPDES permits.

I declare under penalty of perjury that, to the best of my knowledge, the foregoing is true and correct. Executed this 8th day of March, 2022.



Kathy Tyler

² See SD DANR, *Search for Surface Water Discharge Permits*, <https://danr.sd.gov/OfficeOfWater/SurfaceWaterQuality/swdpermitting/wwDBSearch.aspx>.

Exhibit 5

Disparities of industrial animal operations in California, Iowa, and North Carolina

Arbor J.L. Quist¹, Jill E. Johnston¹, Mike Dolan Fliss²

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Summary

Background: Concentrated animal feeding operations (CAFOs) densely house thousands of animals in confined areas. CAFOs in the United States commonly store animal manure in open lagoons and apply manure to nearby fields. These processes can pollute the water and air with pathogens and chemicals that impair the quality of life and physical health of neighboring communities. Iowa (IA) and North Carolina (NC) are two of the leading swine producers in the United States, while California (CA) is the nation's leading milk producer.

Methods: We obtained information on the location and size of swine CAFOs in IA and NC and of dairy CAFOs in CA's Central Valley. We calculated the number of animal units (AUs, a measure of the estimated weight of all the animals) in each CAFO and used the EPA definition to categorize Large CAFOs. We focused on Large CAFOs because they produce an exceptionally large amount of waste and are likely responsible for the majority of air and water pollution from CAFOs. We obtained 2019 block group demographic data and apportioned the race and ethnicity data to the 2010 census blocks. We calculated the number of Large CAFOs and total CAFOs within 3 miles of the block centroids. We compared the proportions of people of color (POC), Black, Hispanic, and American Indian residents living within 3 miles of a CAFO to the proportion of non-Hispanic White residents for the study area of each state. We used Poisson and linear regression to assess the relationship between race/ethnicity and the presence of one or more Large CAFO or the AUs of CAFOs. We also examined the proportion of people living within 3 miles of a Large CAFO by income, rurality (measured as isolation to resources), and social vulnerability.

Results: The proportion of POC, Hispanic, and American Indian residents living within 3 miles of a Large Dairy CAFO in the CA study area is 1.29, 1.54, and 1.15, times higher, respectively, than the percent of non-Hispanic Whites. In the NC study area, percent of POC, Black, Hispanic, and American Indian residents living within 3 miles of a Large CAFO is 1.42, 1.42, 1.57, and 2.20 times higher, respectively, than the percent of non-Hispanic Whites. In NC and CA, blocks with >40% POC had 738-1657 more animal units when adjusting for rurality than areas with <20% POC. In IA, White non-Hispanics are more likely to live near a Large Swine CAFO than POC. Increased census tract poverty was associated with greater exposure to Large CAFOs: the proportion of residents in Census tracts with $\geq 35\%$ of households below the 200% poverty level who live within 3 miles of a Large CAFO is about 2.5 times higher in CA and 15 times higher in NC compared to Census tracts with <20% of households below the 200% poverty level. Of people in Census tracts with the least access to resources, 81%, 27%, and 25% live <3 miles of a CAFO in IA, CA, and NC respectively. Increased tract-level social vulnerability was associated with greater resident exposure to Large CAFOs in NC and CA.

Conclusions: Swine CAFOs in NC and dairy CAFOs in CA are disproportionately located in low-income communities and near POC. Swine CAFOs in IA tend to be located in rural areas that lack access to resources. This environmental injustice harms the neighboring communities as water and air pollution associated with CAFOs are linked to adverse health effects.

Background

Animal production has intensified greatly across the United States since the 1980s.^{1,2} While the number of swine and cattle has increased, the number of farms has decreased.³ The majority of livestock in the United States is now housed in large, concentrated animal feeding operations (CAFOs), which each hold thousands of animals.³ These industrial animal operations produce enormous volumes of waste, which is often stored in uncovered manure lagoons and sprayed onto nearby land as fertilizer.⁴ Because the land cannot absorb the massive amounts of manure, pathogens and chemicals from the waste often pollute the air and water, which can harm the environment and the health of nearby residents.^{4,5}

Iowa (IA) is the United States' top swine-producing state, with approximately 23 million hogs housed in CAFOs located throughout the entire state.^{6,7} Swine CAFOs are heavily concentrated in eastern North Carolina (NC), the second leading U.S. swine producer with approximately 8.5 million hogs.^{8,9} Many studies have concluded that living near swine CAFOs is associated with worse physical and mental health.¹⁰ One NC study found that residents in ZIP codes with a high density of hogs within 2-5 km had higher all-cause mortality, infant mortality, mortality from anemia, kidney disease, tuberculosis, and septicemia, compared to ZIP codes without hog CAFOs.¹¹ Residents living within two miles of a swine CAFO in NC have reported higher incidence of headaches, runny nose, sore throat, coughing, diarrhea, and burning eyes compared to residents who do not live near intensive livestock operations.¹²

California has been the nation's leading milk producer for almost 30 years.¹³ Approximately 1.8 million dairy cows are housed in California, with most of them located in the San Joaquin Valley.¹³ Much of this region is flat with shallow water tables that are susceptible to groundwater contamination.¹⁴ In recent years, many small drinking water systems in the San Joaquin Valley Watershed have not met US EPA safe drinking water standards.¹⁵ Dairy CAFOs can contaminate water and air and can also negatively affect the health of nearby residents. A study of dairy CAFOs in the Yakima Valley, Washington State measured elevated airborne particulate matter and ammonia up to 3 miles from dairy operations.¹⁶ Particulate matter exposure has been linked to many health conditions, including asthma, chronic obstructive pulmonary disease, and stroke.¹⁷ Ammonia exposure can cause burning of the eyes, nose, and throat, and long-term exposure may have lasting effects on the respiratory system.¹⁸ Residents living near cattle, poultry, and swine CAFOs have reported increased incidence of respiratory, gastrointestinal, neurological, and stress-related symptoms.¹⁹ High intensity farming has also been associated with increased acute gastrointestinal illness hospitalizations, especially among children under age 5.²⁰

Due to the large amount of manure produced by CAFOs and the current lagoon and spray field system, surface and groundwater near CAFOs are often contaminated. Groundwater near swine CAFOs with lagoons has been found to have higher *Escherichia coli* levels than reference sites, including antibiotic-resistant *E. coli* strains.²¹ The overuse of antibiotics causes more antibiotic resistant bacteria to evolve, resulting in harder-to-treat infections and increased mortality.²² Most CAFOs give antibiotics to their animals to prevent microbial infection and promote growth; however, antibiotics can be released into surface and groundwater, exposing nearby humans.^{14,23} Antibiotics have been found in shallow groundwater downstream from dairy lagoons.¹⁴ Other pathogens linked to CAFOs include *Salmonella*, *Campylobacter*, *Yersinia enterocolitica*, *Cryptosporidium*, and *Giardia*; many of these pathogens can survive in water for several weeks and can cause acute gastrointestinal illness in exposed humans.²⁴ Researchers have found high fecal indicator bacteria concentrations near swine CAFOs.²⁵ Swine-specific microbial source-tracking markers were found to be 2.3-2.5 times more prevalent in proximal downstream surface water compared to proximal surface water upstream from swine CAFOs, and these

microbial source tracking markers were detected more frequently during the 48 hours after heavy rain.²⁵ Nutrients and pathogens from animal manure can be transported via groundwater or through soil during wet conditions.²³ A study of runoff after land application of cattle and swine manure and after simulated heavy rainfall events found *E.coli* and enterococci concentrations to be significantly higher than in runoff from control plots with no manure.²⁶

During heavy precipitation events, lagoons can flood or breach, transporting manure that may contain illness-causing pathogens. NC swine CAFOs are most densely located in areas of eastern NC that commonly flood during hurricanes, a reoccurring issue as NC is the third most hurricane-prone state.²⁷ Black residents were more likely than White residents to live in areas with flooded CAFOs in NC, according to satellite estimates after Hurricane Floyd (1999).²⁸ Breached swine manure lagoons in NC after Hurricane Fran (1996) contributed to anoxia and hypoxia in the Cape Fear watershed much more than human sewage, likely because swine waste is more concentrated than human sewage.²⁹ Although heavy rain events may contribute more to the transport of pathogens from CAFOs in NC than CA and IA, as NC has a higher average annual rainfall (50 inches) than IA (32 in) or CA (22 in),³⁰ climate change has been increasing the frequency and intensity of heavy precipitation events across various areas of the United States.³¹

NC, IA, and CA have different climates, histories, and demographics, but these three states contain thousands of CAFOs that are impacting the environment and neighbors' health. In this report, we examine the disproportionate siting of CAFOs in communities of color, low-income communities, rural communities isolated from resources, and communities with additional environmental and social vulnerabilities across these three states.

Methods

For these analyses, we abstracted NC swine CAFO permit data (2019) from NC Department of Environmental Quality,³² IA swine CAFO data from Iowa Department of Natural Resources,³³ and CA dairy CAFO data from the California Integrated Water Quality System in 2021.³⁴ We identified Large CAFOs using the United States Environmental Protection Agency's (EPA) definition (dairy CAFOs with ≥ 700 dairy cows, swine CAFOs with ≥ 2500 animals that weigh ≥ 55 lbs or CAFOs with $\geq 10,000$ animals that weigh < 55 lbs, and CAFOs with > 1000 animal units; as established in EPA 40 CFR 122.23(b)(4)).³⁵ We focused on Large CAFOs because they produce an exceptionally large amount of waste and are likely responsible for the majority of air and water pollution from CAFOs. We calculated the number of animal units (AUs) for each CAFO, to be able to compare dairy and swine CAFOs. One animal unit is equal to approximately 1000 pounds of animal weight, which is approximately the weight of a typical steer.³⁶ AUs were calculated for hogs based on the average weight of the life stage of permitted swine. (Growing feeder to finish pigs weigh 50-220 lbs—on average 135 lbs or 0.135 AU; boar studs weigh 250-550 lbs—on average 400 lbs or 0.4 AU).^{36,37}

We obtained 2019 block group demographic data (total population and number of residents by race and ethnicity) for CA, IA, and NC from the American Community Survey (ACS) and apportioned this data to the block level (using the block-block group proportions from the 2010 census). Blocks with centroids within 3 miles of a CAFO were considered exposed and blocks with centroids > 3 miles from a CAFO were considered unexposed. We chose this 3 mile threshold as CAFO exposures can travel several miles and as living within 0.5, 2, and 3 miles from a CAFO has been associated with various health outcomes.^{11,16,19,38,39} As many people indicate more than one racial/ethnic category, we used estimates of all people identifying with a race, regardless of the other categories they indicated. For example, the

Black race category in our analysis includes residents who only identified as Black as well as those who also indicated another race or ethnic group. We defined people of color as all people who identify as Hispanic and/or who identify with one or more non-White race.

As CAFOs are seldom located in urban areas, and as urban areas have different demographic patterns and environmental exposures, we excluded urban areas from analysis. In NC, we excluded cities with populations >250,000 for NC (top five populous NC cities). Since all IA cities have a population <250,000, we excluded the top 3 IA cities (population >100,000 people). As dairy CAFOs in CA were located in more urban areas than swine CAFOs in IA and NC, we excluded the most urban CA Census tracts (geographic isolation scale <3.9; threshold determined as the least isolated tract with a dairy CAFO). We sought to create a contiguous study area where CAFOs may be located in each state. In NC, we excluded counties if they do not contain swine CAFOs and they do not neighbor counties with swine CAFOs; this removed western NC from analysis. Since CA counties are very large, we only included CA counties with dairy CAFOs. All IA counties contain swine CAFOs, thus no counties were excluded from the IA analyses.

We examined the percent of population living within 3 miles of a CAFO by percent of POC. We conducted weighted Poisson regression to examine the relationships between race/ethnicity and the presence of at least one Large CAFO within 3 miles of the center of a block (weighted by census block population), with White non-Hispanic as the reference. We conducted weighted linear regression to assess the relationship between the block-level percent of POC and the number of animal units within 3 miles of a block centroid. Although we excluded the most urban areas that do not contain CAFOs, rurality still varied substantially in the study area. In adjusted models, we controlled for rurality using the cubic natural log of the population density, with the median (i.e., the median after exclusion of urban areas) subtracted to standardize the values.⁸

In additional analyses, we obtained 2019 block group median income from American Community Survey for each state and drew a 3-mile buffer around each block group centroid. We counted the number of CAFOs located in each 3-mile buffer from the centroid and the number of CAFOs located within each block group and used the largest count for each block group in order to account for differing sizes of block groups. We split block groups into six income groups and examined the percent of the population living within 3 miles from a CAFO among each income group. We conducted similar analyses for the percent of each Census tract living below the 200% federal poverty level. We similarly attributed Census tracts as exposed to CAFOs if they contained CAFOs or if CAFOs were located within 3 miles of the Census tract centroid. We also used a geographic isolation scale (a continuous measure split into quartiles based on nationwide data) that classifies Census tracts according to their access to resources, such as food, healthcare, and internet, as a measure of rurality.⁴¹ We assessed the percent of the population living in tracts within 3 miles of a CAFO among each rurality group.

We also used the CDC/ATSDR Social Vulnerability Index (SVI) and the EPA's EJScreen: Environmental Justice Screening and Mapping Tool to examine the other social and environmental exposures and vulnerabilities residents living near Large CAFOs face.^{42,43} The SVI assesses Census tract vulnerability in terms of socioeconomic status, household composition and disability, minority status and language, and housing type and transportation. EJScreen estimates environmental exposures for Census block groups for diesel particulate matter level in air, air toxics cancer risk, indicator for major direct dischargers to water, and other environmental exposures. EJScreen does not currently incorporate CAFO data into its environmental justice calculation tools, though CAFO waste can and does discharge into waterways. For both the SVI and EJScreen, we split the continuous indices into quartiles (separate quartiles for each state) and examined the percent of the population living within 3 miles from a Large CAFO.

These descriptive analyses use publicly available data to examine the environmental injustices associated with CAFOs. Because the US EPA examines statistical significance, we have included p-values and confidence intervals; however, we join many other scientists in urging against relying purely on statistical significance and p-value thresholds to interpret results.⁴⁴⁻⁴⁶ The confidence intervals (CIs) we report indicate the precision of the associations; typically, results are considered to be statistically significant if the 95% CIs do not include the null value (1 for ratio and 0 for differences). The p-values reported indicate the statistical difference between each ratio by race/ethnicity and the proportion of White non-Hispanic residents living with 3 miles of a CAFO.

In order to place these CAFO disparities analyses in context, we also describe the rurality, income, and racial demographics of California, Iowa, and North Carolina.

Results

California, North Carolina, and Iowa have different demographics, but all three states are home to thousands of CAFOs, affecting their populations in different ways. Statewide, a much larger proportion of California's population are people of color, while Iowa's residents are predominantly White non-Hispanic (Figure 1). California has a larger proportion of high-income households than Iowa and North Carolina. California has many more urban block groups than Iowa or North Carolina, and Iowa contains a larger proportion of block groups that are very rural and very isolated from resources. In general, swine CAFOs in Iowa are located in very isolated areas and dairy CAFOs are located in less isolated areas in California (Figure 2).

In general, blocks with a higher percent of people of color (POC) have a larger percent of population living within 3 miles of a CAFO in CA and NC, while the opposite was observed in IA (Figure 3). In the CA study area, the percent of POC, Hispanic, and American Indian residents living within 3 miles of a Large Dairy CAFO is 1.29, 1.54, and 1.15, times higher, respectively, than the percent of non-Hispanic Whites (Table 1; Figure 7). These rates translate into hundreds of thousands more POC living near Large CAFOs than if all residents were equally likely to live near a Large CAFO. For example, if Hispanic people in the CA Central Valley study area were exposed to Large Dairy CAFOs at the same rate as White non-Hispanics in this area, then approximately 227,600 fewer Hispanic residents would be exposed to (i.e., live <3 miles) a Large Dairy CAFO. In the NC study area, percent of POC, Black, Hispanic, and American Indian residents living within 3 miles of a Large Swine CAFO is 1.42, 1.42, 1.57, and 2.20 times higher, respectively, than the percent of non-Hispanic Whites (Table 1, Figure 6). If people of all races and ethnicities were equally exposed to Large Swine CAFOs at the same rate across the NC study area, then approximately 16,000 fewer American Indian residents, 53,000 fewer Black residents, and 29,400 fewer Hispanic residents would live <3 miles of a Large Swine CAFO in NC. In CA and NC, the racial/ethnic disparities are more apparent for the Large CAFOs than the medium CAFOs. Figures 4-6 illustrate each state's study area, location of CAFOs, and the block-level percent of POC.

Blocks with a higher percent of POC in NC and CA have, on average, more animal units within 3 miles than blocks without POC. Thus, some of the largest facilities in NC and CA are in areas with the highest percent of POC. When accounting for rurality, blocks with 60-79% POC have, on average, 1647 more animal units of dairy cattle within a 3-mile radius than blocks with 0-19% POC in CA (Table 2). In IA, when accounting for rurality, blocks with >80% POC have, on average, 1126 fewer animal units of hogs within a 3-mile radius than blocks with no POC. In NC, blocks with 60-79% POC have, on average, 1120 more animal units of swine within a 3-mile radius than blocks with no POC, when adjusting for rurality.

The increase in animal units in blocks with 40-100% POC in CA and NC is substantially higher, with 738-1657 more animal units, than areas with <20% POC.

Exposure to CAFOs differs across geographic isolation, a measure of rurality. In IA, 67% of people in Census tracts with the least access to resources live within 3 miles of a Large Swine CAFO, and 81% of them live within 3 miles of any swine CAFO (Table 3; Figure 8). In NC, a quarter of the population in the most isolated tracts in the study area lived within 3 miles of a swine CAFO. CA dairy cattle CAFOs are located in less rural areas than IA and NC, with 19% of residents in the least isolated, most urban tracts of the CA study area living within 3 miles of dairy CAFO. In CA, 45% of Large Dairy CAFOs are located in very isolated areas, while 99.5% of Large Swine CAFOs in IA and 99.9% of Large Swine CAFOs in NC are located in very isolated Census tracts (Table 4).

CAFOs are disproportionately located near low-income communities in NC and CA. The percent of residents in Census tracts with $\geq 35\%$ of households below the 200% poverty level who live within 3 miles of a Large CAFO is about 2.5 times higher in CA and 15 times higher in NC compared to Census tracts with <20% of households below the 200% poverty level (Table 5; Figure 9). No residents in NC block groups with median incomes $\geq \$90,000$ live within 3 miles of a Large CAFO, but 16% of residents in block groups with median incomes $< \$35,000$ live within 3 miles of a Large Swine CAFO (Table 6). We do not see any strong patterns between poverty level or median income and proximity to swine CAFO in IA.

Socioeconomic status is one part of the social vulnerability index, but disability and lack of transportation can also lead to social vulnerability. In CA and NC, greater social vulnerability was associated with a larger population proportion living within 3 miles of a Large CAFO, especially among the socioeconomic and household composition and disability indices (Figure 10). In IA, the proportion of the population living within 3 miles of a Large Swine CAFO is somewhat lower in areas with high social vulnerability compared to medium low vulnerability.

People who live near Large CAFOs are also often exposed to multiple other environmental exposures. In IA and NC, areas with medium high levels of various exposures, especially diesel particulate matter, major direct dischargers to water (not including CAFOs), traffic proximity and volume, and proximity to treatment storage and disposal facilities have higher proportions of the population living within 3 miles of a Large CAFO compared to areas with low levels of these exposures (Figure 11). Exposure to diesel particulate matter and traffic may be linked to the CAFOs, as trucks frequent CAFOs, carrying animals between CAFOs specialized for growing animals of different sizes and often carrying away waste. In CA, areas with higher levels of ozone and fine particulate matter in air and major direct dischargers to water are also areas with a higher proportion of residents living near a Large Dairy CAFO.

Because CAFOs in IA are so widespread throughout the state and because IA has a relatively racially homogeneous population, we also examined how swine CAFO locations in IA varied across age and education. Areas with higher-than-average percent of the population aged 70 and older have a larger proportion of the population living within 3 miles of a Large Swine CAFO, compared to areas where <8% of the population are aged 70 and older (the lowest quartile; Table 7). Additionally, areas where 5-47% of the population do not have a high school degree have a larger percent of the population living within 3 miles of a Large CAFO compared to areas where <5% of the adult population lacks a high school degree.

Conclusions

In the California study area, dairy CAFOs are disproportionately located near low-income communities and POC, particularly Hispanic and Native American residents. These are areas with other social vulnerabilities, including areas with more residents with disabilities, older residents, and lower socioeconomic status. In Iowa, swine CAFOs are located across the entire state, but especially located in rural areas that are very isolated from resources. As Iowa is predominantly White non-Hispanic with POC located mostly in the cities, a larger proportion of White non-Hispanic residents live near swine CAFOs in Iowa than POC. Swine CAFOs in IA tend to be located near older residents, who may have existing health issues, and near less educated residents. In the North Carolina study area, swine CAFOs are disproportionately located near POC, especially Native American, Hispanic, and Black residents, and in lower-income areas. Residents in these areas also have greater social vulnerabilities, including disabilities.

These results highlight the environmental injustice associated with the locations of CAFOs. This report builds on the existing literature documenting the disproportionate effect swine CAFOs have on Black, Hispanic, and Native American residents, and on low-income communities in North Carolina.^{8,47,48} These same clear environmental justice issues with race and income are not seen in Iowa, as Iowa's history and demographics differ from NC, but very isolated and rural areas of Iowa are disproportionately impacted from CAFOs.⁴⁹ These are the first analyses to our knowledge that describe the disproportionate exposure of CA dairy CAFOs to Hispanic communities.

CAFOs pollute the air, water, and soil, harming the quality of life of nearby residents and producing inequitable health effects. CAFOs are often commonly densely located in vulnerable communities, where residents may have existing health conditions. These vulnerable communities may have reduced levels of political power or representation needed to self-determine and protect the quality of their environments. Decreasing CAFO density (especially in low-income, older, and systematically marginalized communities) and improving waste management systems and flood protection to inhibit manure release into the environment may mitigate some of CAFOs' disproportionate exposures and effects.

Tables and Figures

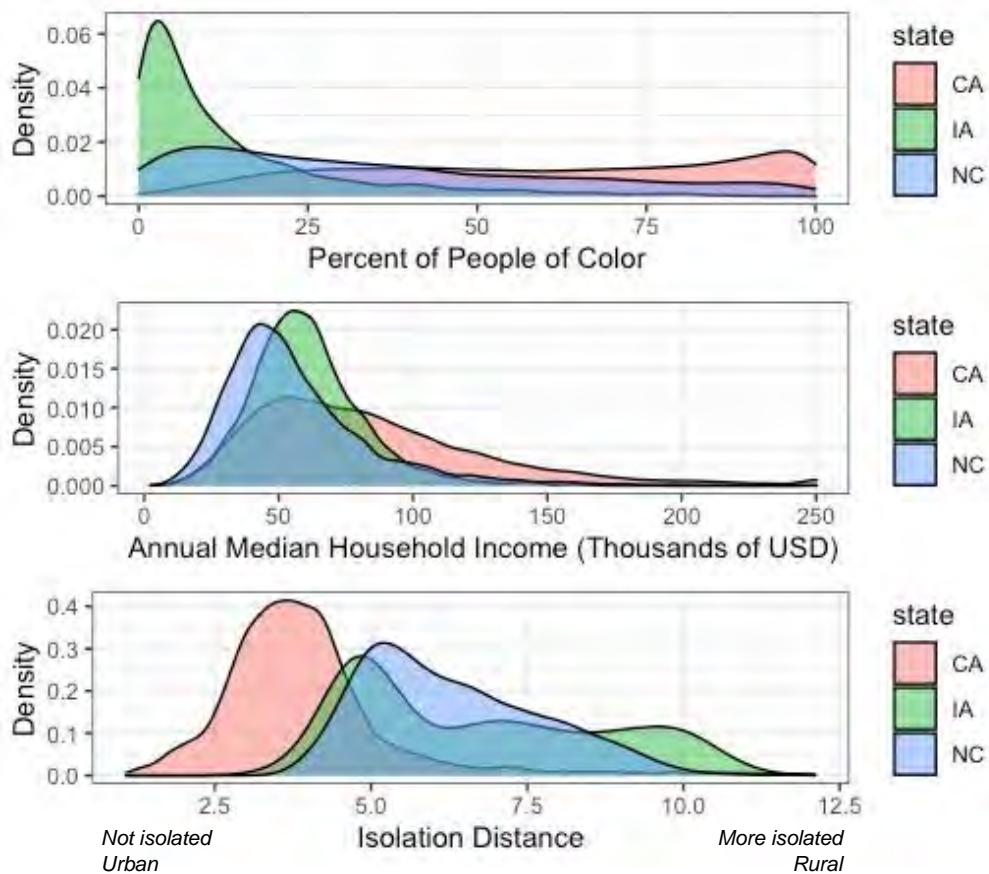


Figure 1. Statewide comparison of percent of people of color, annual median household income, and isolation distance (a measure of rurality; higher isolation distance indicates less access to resources and a more rural area), as shown in density graphs using census block group-level data from 2019 American Community Survey. Statewide, only a small percent of IA’s population are people of color (POC), while CA contains many block groups with a high percent of POC, with NC falling somewhat between CA and IA. NC and IA have similar distributions of annual median household income, while CA contains many block groups with high median incomes. CA contains many more urban block groups than NC or IA, and IA has more very rural block groups than CA or IA.

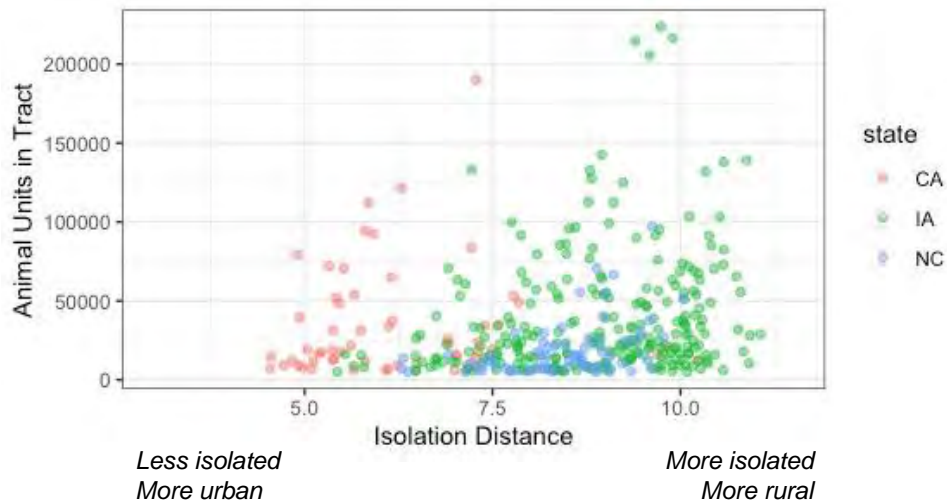


Figure 2. Number of animal units (AUs) of swine in North Carolina and Iowa and dairy cattle in California within Census tracts with over 5000 AUs by geographic isolation distance. Tracts with ≤ 5000 AUs were excluded for visual reasons because of the large numbers of these tracts (CA: 66 tracts, IA: 104, NC: 162 tracts). The continuous geographic isolation scale classifies every Census tract according to its access to resources; a higher isolation distance indicates less access to resources and a more rural area.⁴¹ The tracts with the most dairy cattle in CA are much more urban than those of IA and NC; the tracts with the most swine in IA are much more rural than those of CA and IA.

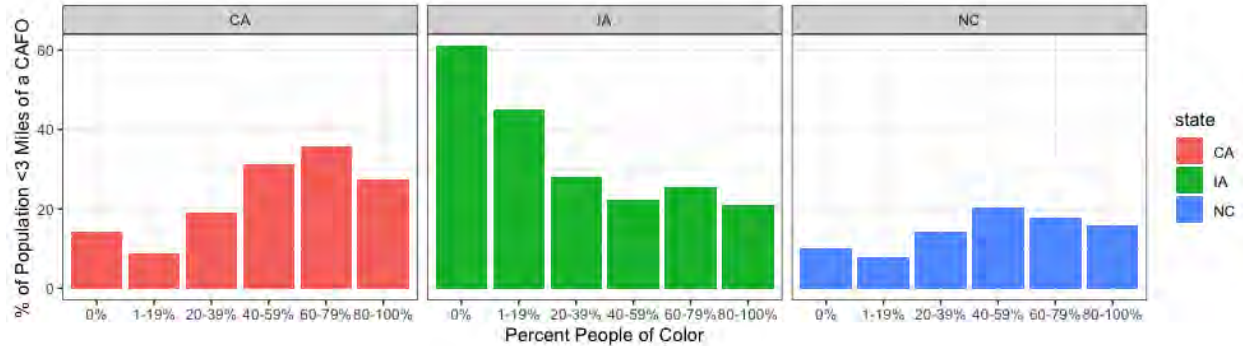


Figure 3. Percent of population living within 3 miles of any permitted dairy CAFO in CA, swine CAFO in IA, or swine CAFO in NC, within study area, by percent of people of color (POC) in census block. Areas with a higher percent of POC in CA and NC tend to have a larger proportion of their population living within 3 miles of a CAFO, while the opposite is true in IA.

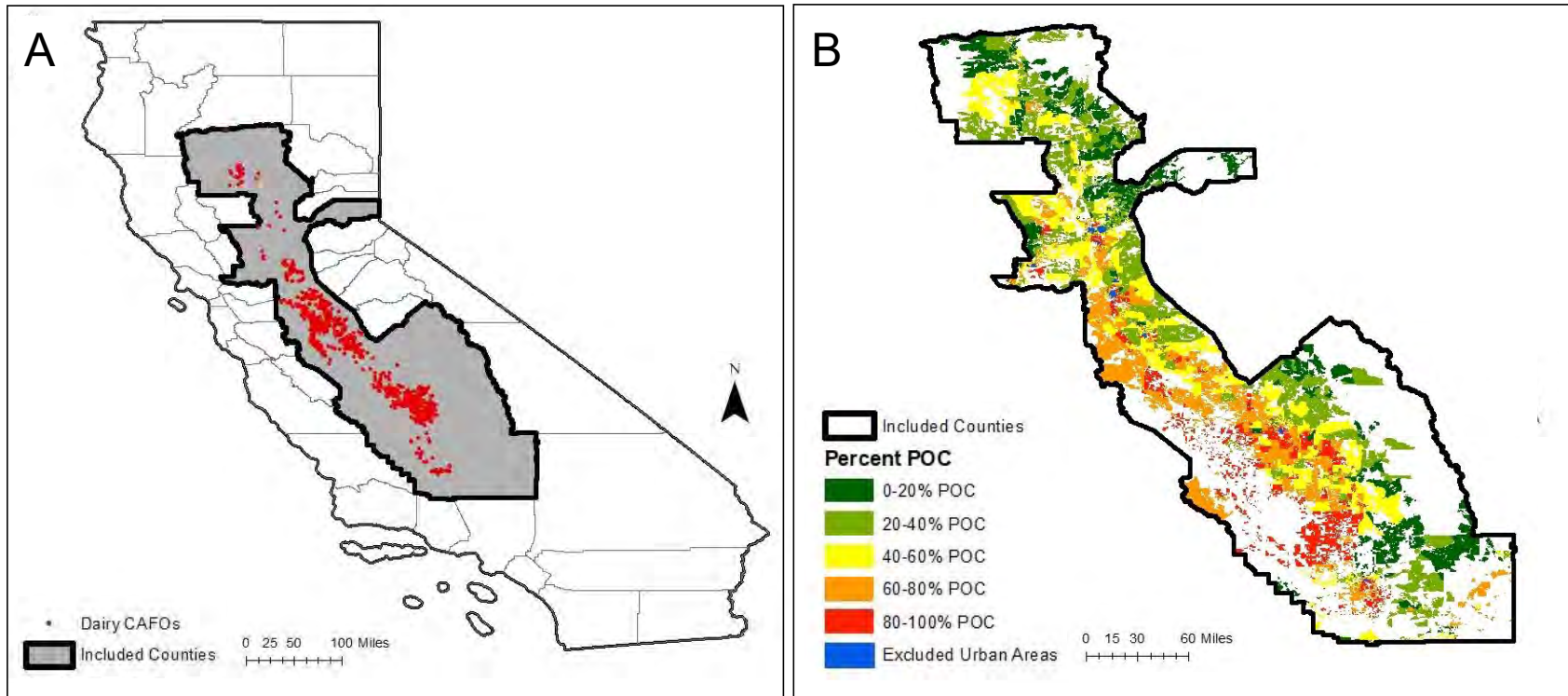


Figure 4. California (A) dairy cattle CAFOs and (B) census blocks categorized by people of color within study area. Urban areas and counties that do not contain CAFOs were excluded from study area and analysis. Dairy cattle CAFOs in CA tend to be located in areas with a higher percent of people of color (POC).

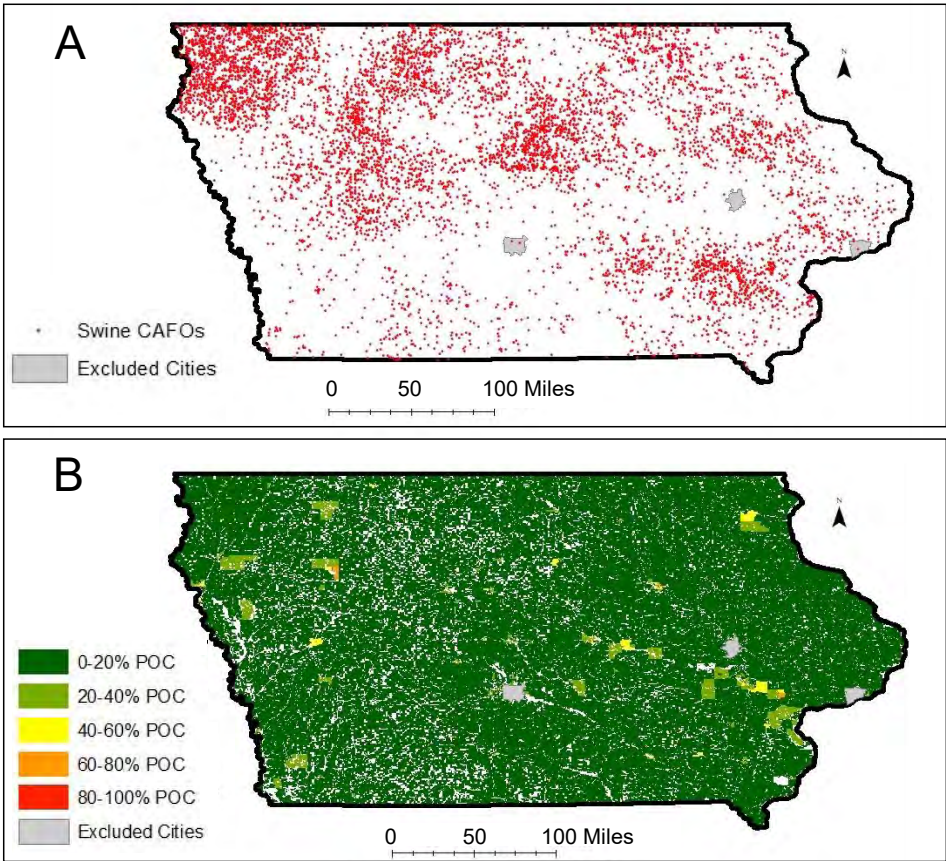


Figure 5. Iowa (A) swine CAFOs and (B) census blocks categorized by people of color (POC). The largest three cities in Iowa (populations >100,000) were excluded from study area and analysis. Swine CAFOs are located throughout IA, and there are very few blocks in IA with >40% POC.

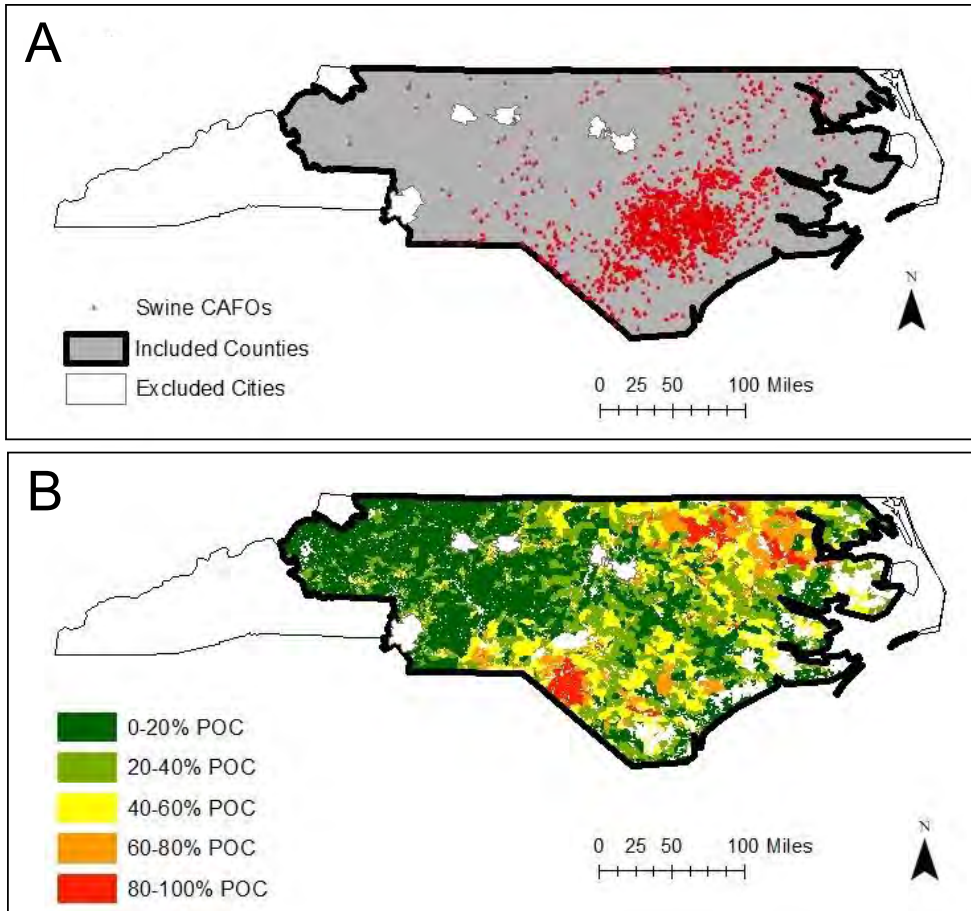


Figure 6. North Carolina (A) swine CAFOs and (B) census blocks categorized by people of color (POC). The largest five cities in North Carolina (populations >250,000) and counties that do not contain swine CAFOs and do not neighbor counties with swine CAFOs were excluded from study area and analysis. Swine CAFOs are concentrated in eastern NC where the percent of POC is higher than central/western NC.

Table 1. Ratios of POC, Black, Hispanic, and American Indian residents compared to non-Hispanic White residents living within 3 miles of a Large CAFO or a medium CAFO in CA, IA, and NC. In the CA study area, the percent of POC, Hispanic, and American Indian residents living within 3 miles of a Large Dairy CAFO is 1.29, 1.54, and 1.15, times higher, respectively, than the percent of non-Hispanic Whites. In the NC study area, percent of POC, Black, Hispanic, and American Indian residents living within 3 miles of a Large Swine CAFO is 1.42, 1.42, 1.57, and 2.20 times higher, respectively, than the percent of non-Hispanic Whites. In IA, the percent of POC living within 3 miles of a swine CAFO is lower than the percent of non-Hispanic Whites. Ratios above 1 indicate that the proportion of that racial/ethnic group living near a CAFO is higher than that of non-Hispanic Whites, with a higher ratio indicating more exposure disparity. Ratios below 1 indicate that the proportion of that racial/ethnic group living near a CAFO is lower than that of non-Hispanic Whites (the reference group). See Supplementary Table 1 for ratios of these racial/ethnicity groups within 3 miles of **any** CAFO compared to non-Hispanic White residents.

Race/Ethnicity Category	Within 3 Miles of a Large CAFO				Within 3 Miles of a Medium CAFO				Total Population
	Number of People	Percent of Population	Ratio ⁴	P-value	Number of People	Percent of Population	Ratio ⁴	P-value	
CALIFORNIA									
American Indian ¹	32,093	18.16	1.15	<0.0001	13,990	7.92	0.87	<0.0001	176,727
Asian	99,340	12.33	0.78	<0.0001	99,485	12.35	1.36	<0.0001	805,771
Black	56,679	12.12	0.76	<0.0001	44,049	9.42	1.04	<0.0001	467,687
Hispanic	647,950	24.43	1.54	<0.0001	225,697	8.51	0.94	<0.0001	2,651,833
Pacific Islander ²	10,121	15.65	0.99	0.17	7145	11.05	1.21	<0.0001	64,673
Other Race	172,391	24.42	1.54	<0.0001	61,951	8.77	0.96	<0.0001	706,067
Multiracial	58,027	15.59	0.98	<0.0001	36,779	9.88	1.09	<0.0001	372,272
POC	807,133	20.44	1.29	<0.0001	369,267	9.35	1.03	<0.0001	3,949,451
White non-Hispanic	432,553	15.85	1	1	248,407	9.1	1	1	2,729,076
Total	1,239,686	18.56			617,674	9.25			6,678,526
IOWA									
American Indian ¹	4574	20.11	0.74	<0.0001	3029	13.32	0.81	<0.0001	22,747
Asian	7085	10.19	0.37	<0.0001	11,407	16.4	0.99	0.32	69,553
Black	11,289	12.13	0.45	<0.0001	8846	9.5	0.57	<0.0001	93,095
Hispanic	31,036	21.33	0.78	<0.0001	25,018	17.19	1.04	<0.0001	145,496
Pacific Islander ²	1158	21.41	0.79	<0.0001	817	15.1	0.91	<0.0001	5409
Other Race	7064	22.26	0.82	<0.0001	5594	17.63	1.07	<0.0001	31,728
Multiracial	9115	18.34	0.67	<0.0001	6983	14.05	0.85	<0.0001	49,705
POC	52,509	16.12	0.59	<0.0001	48,096	14.76	0.89	<0.0001	325,832

White non-Hispanic	642,843	27.19	1	1	391,045	16.54	1	1	2,363,878
Total	695,353	25.85			439,142	16.33			2,689,711
<u>NORTH CAROLINA</u>									
American Indian ¹	29,327	18.54	2.20	<0.0001	11,708	7.4	1.75	<0.0001	158,167
Asian	7591	3.53	0.42	<0.0001	4009	1.87	0.44	<0.0001	214,790
Black	180,516	11.92	1.42	<0.0001	76,558	5.05	1.19	<0.0001	1,514,767
Hispanic	81,583	13.18	1.57	<0.0001	25,893	4.18	0.99	0.05	619,201
Pacific Islander ²	1174	8.71	1.03	0.23	519	3.85	0.91	0.03	13,481
Other Race	21,772	10.94	1.30	<0.0001	8828	4.44	1.05	<0.0001	199,050
Multiracial	19,358	10.27	1.22	<0.0001	9220	4.89	1.15	<0.0001	188,550
POC ³	292,306	11.97	1.42	<0.0001	114,861	4.7	1.11	<0.0001	2,442,211
White non-Hispanic	371,630	8.42	1.00	1	186,935	4.24	1.00	1	4,414,030
Total	663,936	9.68			301,797	4.4			6,856,241

¹Includes all people who indicate they are American Indian or Alaska Native residents. Race/ethnic groups are not mutually exclusive; one person may be present in multiple categories; thus, the racial and ethnic categories do not sum to the total.

²Includes all people who indicate they are Native Hawaiian or other Pacific Islander.

³People of color (POC) was calculated as the total population minus the White non-Hispanic population.

⁴Ratio of the percent of people of other racial and ethnic groups to the percent of non-Hispanic Whites who live within 3 miles of a CAFO.

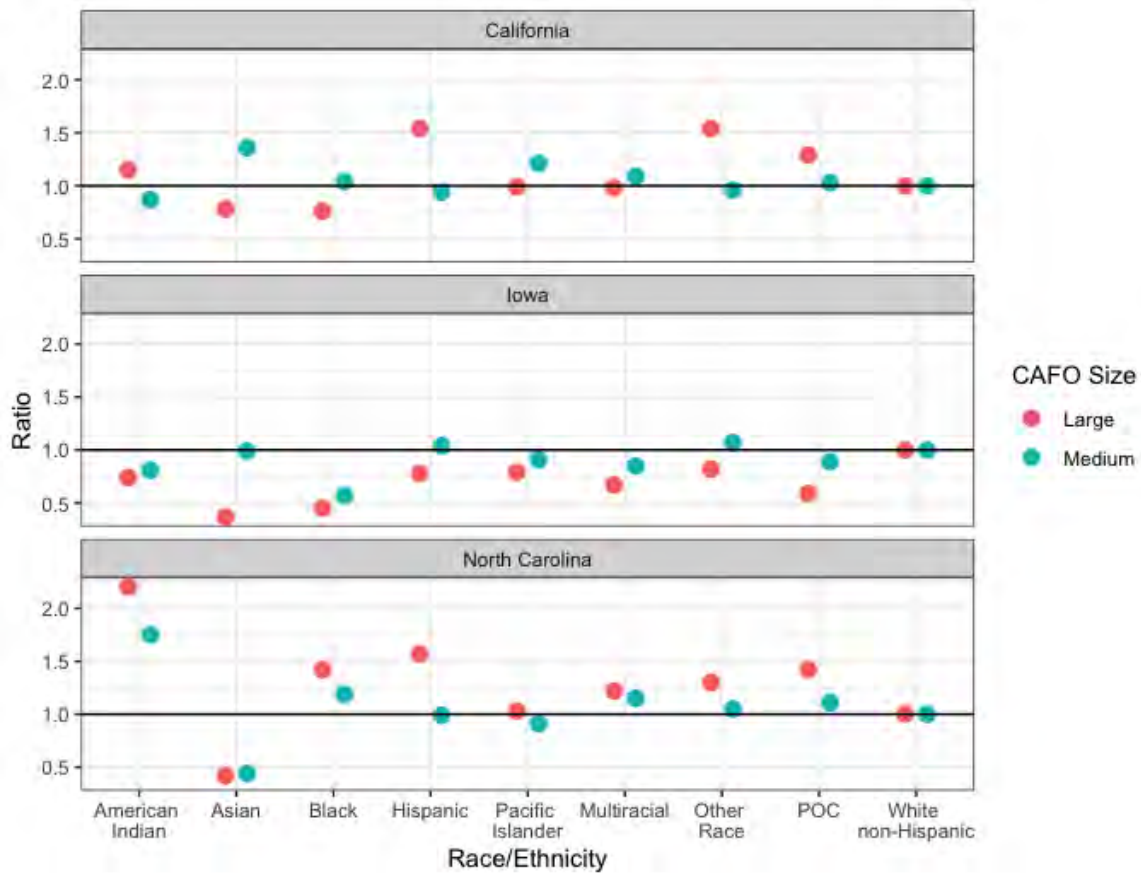


Figure 7. The ratio of residents by race/ethnicity group compared to non-Hispanic White residents living within 3 miles of a Large CAFO or a medium CAFO in CA, IA, and NC (visual representation of Table 1). Points above 1 (line on graph, the null value) indicate that the proportion of that race/ethnicity group living near a CAFO is higher than that of non-Hispanic White; points below 1 indicate that the proportion of that race/ethnicity group living near a CAFO is lower than that of non-Hispanic Whites. The ratios are farther from the null and more extreme when examining Large CAFOS than Medium CAFOS.

Table 2. Average difference in animal units within 3 miles of residents of blocks with varying percent of POC compared to blocks without POC (in CA analysis, blocks with 0-19% POC were used as the reference because very few blocks in the CA had 0% POC). In CA and NC, blocks with 40-100% POC contained many more animal units than blocks with 0-19% POC, although the opposite is true for IA.

Percent POC	CALIFORNIA		IOWA		NORTH CAROLINA	
	Unadjusted	Adjusted ¹	Unadjusted	Adjusted ¹	Unadjusted	Adjusted ¹
0%	(ref)	(ref)	(ref)	(ref)	(ref)	(ref)
1-19%	(ref)	(ref)	-918 (-1017, -818)	-88 (-185, 10)	57 (-37, 150)	273 (182, 364)
20-39%	606 (487, 725)	889 (771, 1007)	-2193 (-2306, -2080)	-798 (-910, -686)	247 (153, 340)	577 (486, 668)
40-59%	963 (847, 1080)	1400 (1284, 1516)	-2214 (-2358, -2071)	-761 (-903, -620)	434 (340, 529)	814 (722, 906)
60-79%	1139 (1024, 1254)	1657 (1542, 1772)	-2360 (-2562, -2158)	-794 (-991, -596)	701 (605, 797)	1120 (1027, 1214)
80-100%	742 (626, 858)	1366 (1250, 1483)	-2673 (-3108, -2237)	-1126 (-1547, -704)	272 (172, 372)	738 (641, 835)

¹Adjusted for the rurality using the cubic natural log of the population density.

Table 3. Percent of population living within 3 miles of a CAFO by geographic isolation in census tract (no urban areas were removed from this analysis, although counties without dairy CAFOs were excluded in CA and counties without CAFOs and not neighboring CAFOs were removed in NC). A larger percent of residents in the very isolated areas reside near Large CAFOs, especially in IA. CA has more CAFOs in urban and suburban areas (not isolated and slightly isolated areas) compared to NC and IA.

Geographic Isolation ¹	Total Population	Any CAFO		Large CAFO		No CAFOs	
		Population within 3 miles	Percent of total population	Population within 3 miles	Percent of population	Population within 3 miles	Percent of population
CALIFORNIA							
Not isolated	968,916	179,276	18.50	102,727	10.60	789,640	81.50
Slighted Isolated	4,153,714	1,098,277	26.44	652,050	15.70	3,055,437	73.56
Somewhat Isolated	1,548,899	659,343	42.57	561,302	36.24	889,556	57.43
Very Isolated	826,878	219,194	26.51	181,117	21.90	607,684	73.49
IOWA							
Not isolated	63,416	0	0	0	0	63,416	100
Slighted Isolated	592,247	215,086	36.32	5167	0.87	377,161	63.68
Somewhat Isolated	1,020,296	204,412	20.03	101,762	9.97	815,884	79.97
Very Isolated	1,463,549	1,178,730	80.54	978,559	66.86	284,819	19.46
NORTH CAROLINA							
Not isolated	64,272	0	0	0	0	64,272	100
Slighted Isolated	1,112,242	0	0	0	0	1,112,242	100
Somewhat Isolated	4,054,306	60,594	1.49	27,435	0.68	3,993,712	98.505
Very Isolated	5,034,056	1,270,767	25.24	971,211	19.29	3,763,289	74.757

¹A continuous geographic isolation scale that classifies census tract according to their access to resources was split into quartiles (based on national data) to create these categories.⁴¹

Table 4. Number of CAFOs within each Census tract, by geographic isolation (areas very isolated from resources are very rural areas). Almost all the Large CAFOs in IA and NC are in very isolated, rural areas, while the majority of Large CAFOs in CA are in less isolated areas (slightly and somewhat isolated areas, which correspond to small towns and suburban areas).

Geographic Isolation ¹	Number of Large CAFOs	Number of Medium CAFOs	Total CAFOs	Percent of Large CAFOs	Percent of Total CAFOs
CALIFORNIA					
Not isolated	1	1	2	0.15	0.19
Slightly isolated	15	17	32	2.22	3.12
Somewhat isolated	357	209	566	52.81	55.11
Very isolated	303	124	427	44.82	41.58
IOWA					
Not isolated	0	0	0	0	0
Slightly isolated	0	3	3	0	0.04
Somewhat isolated	18	50	68	0.52	0.89
Very isolated	3443	4085	7528	99.48	99.07
NORTH CAROLINA					
Not isolated	0	0	0	0	0
Slightly isolated	0	0	0	0	0
Somewhat isolated	1	2	3	0.09	0.15
Very isolated	1055	902	1957	99.91	99.85

¹A continuous geographic isolation scale that classifies census tract according to their access to resources was split into quartiles (based on national data) to create these categories.⁴¹

Figure 8. Iowa census tracts by isolation category¹⁴ and swine CAFOs. Swine CAFOs are spread across IA, especially in the very isolated areas.

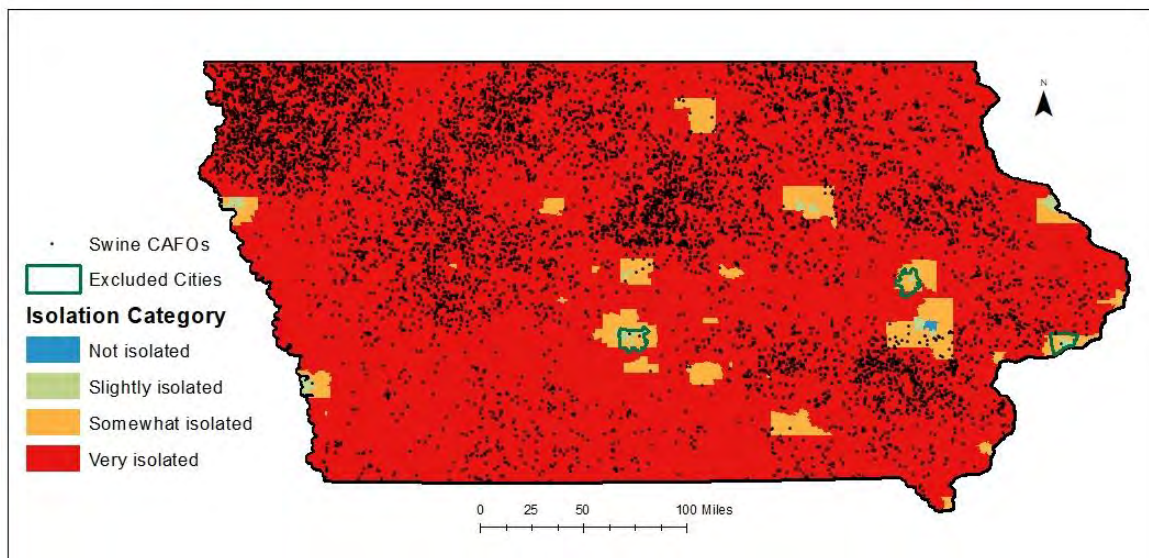


Table 5. Percent of population living within 3 miles of a Large CAFO by percent of households below the 200% poverty level by Census tract. In CA and NC, areas with a high poverty level (i.e., $\geq 35\%$ of households below the 200% poverty level) have a larger percent of their population living within 3 miles of a Large CAFO than areas with a low poverty level ($< 20\%$ of households below the 200% poverty level). In contrast, in IA, areas with higher poverty levels ($\geq 35\%$) have a lower percent of their population < 3 miles of a Large CAFO than areas with lower poverty levels ($< 35\%$). See supplementary table 2 for poverty group populations within 3 miles of **any** CAFO.

Percent of Households Below 200% Poverty Level	Population in Category < 3 Miles of a Large CAFO	Total Population in Category	Percent of Population < 3 Miles from Large CAFO	Ratio
CALIFORNIA				
Below 20%	90,933	908,350	10.01	(ref)
20-34%	537,205	2,755,714	19.49	1.95
35-49%	378,515	1,511,127	25.05	2.50
$\geq 50\%$	417,234	1,747,992	23.87	2.38
IOWA				
Below 20%	227,068	780,581	29.09	(ref)
20-34%	627,157	1,251,271	50.12	1.72
35-49%	77,516	399,609	19.40	0.67
$\geq 50\%$	2108	113,480	1.86	0.06
NORTH CAROLINA				
Below 20%	20,221	1,254,755	1.61	(ref)
20-34%	263,839	2,198,604	12.00	7.45
35-49%	474,940	2,022,555	23.48	14.58
$\geq 50\%$	239,646	1,013,171	23.65	14.69

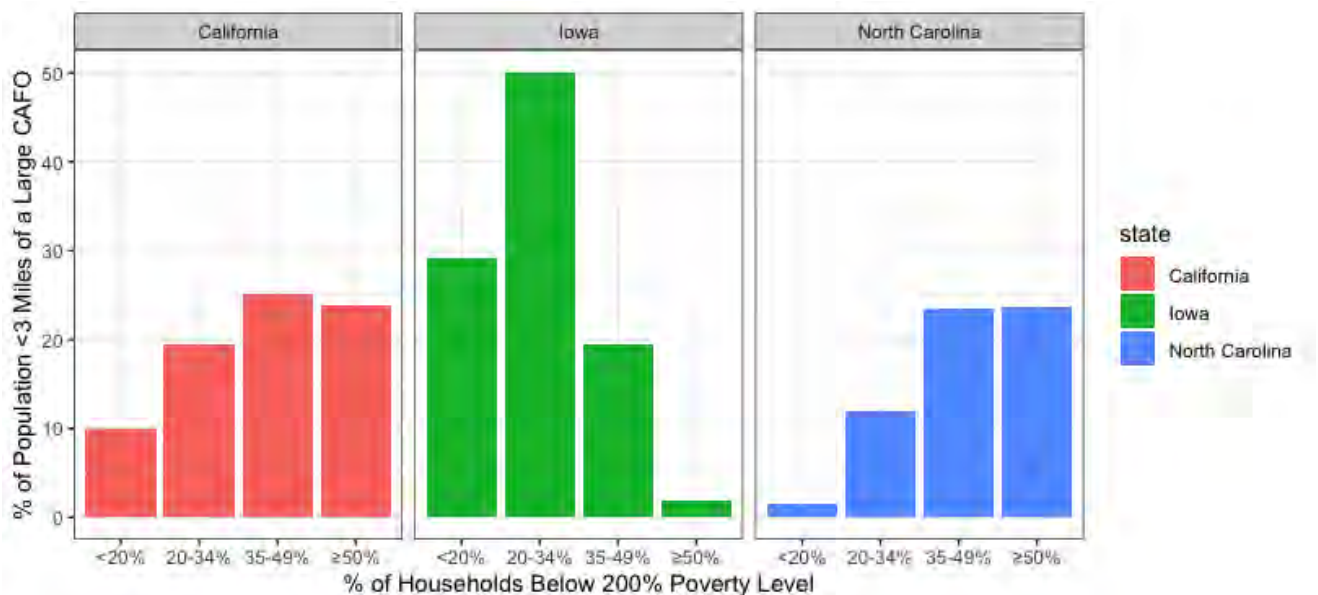


Figure 9. Percent of population living within 3 miles of a CAFO by percent of households below the 200% poverty level by Census tract (a visual representation of Table 5). In CA and NC, areas with a high poverty level (i.e., $\geq 35\%$ of households below the 200% poverty level) have a larger percent of their population living within 3 miles of a Large

CAFO than areas with a low poverty level (<20% of households below the 200% poverty level). In contrast, in IA, areas with higher poverty levels (≥35%) have a lower percent of their population <3 miles of a Large CAFO than areas with lower poverty levels (<35%).

Table 6. Percent of population living within 3 miles of a Large CAFO by median household income in each block group. In CA and IA, fewer rich households (≥\$90,000) live near Large CAFOs than poorer households.

Median Household Income Category (\$)¹	Population in Category within 3 Miles of a Large CAFO	Total Population in Category	Percent of Population within 3 Miles from a Large CAFO
CALIFORNIA			
<35,000	161,772	895,919	18.06
35,000-44,999	188,767	912,458	20.69
45,000-54,999	198,856	940,047	21.15
55,000-64,999	180,655	860,928	20.98
65,000-89,999	334,720	1,806,660	18.53
≥90,000	246,206	1,678,126	14.67
IOWA			
<35,000	22,183	171,004	12.97
35,000-44,999	76,891	278,791	27.58
45,000-54,999	175,882	460,638	38.18
55,000-64,999	226,061	524,835	43.07
65,000-89,999	298,547	771,999	38.67
≥90,000	41,443	363,113	11.41
NORTH CAROLINA			
<35,000	141,127	892,668	15.81
35,000-44,999	207,714	1,222,393	16.99
45,000-54,999	180,850	1,244,261	14.53
55,000-64,999	118,621	982,463	12.07
65,000-89,999	88,930	1,263,368	7.04
≥90,000	0	864,988	0

¹2019 block group median income from American Community Survey, urban areas excluded

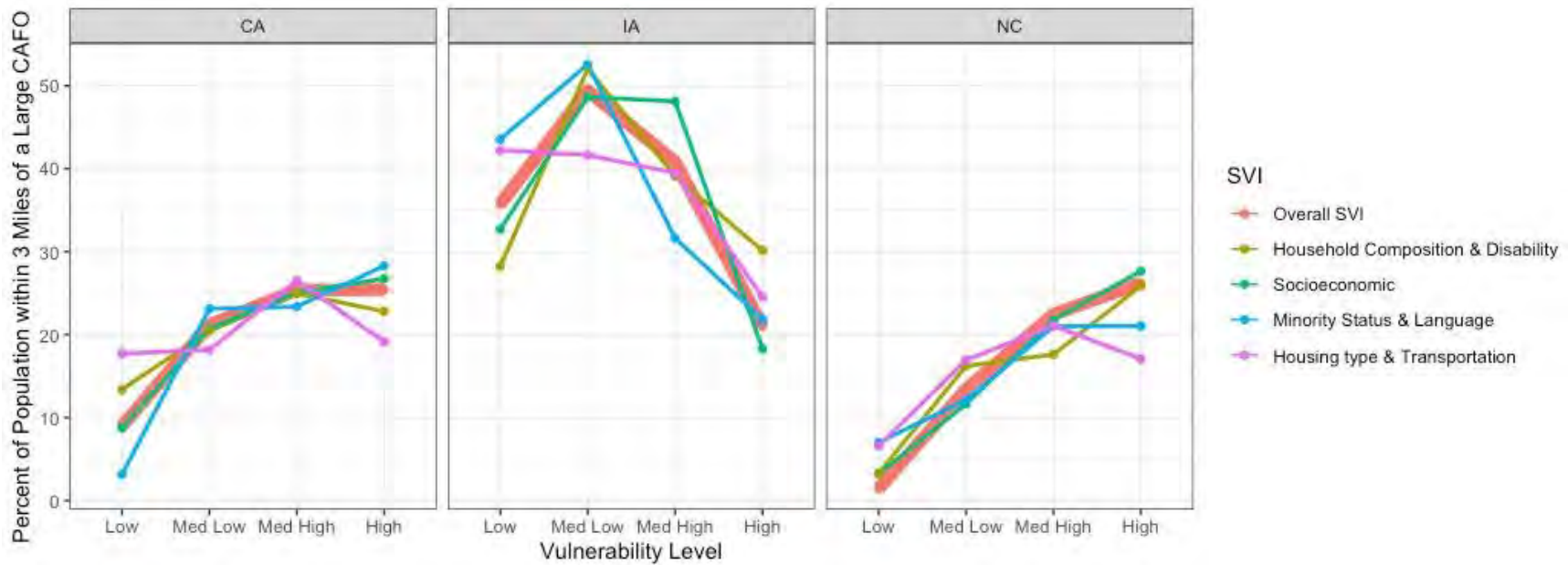


Figure 10. Percent of study population within 3 miles of a Large CAFO by varying levels of vulnerability, as measured by the social vulnerability index. Low, medium low, medium high, and high categories correspond to the state-specific social vulnerability quartiles. The thicker, peach-colored line represents the overall social vulnerability (SVI) that summarizes all categories. In CA and NC, as vulnerability increases, the percent of the population living near a Large CAFO also increases.

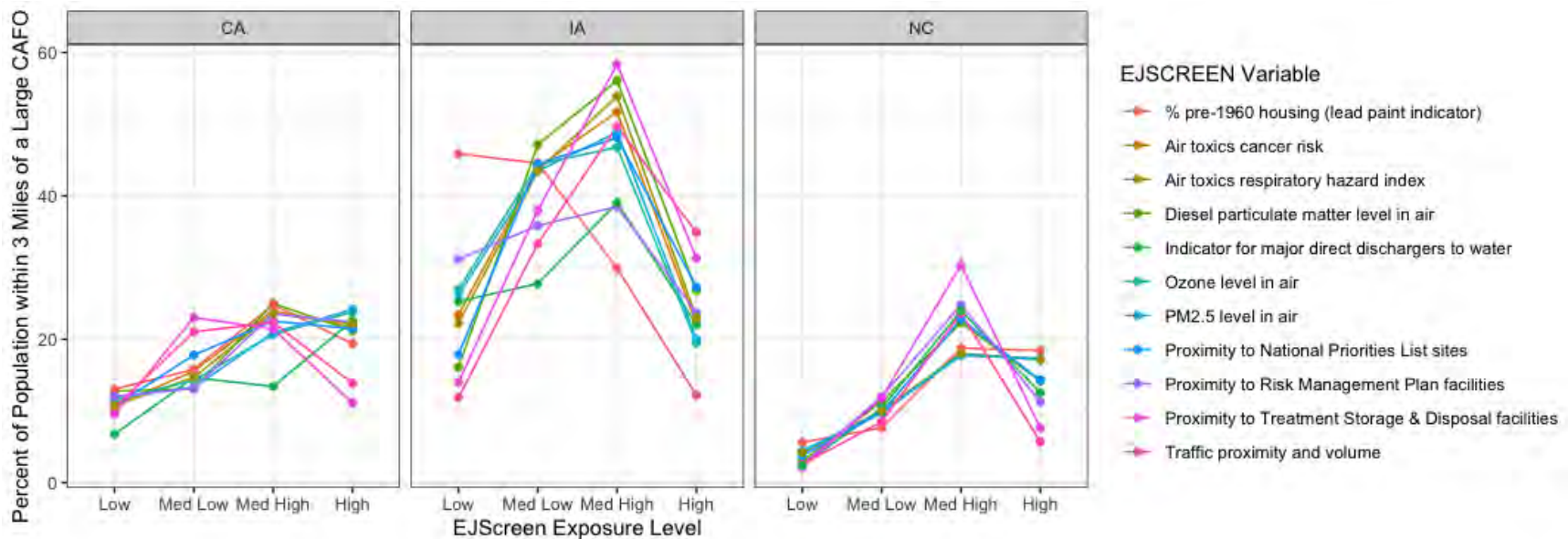


Figure 11. Percent of study population within 3 miles of a Large CAFO by varying levels of EJScreen exposure. Low, medium low, medium high, and high categories correspond to the state-specific quartiles for each EJSCREEN measure. In IA and NC, areas with medium high levels of various exposures, especially diesel particulate matter, major direct dischargers to water (not including CAFOs), traffic proximity and volume, and proximity to treatment storage and disposal facilities have higher proportions of the population living within 3 miles of a Large CAFO compared to areas with low levels of these exposures.

Table 7. Percent of population living in IA within 3 miles of a Large Swine CAFO in 2021 by percent of people aged 70 and older in census block group, within study area. In IA, areas with a low percent (<8%) of the population above age 70 also have a lower percent of the population living near swine CAFOs.

Percent of Population Age 70+	Total population	Population of adults age 70+	Total population <3 mile of a CAFO	Population of adults age 70+ <3 mile of a CAFO	Percent of total population <3 mile of a CAFO	Percent of population age 70+ <3 mile of a CAFO	Ratio
<8%	762,703	37,762	71,488	4329	9.37	11.46	1.00 (ref)
8-11%	696,104	69,640	168,030	17,008	24.14	24.42	2.13
12-15%	560,279	77,676	157,895	21,701	28.18	27.94	2.44
≥16%	582,628	122,171	133,819	27,005	22.97	22.10	1.93

Table 8. Percent of population living within 3 miles of a Large Swine CAFO in IA by percent of population with less than a high school degree in census block group, within study area. In IA, areas with a low percent (<5%) of adults without a high school degree (i.e., highly educated areas) have a lower percent of their population living near a swine CAFO than areas with a higher percent (≥5%) of the population without a high school degree.

Percent of Adults with less than a HS degree	Total population	Total population within 3 miles of a Large CAFO	Percent of population within 3 miles of a Large CAFO	Ratio
<5%	238,733	959,394	24.88	1.00
5-6%	261,096	500,098	52.21	2.10
6.5-10.5%	256,399	511,367	50.14	2.02
≥10.5%	177,621	574,082	30.94	1.24

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Supplementary Table 1. Ratios of POC, Black, Hispanic, and American Indian residents compared to non-Hispanic White residents living within 3 miles of any CAFO in CA, IA, and NC. In the CA study area, the percent of Hispanic residents living within 3 miles of any dairy CAFO is 1.32 times higher than the percent of non-Hispanic Whites. In the NC study area, percent of Black, Hispanic, and American Indian residents living within 3 miles of any swine CAFO is 1.34, 1.37, and 2.05 times higher, respectively, than the percent of non-Hispanic Whites. In IA, the percent of POC living within 3 miles of any swine CAFO is lower than that of non-Hispanic Whites.

Race/Ethnicity Category	Within 3 Miles of any CAFO				
	Number of People	Total Population	Percent of Population	Ratio ⁴	P-value
<u>CALIFORNIA</u>					
American Indian ¹	46,083	176,727	26.08	1.05	<0.0001
Asian	198,825	805,771	24.68	0.99	<0.0001
Black	100,729	467,687	21.54	0.86	<0.0001
Hispanic	873,647	2,651,833	32.95	1.32	<0.0001
Pacific Islander ²	17,266	64,673	26.7	1.07	<0.0001
Other Race	234,342	706,067	33.19	1.33	<0.0001
Multiracial	94,806	372,272	25.47	1.02	<0.0001
POC	1,176,400	3,949,451	29.79	1.19	<0.0001
White non-Hispanic	680,960	2,729,076	24.95	1	1
Total	1,857,360	6,678,526	27.81		
<u>IOWA</u>					
American Indian ¹	7603	22,747	26.08	0.76	<0.0001
Asian	18,492	69,553	24.68	0.61	<0.0001
Black	20,135	93,095	21.54	0.49	<0.0001
Hispanic	56,054	145,496	32.95	0.88	<0.0001
Pacific Islander ²	1975	5409	26.7	0.83	<0.0001
Other Race	12,658	31,728	33.19	0.91	<0.0001
Multiracial	16,098	49,705	25.47	0.74	<0.0001
POC	100,606	325,832	29.79	0.71	<0.0001
White non-Hispanic	1,033,889	2,363,878	24.95	1	1
Total	1,134,495	2,689,711	27.81		
<u>NORTH CAROLINA</u>					
American Indian ¹	41,035	158,167	25.94	2.05	<0.0001
Asian	11,600	214,790	5.4	0.43	<0.0001
Black	257,074	1,514,767	16.97	1.34	<0.0001
Hispanic	107,476	619,201	17.36	1.37	<0.0001
Pacific Islander ²	1693	13,481	12.56	0.99	0.74
Other Race	30,600	199,050	15.37	1.22	<0.0001
Multiracial	28,579	188,550	15.16	1.2	<0.0001
POC ³	407,168	2,442,211	16.67	1.32	<0.0001
White non-Hispanic	558,566	4,414,030	12.65	1	1
Total	965,733	6,856,241	14.09		

¹Includes all people who indicate they are American Indian or Alaska Native residents. Race/ethnic groups are not mutually exclusive; one person may be present in multiple categories; thus, the racial and ethnic categories do not sum to the total.

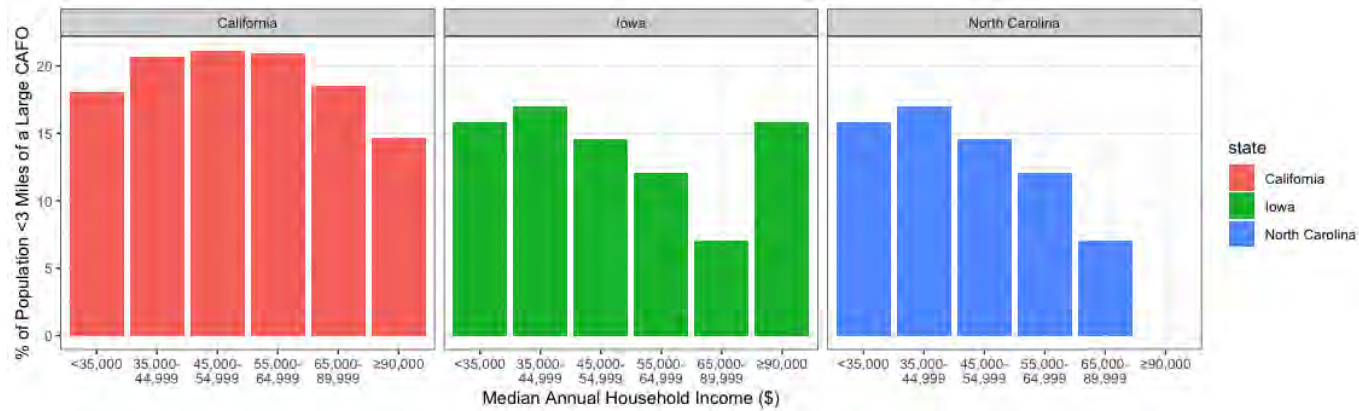
²Includes all people who indicate they are Native Hawaiian or other Pacific Islander.

³People of color (POC) was calculated as the total population minus the White non-Hispanic population.

⁴Ratio of the percent of people of other racial and ethnic groups to the percent of non-Hispanic Whites who live within 3 miles of a CAFO.

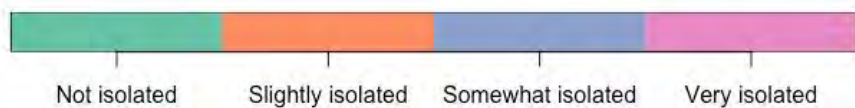
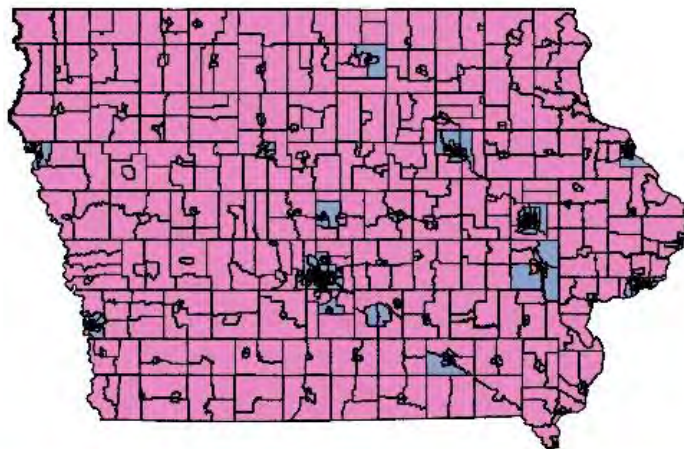
*Supplementary Table 2. Percent of population living within 3 miles of **any** CAFO by percent of households below the 200% poverty level by Census tract. In CA and NC, areas with a high poverty level (i.e., $\geq 35\%$ of households below the 200% poverty level) have a larger percent of their population living within 3 miles of a Large CAFO than areas with a low poverty level ($< 20\%$ of households below the 200% poverty level). In contrast, in IA, areas with higher poverty levels ($\geq 35\%$) have a lower percent of their population < 3 miles of a Large CAFO than areas with lower poverty levels ($< 35\%$).*

Percent of Households Below 200% Poverty Level	Population in Category <3 Miles of any CAFO	Total Population in Category	Percent of Population <3 Miles from Large CAFO	Ratio
CALIFORNIA				
Below 20%	362,826	1,673,184	21.68	1.00
20-34%	580,035	1,990,880	29.13	1.34
35-49%	576,616	1,511,127	38.16	1.76
$\geq 50\%$	550,360	1747,992	31.49	1.45
IOWA				
Below 20%	278,996	780,581	35.74	1.00
20-34%	759,383	1,251,271	60.69	1.70
35-49%	101,825	399,609	25.48	0.71
$\geq 50\%$	2108	113,480	1.86	0.05
NORTH CAROLINA				
Below 20%	42,595	1,254,755	3.39	1.00
20-34%	365,619	2,198,604	16.63	4.90
35-49%	635,957	2,022,555	31.44	9.26
$\geq 50\%$	287,190	1,013,171	28.35	8.35

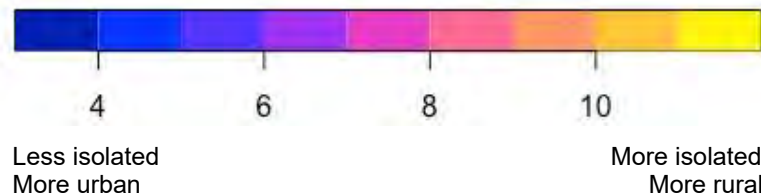
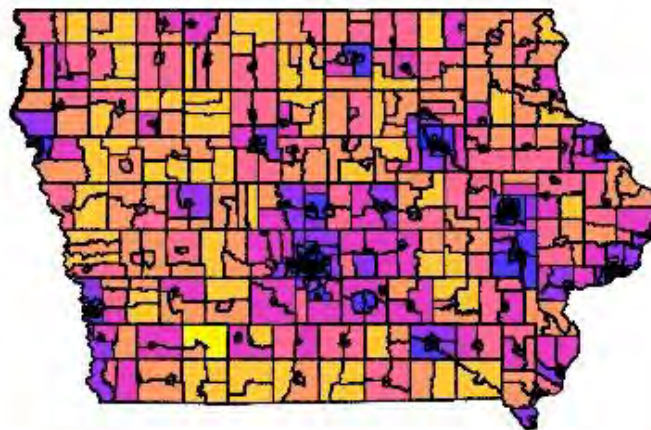


Supplementary Figure 1. Percent of population living within 3 miles of a CAFO by median household income in each block group (a visual of Table 6). In CA and IA, fewer rich households ($\geq \$90,000$) live near Large CAFOs than poorer households.

Isolation Categories



Isolation Values



Supplementary Figure 2. Isolation categories and isolation values highlighting how widespread very isolated, rural areas are in Iowa.

Exhibit 6

DECLARATION OF LARRY BALDWIN

I, LARRY BALDWIN, declare and state as follows:

1. I am 66 years old, and I live in New Bern, North Carolina. I have devoted much of my life to combatting water pollution, especially water pollution from concentrated animal feeding operations (“CAFOs”). I currently work for Waterkeeper Alliance (“Waterkeeper”) as the Campaign Coordinator for the Pure Farms, Pure Waters North Carolina campaign, and I’ve held this position since June 2021.

2. Waterkeeper is the largest and fastest-growing nonprofit focused solely on clean water. We fight for every community’s right to drinkable, fishable, and swimmable water, and we work to hold polluters accountable. Consistent with our mission, Waterkeeper connects more than 300 member and affiliate organizations worldwide, including multiple Riverkeeper organizations headed by individual Riverkeepers.

3. Prior to my current position, I spent nearly 20 years working with Riverkeeper and Waterkeeper affiliate organizations. From 2002 to 2011, I was the Lower Neuse Riverkeeper, overseeing a river in a watershed with a high concentration of CAFOs. In 2011, I joined Waterkeeper as the North Carolina CAFO Coordinator. In that role, I worked with eight Riverkeeper programs throughout North Carolina to end the stranglehold that the CAFO industry has on communities and the environment. From 2016 to 2021, I was the Crystal Coast Waterkeeper, overseeing a group of rivers, creeks, and coastal waters.

4. As the Campaign Coordinator for the Pure Farms, Pure Waters North Carolina campaign, I help to lead the campaign, which focuses on calling attention to polluting practices at CAFOs, ensuring that CAFOs comply with federal law, and supporting independent and responsible family farmers. In addition, I help to train, manage, and coordinate Riverkeepers

working on CAFO pollution across North Carolina. And I partner with clean water and community advocates combatting CAFO pollution across the United States and internationally.

5. CAFOs generate a staggering amount of waste. Each pig produces about 10 times as much waste as a human being. So, a CAFO with 2500 swine produces roughly as much waste as a city with 25,000 people. Most cities have some sort of system for the treatment of human waste, but swine CAFOs generally do not. Instead, swine CAFOs typically store liquid waste in large pits, which the industry calls “lagoons.” I think “cesspool” is a more accurate term. After enough waste builds up in a storage pit, CAFO workers spray it across nearby fields. But most CAFOs don’t have enough land to absorb the volume of waste they generate, and it’s expensive to move liquid waste very far. So, in my experience, CAFO operators typically overapply waste to the land they have, and they allow the excess to leach into groundwater or wash off fields into surface waters.

6. At Waterkeeper and our partner organizations, monitoring water quality and collecting water samples are important components of our work. All our samples are collected from public locations; we do not trespass. When we find evidence of CAFO pollution, we work to identify the facility responsible. Our work is challenging, in part, because discharges from land application sites to surface water are often intermittent. Unlike some other industrial facilities, a CAFO might discharge a substantial amount of water pollution from a land application site on one day and very little on another day. The amount of discharge depends on a variety of factors, including the CAFO’s schedule for applying waste, its application methods, and the amount of precipitation. In addition, CAFO operators are aware of our work, and I believe that some operators change their behavior to avoid detection. For example, when we’re

monitoring water quality from the air, we sometimes see people at CAFOs spot our plane, jump into pickup trucks, and rush to shut off the equipment that is spraying waste onto fields.

7. Although some water pollution from CAFOs can be intermittent, I do not believe that it is possible for CAFOs to avoid pollution altogether. This is especially true for Large CAFOs using wet manure management systems. Over the years, my colleagues and I have collected evidence of ubiquitous water pollution from CAFOs both through our water sampling and through our direct observations of discharges. The source of the problem, in my opinion, is apparent from the first word of the acronym: CAFOs are *concentrated*. The defining characteristic of a CAFO—that is, confining hundreds or thousands of animals in an enclosed space while they generate tremendous quantities of urine and feces—is a recipe for disaster. Not too long ago, there were more than 20,000 farms raising swine in North Carolina. Now, there are about 2,300 swine CAFOs, and they confine a larger number of swine overall. The CAFO industry and its allies like to characterize CAFOs as “farms,” but that term conjures up images of idyllic green pastures and happy animals, like a real-life “Charlotte’s Web.” The truth is that CAFOs are industrial facilities, and they pollute on an industrial scale.

8. Based on my experience and observations, most CAFO operators do not spray animal waste on fields solely to fertilize those fields. Some CAFOs grow only Bermuda grass and other crops of very little value, so they don’t have much of an incentive to fertilize. And CAFOs that grow more valuable crops, such as hay and alfalfa, sometimes leave baled crops on the fields. Eventually, the nutrients in those crops seep back into the soil, making it more likely that future waste applications will cause water pollution discharges. I’ve even seen baled crops dumped in wetlands.

9. In my opinion, the primary object of spraying waste is waste disposal. The CAFO industry has done a great job of hiding this reality, and they've worked to drive a wedge between environmentalists and community advocates, on one side, and CAFO operators, on the other. But I don't want to put CAFO operators out of business, and neither do my colleagues or partners. We want to put them out of the business of *pollution*. And, right now, pollution is a key part of the CAFO industry's business model. I believe it's possible to raise animals while respecting your fellow man and the environment. The first step is acknowledging your impact and obtaining necessary permits, just as family businesses in other industries do every day, all across the country. In my opinion, many CAFO operators want to do the right thing, but the structure of the industry makes it difficult.

10. The problem isn't only that animals are concentrated in CAFOs, but also that CAFOs are concentrated in certain parts of North Carolina, where they inflict disproportionate harm on Black, Latinx, Native American, and low-income communities. I do not believe that this concentration is accidental. Instead, I believe that the CAFO industry deliberately targets the communities with the least political and financial power. In my opinion, North Carolinians can do better than disrespecting our neighbors for the false promise of cheap meat. Under-regulated CAFOs don't really produce cheap meat anyway. They just shift the costs onto the people living next-door, who bear the brunt of CAFO pollution.

11. Over the years, I have seen the harm that CAFO pollution causes to people living in environmental justice communities in North Carolina, and I have spoken to many community members about their experiences. It is heart-wrenching. CAFO pollution is an ever-present, pervasive problem that community members can see, smell, and taste every day. Adding insult to injury, I have heard people suggest that anyone living near a CAFO should move away if they

don't like the pollution. But the communities were there first, and some families have deep roots in areas where CAFOs now are densely concentrated. Even if people wanted to leave, it's difficult to do so because CAFOs have damaged their health and driven down the value of their property.

12. I do not believe that CAFO operators set out to harm their neighbors or pollute the water. Instead, I think the CAFO industry and our current regulatory system incentivize unsustainable practices. A few major corporations control most animal production in this country, and it's not surprising that those corporations seek to maximize profits, while shifting the burdens of pollution elsewhere. That's why we need government agencies to provide oversight. Right now, I believe our agencies are failing.

13. It's my understanding that the North Carolina Department of Environmental Quality ("NC DEQ") inspects CAFOs only once each year. Those inspections are scheduled two weeks in advance, which means that CAFO operators have an opportunity to prepare for inspections by temporarily obscuring any obvious problems at their facilities. In addition, the inspections last only about 45 minutes, and inspectors often rely on a CAFO's self-created records instead of reaching their own conclusions by walking around the facility. As long as a CAFO operator claims that they comply with all relevant rules, inspectors seem to take their word for it.

14. Even when Waterkeeper and its partners present clear evidence of water pollution, NC DEQ usually ignores the evidence and fails to address the problem. One Riverkeeper, who focuses on the Catawba River, has filed over 600 complaints about water pollution from CAFOs. Even though he includes evidence to support his complaints, absolutely nothing has changed. I've had similar experiences myself, going back years. NC DEQ isn't even required to keep

complainants informed about the status of their complaints unless the agency issues a violation. It's very frustrating for Riverkeepers and others to spend time gathering evidence and making complaints, only to be ignored by the agency. I suspect that, instead of issuing violations, NC DEQ calls CAFO operators to warn them about our monitoring.

15. The time has come for the U.S. Environmental Protection Agency to ensure that all discharging CAFOs obtain National Pollutant Discharge Elimination System ("NPDES") permits, as required under the Clean Water Act. Unfortunately, NC DEQ is not doing its job, and we can't count on state lawmakers, because too many of them have close ties to the CAFO industry. Based on my experience, I believe NPDES permits help to increase transparency and reduce pollution. Many other industrial facilities obtain NPDES permits, comply with the CWA, respect their neighbors, and remain profitable. There's no reason why CAFOs should be treated differently.

I declare under penalty of perjury that, to the best of my knowledge, the foregoing is true and correct. Executed this 24TH day of October 2022.

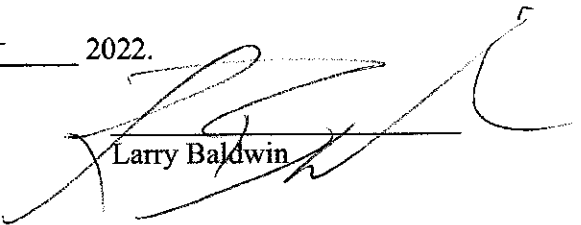

Larry Baldwin

Exhibit 7

DECLARATION OF KATHRYN BARTHOLOMEW

I, KATHRYN BARTHOLOMEW, declare and state as follows:

1. I am 58 years old, and I live at [REDACTED] Schuyler County, New York. Schuyler County is a rural, agricultural area with a population of less than 18,000 people, located in New York's Finger Lakes region. My family's roots in this area go back six generations, and I have lived here my entire life. I care deeply about the natural resources and beauty of Schuyler County and the entire Finger Lakes region. I love to spend time walking through the woods, past gorges and waterfalls, and along the beach at nearby Seneca Lake. Since 2004, I have been the Chair of the Schuyler County Environmental Management Council.

2. I am dismayed by the increasing presence of concentrated animal feeding operations ("CAFOs") in Schuyler County and throughout the Finger Lakes region. Most of the farms in this area are small. However, large CAFOs started operating here in the early 1990s, and every year, CAFO owners build more confinement barns; purchase more fields to grow corn, soybeans, and alfalfa for their cows; and construct more slurry lagoons to hold their cows' urine and feces. CAFOs have also begun to partner with energy companies to construct biodigesters, which capture methane from slurry lagoons to make biogas.¹ I'm concerned that CAFOs will use the biogas projects as a means to further justify their existence. It seems that CAFOs are always expanding, and I am

¹ See *Bergen Farms, Glenview Dairy Sign on for Renewable Natural Gas Project in Schuyler*, The Odessa File (Sept. 12, 2022), <http://www.odessafile.com/government.html>.

worried that this expansion—without proper regulation—will endanger our community and environment.

3. CAFOs threaten every ecosystem in our watershed, particularly our water.

Seneca Lake holds half of the water in all the Finger Lakes, and along with other members of my community, I am concerned about threats to its water quality. Several brooks and creeks in Schuyler County already are officially designated as “impaired” because of problems associated with CAFO manure.² Seneca Lake itself has been affected by harmful algal blooms, which experts link to manure runoff.³ As CAFOs in this area expand in number and size, I am concerned that they might pose a serious threat to our water supply. There’s only so much potable water, and serious contamination could take years to repair. Even though my drinking water comes from a deep well, I get it checked regularly to make sure that it is safe.

4. In addition to threatening our water, CAFO manure also produces an awful smell. I grew up across the street from a dairy farm, so I am used to the smell of cow patties; the smell of CAFO manure is something of another order altogether. I live three miles from

² See N.Y. Dep’t of Env’t Conservation, 2018 Section 303(d) List of Impaired Waters Requiring a TMDL/Other Strategy, at 5, 23 (June 2020), https://www.dec.ny.gov/docs/water_pdf/section303d2018.pdf (listing Reeder Creek and Pond Brook as impaired for phosphorous and dissolved oxygen).

³ See Kelly Coughlin & David Youst, *Seneca Lake Water Quality Overview* (Oct.2017), <https://senecalake.org/resources/Documents/Water%20Quality/Publications/Seneca%20Lake%20Water%20Quality%20Overview%20Oct%202017.pdf> (reporting high phosphorus levels and increasing numbers of harmful algal blooms in Seneca Lake and its tributaries); see also Patricia Glibert, *From Hogs to HABs: Impacts of Industrial Farming in the US on Nitrogen and Phosphorous and Greenhouse Gas Pollution*, 150 *Biogeochemistry* 139 (2020) (explaining that water pollution from CAFOs can lead to harmful algal blooms).

the closest CAFO, and I feel fortunate that I cannot smell the slurry lagoons at this distance. However, the CAFO applies slurry to corn and alfalfa fields adjacent to my property, and I find the smell of that slurry to be extremely unpleasant. After the CAFO workers spray the slurry, I won't hang my laundry outside because of the odor. In other areas of Schuyler County, where there are larger CAFOs closer together, the smell is truly terrible; when I drive by, I have to roll up my windows and hold my breath.

5. I am lucky that the CAFO closest to my home is operated reasonably well. To my knowledge, it complies with state and federal laws. Apart from two instances that I have witnessed, the CAFO workers generally do not apply slurry to the land when rain or snow is in the forecast. The CAFO operators try to be good neighbors. However, other residents in the region are not so fortunate. I have heard of manure spills in neighboring counties,⁴ and as head of the Schuyler County Environmental Management Council, I have seen that the CAFO industry can be a Goliath, and community members aren't always able to address concerns about odors, noise, and water pollution; it is disturbing.

6. I think it is ridiculous that New York State does not require CAFOs to obtain National Pollutant Discharge Elimination System permits under the Clean Water Act.

Based on my experience, there is no question that Large CAFOs pollute the water, and

⁴ See Carrie Chantler, *Owasco Lake Advocates Decry Runoff of Manure into Water*, Auburn Citizen (Apr. 6, 2014), https://auburnpub.com/news/local/owasco-lake-advocates-decry-runoff-of-manureintowater/article_498bd2fe-a7ec-5994-b4ed-005111da2e89.html (reporting that discharge from a Large CAFO caused a 25-by-75 foot plume of liquid manure to enter Lake Owasco in 2014); see also Matt Weinstein, *DEC: Manure Runoff Affecting Cayuga Lake*, Ithaca J. (Feb. 20, 2017), <https://www.ithacajournal.com/story/news/local/2017/02/20/dec-manure-runoff-impacting-cayuga-lake/98152244/> (explaining that “emergency applications of manure,” made in advance of “rapidly warming temperatures” in February 2017, had reached Cayuga Lake).

there is no reason why the CAFO industry should be treated differently than any other polluting industry. I believe that it is possible for CAFOs to be good neighbors, but we should not have to rely on a CAFO operator's good will when the health of our community and our environment is at stake. That's why we have environmental laws.

7. To protect our health and environment, I believe that U.S. Environmental Protection Agency should adopt a rebuttable presumption that Large CAFOs using wet manure management systems actually discharge water pollution.

I declare under penalty of perjury that, to the best of my knowledge, the foregoing is true and correct. Executed this 25 day of October, 2022.



Kathryn Bartholomew

Exhibit 8

DECLARATION OF EDITH HAENEL

I, EDITH HAENEL, declare and state as follows:

1. I am 71 years old. For the past 40 years, I have lived with my husband on 25 acres of land at [REDACTED], Worth County, Iowa. Our area is very rural. In fact, Worth County is among the most sparsely populated counties in Iowa. Northwood is the county seat, and it has a population of about 2,000 people.

2. I met my husband when I came to Iowa to pursue my master's degree in social work. At the time, he was working on a small farm growing crops and raising livestock. I fell in love with him and with the land. To this day, my husband and I value our rural lifestyle. We love our community. We love that our land is quiet.

3. When we first moved to the property where we live now, there were small farms all around us. However, about 20 years ago, we started to notice that the small farms were being replaced by concentrated animal feeding operations ("CAFOs"). According to the Iowa Department of Natural Resources ("IA DNR"), there are now 14 CAFOs in Worth County, including five Large swine CAFOs.¹ The nearest CAFO to us is about a mile from our home. According to IA DNR, it confines 2,486 swine, and it stores their waste in concrete pits beneath where the pigs stand and live. CAFO owners spread the stored waste onto fields, including the field that directly abuts our property.

4. The CAFO nearest to us sits right above a stream called Elk Creek. We are concerned that, over time, the CAFO will significantly impair the water in Elk Creek.

¹ See Iowa Dep't of Nat. Res., *Animal Feeding Operations Databases*, <https://programs.iowadnr.gov/animalfeedingoperations/> (click "Search," input Worth in "County" dropdown).

5. In addition, I worry that the CAFO nearest to us will contaminate the groundwater. Like many CAFOs in Worth County,² this CAFO is built on top of a karst formation. Karst is made up of soft, porous limestone.³ Building CAFOs on top of karst formations is risky, because it's easy for animal waste to pass through the karst and contaminate the groundwater underneath.⁴ I am especially worried about the CAFO nearest to us because that CAFO is located above an aquifer, and the karst bedrock is only 13 feet below ground.

6. In addition, I am concerned that CAFOs could contaminate groundwater by applying more manure to fields than the land can hold. According to my husband, there is sandy soil in this area, and sandy soils might not be able to absorb as much manure as clay soil. I have heard that some CAFO operators in our area sometimes spread waste on the same fields, and I worry that this practice increases the risk of groundwater contamination.

7. The potential contamination of groundwater is especially worrisome to me because, like nearly everyone in our community, my husband and I get our drinking water from a well. As a result, we cannot rely on a rural water system to filter or clean our water before it reaches our home. Although the county offers free water testing, that testing does not cover contaminants associated with CAFO manure. I am afraid that we might learn of groundwater contamination only after people in our community start to get sick. I understand that, elsewhere

² See Iowa Dep't of Nat. Res., *AFO Siting Atlas*, <https://programs.iowadnr.gov/maps/afo/> (select "Sinkhole or Potential Karst" and "Animal Feeding Operations" map layers) (showing that the majority of CAFOs in Worth County are located on or within 500 feet of sinkholes and karst formations).

³ See Iowa Dep't of Nat. Res., *AFO Construction Permits*, <https://www.iowadnr.gov/Environmental-Protection/Animal-Feeding-Operations/AFO-Construction-Permits>.

⁴ *Id.*

in Iowa, people have gotten sick after drinking groundwater contaminated with pollutants that are associated with CAFOs.

8. I am also concerned about air pollution from CAFOs. I have epilepsy, and I worry that I could be especially vulnerable to CAFO pollution. I also worry about the effects of long-term exposure to CAFO pollution among children. My great-nieces and nephews live about three-quarters of a mile downwind from a CAFO, and I understand that children living near CAFOs may have a greater risk of developing asthma and other health conditions.

9. In addition to raising health concerns, air pollution from CAFOs smells terrible. My husband has lived in this area for his entire life, and he has worked on farms, so he is used to the smells of animals and agriculture. But even he thinks that CAFO odors are unbearable; he says that the smell from smaller farms cannot even compare. I know from conversations with friends and family that CAFO odors affect many areas.

10. I believe that CAFOs have attracted insects to our area, and I am especially concerned about biting flies. I see more biting flies near my home now than I did before the CAFOs moved in. I am very sensitive to chemicals on my skin, so I cannot use bug spray. The biting flies can be exceedingly annoying.

11. It's not only the pollution and insects that bother me. I am concerned that CAFOs are fundamentally changing our community. Over time, CAFOs have put many small farms in our area out of business, and they affect non-farm businesses too. It's my understanding that most CAFO operators do not buy supplies locally, and CAFOs tend to bring only low-paying jobs. Ultimately, I worry that CAFOs might cause many of my friends and neighbors to leave Iowa. I have spoken with people from across the state whose communities already have been significantly impacted by CAFOs. In addition, I have heard of people who left Iowa because

they were overwhelmed by water pollution, air pollution, odors, and pests from CAFOs; it just became impossible for them to remain in their homes any longer.

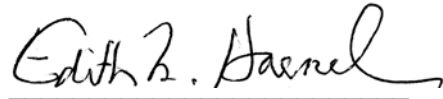
12. I think the CAFO industry has an outsize influence on our state and local government, and I worry that our community is losing its independence. Back when the CAFO nearest to us first moved in, I became more involved in local government, because I wanted to ensure that CAFO pollution would not destroy our home. I started going to Worth County Board of Supervisors meetings, and after every meeting, I would publish notes on Facebook so everybody had access to them. People who read my notes and shared my concerns about CAFOs started to attend meetings themselves. These people and I often have differing views from the Board of Supervisors, as some of the board members support the CAFO industry. Some of the board members did not welcome our opposing views. The Board began to cut down the amount of time in which members of the public were allowed to ask questions, until no questions were allowed unless we asked to be put on the agenda. It has become more difficult to have open discussions at the meetings where crucial decisions are made.

13. IA DNR is the watchdog agency that is supposed to protect Iowans from CAFO pollution and other environmental harms. However, I do not believe that IA DNR is doing its job. I have been disappointed by IA DNR's failure to engage with citizens concerned about CAFOs. I do not think IA DNR fairly reports the extent of damage to Iowa's waterbodies, and I believe its decision to approve biodigesters indicates that it does not take seriously the threats that CAFOs pose to people and the environment. At one point, IA DNR didn't even know how many CAFOs there are in the state.

14. I feel like my neighbors and I are being run over, and the agencies that are supposed to protect our health and our resources are not doing anything to stop it.

15. To empower Iowans and other people across the country, I hope the U.S. Environmental Protection Agency will ensure that CAFOs provide transparency about their operations, including information about their location, the number of animals they confine, and when and where they apply manure to fields. Without access to that information, people cannot protect their health, their families' health, or the environment.

I declare that under penalty of perjury that, to the best of my knowledge, the foregoing is true and correct. Executed this 25th day of October, 2022.

A handwritten signature in cursive script that reads "Edith H. Haenel". The signature is written in black ink and is positioned above a horizontal line.

Edith Haenel

Exhibit 9

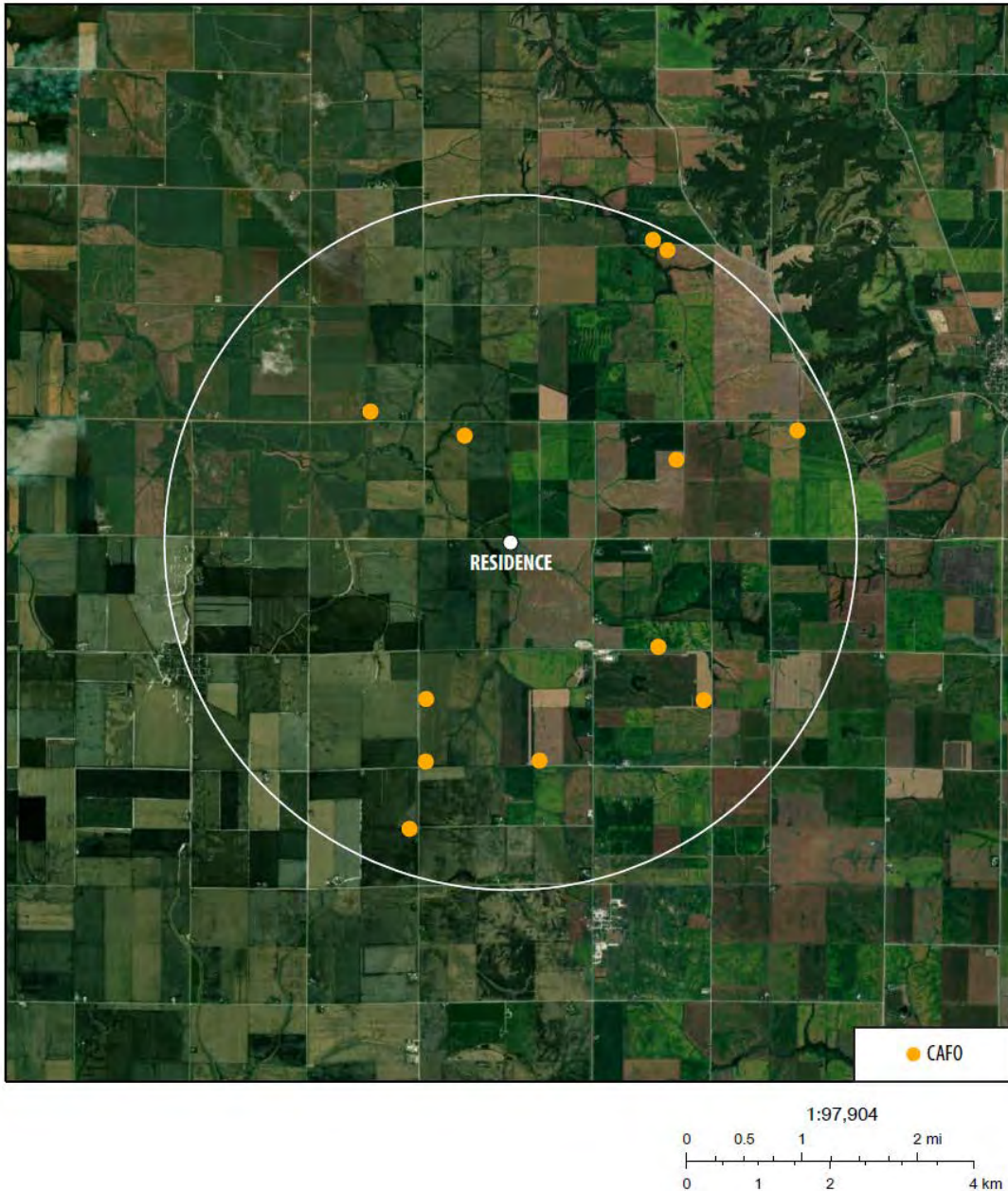
DECLARATION OF JEAN LAPPE

I, JEAN LAPPE, declare and state as follows:

1. I am 69 years old, and my husband and I have lived at [REDACTED] [REDACTED] Louisa County, Iowa for 40 years. I grew up in this area and have lived within a 10-mile radius for most of my adult life. The reason we live in this rural area is because we love having open space and spending time outdoors, and our home is secluded, as our closest neighbor is a half-mile away. Our home is very important to us, and over the years, we have put a lot of blood, sweat, and tears into it. We hope to one day pass it along to our son.

2. For the first 30 or so years of our time living in our home, we routinely opened the windows on nice days and spent hours outside gardening, picking apples, walking near the local creeks, hanging clothes out to dry, and entertaining family and friends. I love feeling the breeze, and in the warmer months, we'd leave our windows open and let the wind flow through the house.

3. That all changed when concentrated animal feeding operations ("CAFOs") started popping up in our community. The first CAFO near our home started operating in the mid-2000s. Since 2014, more CAFOs have begun operating, confining tens of thousands of pigs essentially in our backyard. As shown on the following map, there are now 12 CAFOs within three miles of our house, and the closest one is just under a mile away from us. The operations around us generally have two confinement buildings, and each building houses just under 2,500 pigs.



Source: Iowa Dep't of Nat. Resources, AFO Siting, https://programs.iowadnr.gov/maps/afo/?utm_medium=email&utm_source=govdelivery; Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community.

4. The CAFOs near my home generate millions of gallons of manure and, to my knowledge, they are all wet-manure management facilities, meaning that they store manure in liquid form—typically, in huge pits under the buildings where they confine the pigs. Sometimes,

the CAFOs contract with local farmers to haul the manure away. Other times, the CAFOs move the manure by pumping it through tubes and apply it to fields right near our home.

5. Being so close to CAFOs and land application fields has completely changed our lives. The stench can be simply unbearable. The pollution irritates my throat and sinuses and exacerbates health problems I experience due to an autoimmune disease. We've purchased two air purifiers, which help us breathe indoors, but the odor makes it difficult to go outside for even short periods of time. I miss my peaceful morning coffee in front of an open window or out on the deck. Now, if I spend too much time outside, I cough and get congested from the polluted air. When the stench is really bad, my husband and I waste no time getting into the house. I usually choose to stay inside to avoid the odor altogether, and consequently, I feel like I'm a prisoner in my own house.

6. The odor is especially bad during the months when local farmers spread manure on nearby fields. Recently, when they were spreading manure, the air was so unbreathable that I took my daughter's RV and left the area for three weeks. A couple of years ago, I went to visit my daughter in Colorado to escape the smell. I'm not the only one; I know many people in the community who leave the area to avoid odors and air pollution from manure application.

7. In addition to polluting the air, the animal waste generated by the CAFOs threatens drinking water. I would like to have our well tested by the state, but it is too expensive. Instead, I have done my own monitoring, and I have found that ammonia levels have increased since the CAFOs came to the area. One of my neighbors stopped drinking their well water altogether because it was contaminated with pollutants that probably came from the CAFOs. They are not alone: One recent study showed that, throughout Iowa, 40 percent of private wells

are contaminated with bacteria, which likely come from animal agriculture facilities.¹ A doctor once told me that no one in Iowa should be drinking their well water because contamination is so widespread.

8. I'm concerned that CAFOs also are polluting our local creeks. Several of the CAFOs near our house border East Fork Crooked Creek, which has been designated by the State of Iowa as an impaired waterway.² I used to participate in volunteer water quality monitoring, and we found that samples from the creek had high nitrate levels. We would test the nitrate levels before and after farmers applied manure near the creek, and the levels were higher after the manure applications. At times, the nitrate levels were 30 parts per million, which is well above the safe drinking water standard of 10 parts per million. But before we could report the results of our testing, we learned that the monitoring program had been shut down.

9. The pollution in East Fork Crooked Creek prevents us from enjoying it. We can't let our grandchildren wade in the water because contact with CAFO pollution could make them sick. And, when our children come home with their dogs in tow, we must make sure the dogs don't go in the creek, either. My daughter once had to take her golden retriever to the vet because he got a bad rash after going in the creek.

10. I have personally witnessed local farmers, whose fields run into East Fork Crooked Creek, engaging in dangerous manure management practices. For example, I have seen farmers applying manure right up to the banks of creek, without any buffers between the manure and the water. Applying the manure so close to the creek makes it easy for the waste to run off

¹ See Env't Working Grp., *Iowa's Private Wells Contaminated by Nitrate and Bacteria* (Apr. 2019), https://www.ewg.org/interactive-maps/2019_iowa_wells/ (showing that, of 55,000 private wells in Iowa that were tested, 22,000 were contaminated with bacteria).

² See Iowa Dep't of Nat. Res., *Water Quality Assessments Impaired Water List: East Fork Crooked Creek*, <https://programs.iowadnr.gov/adbnnet/Segments/6268/Assessment/2022>.

into the water. And one year during early December, just a quarter mile from my house, I saw a farmer applying manure to frozen fields, as you can see in the picture below. When farmers spread manure on frozen fields, it just sits on the ground, which means there's a significant chance that it will eventually wash off fields into nearby waterways. And manure applied to frozen fields continues to smell. We were smelling that manure for weeks—even many days later on Christmas morning!



Source: Jean Lappe

11. Over the past several years, I have repeatedly opposed new CAFOs opening in our area, because I am concerned about the threats CAFOs pose to our air and water. Along with other members of the grassroots non-profit organization Iowa Citizens for Community Improvement, I gave comments to the Iowa Environmental Protection Commission, explaining that the concentration of CAFOs in our community has caused dangerously high levels of

nitrate in local creeks. I drove three hours to speak to the Commissioners for only two minutes—but, in the end, the Commission didn't do anything to stop more CAFOs from polluting our community.

12. I have also submitted comments to IA DNR opposing new CAFOs and objecting to individual CAFOs' manure management plans. In those comments, I told IA DNR that adding more CAFOs to our community would only exacerbate already unlivable conditions. I also explained that IA DNR should prevent local farmers from engaging in unsafe manure management practices, like applying manure to fields that don't have buffering systems. Despite the outcry from our community, IA DNR has done nothing to protect us from the threats CAFOs pose to our water quality.

13. As a last resort, in 2014, I joined a coalition of community members and the nearby City of Mount Union to bring a lawsuit against local CAFO operators for producing odors, emissions, particulate matter, and flies, which make it impossible for us to enjoy our property. Unfortunately, that lawsuit failed, in part because the Iowa legislature and courts have erected numerous barriers to prevent community members from holding CAFOs accountable for their pollution.

14. Perhaps most distressing is the way that the CAFO industry has torn our community apart. We used to be a peaceful community, but now we're pitted against each other. Anybody who dares to stand up against the CAFO industry is subject to intimidation and harassment. One woman who joined the lawsuit was subjected to incessant bullying. She eventually committed suicide, and that tragedy caused an irreparable rift in the community. Our lives and the fabric of our community have become collateral damage to corporate agriculture.

15. We need the U.S. Environmental Protection Agency (“EPA”) to protect us from the corporate greed that is destroying our way of life. To combat CAFO water pollution, CAFOs should be required to get permits under the Clean Water Act. We need to make sure that CAFOs are held to stricter standards. We also need more effective ways for community members to have their objections taken seriously—and to hold CAFOs accountable when they pollute. Right now, the system is simply broken.

16. EPA is supposed to protect us from corporate bullies who see nothing but dollar signs. Our water quality has been stolen, and our property values and quality of life have been destroyed. Please help us start the clean-up in Southeast Iowa before it’s too late.

I declare under penalty of perjury that, to the best of my knowledge, the foregoing is true and correct. Executed this 24th day of October, 2022.



Jean Lappe

Exhibit 10



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Frank Gibbs: Liquid manure is too wet

Written by David Green. Aug. 20, 2006

By DAVID GREEN

Don't blame tile lines for discharges of liquid manure into drains, says soil scientist and farmer Frank Gibbs, and don't blame the rich soil with its worm holes leading to the tile.

Put the blame on the watered down manure. That's where the problem lies.

Gibbs, from the National Resources Conservation Service office in Findlay, Ohio, spoke to farmers last Wednesday at the annual Center for Excellence Field Day at Bakerlads Farm north of Clayton.

Gibbs told how he came to this conclusion several years ago, after he got a call from a producer in Ohio who had a problem. He was applying manure from his swine operation at only about half the recommended rate, but it was still finding its way into tile and drains.

A DNR officer told the farmer that he wouldn't cite him for discharges this time, but it had to be stopped.

"I went down there thinking I'd see big cracks in the ground," Gibbs said, "but the soil moisture was ideal. Impeccable shape. I saw lots and lots of night crawler holes and I thought, 'My God, could this be what's going on here?'"

Gibbs got ahold of some dye—similar to the kind used to check for leaks in a toilet tank—dumped it into the manure lagoon and agitated the mixture. After he dug down to a six-inch tile, manure was injected into the soil with a drag line. The tile was dry when the experiment began.

“We wondered how long it might take to percolate down to the tile lines. Twenty minutes? Should we go to lunch?”

There was no time for lunch, Gibbs said. The dye was there within seconds, and every time a pass was made over a lateral tile line, another pulse of colored liquid came through.

Gibbs wondered if the pressure from the applicator pump was the cause, so they next tried a gravity-feed system. Same problem. One more idea came to mind. This time they avoided the watery manure from the lagoon and loaded some of the thicker slurry from the pit under the hog barn.

“It didn’t go anywhere,” Gibbs said. “It behaved like manure. We dug up some areas with a back hoe and it was laying right where it was shot.”

He knew then not to fault the tile nor the healthy soil.

“The problem is simple. We’re watering manure down to where it behaves like water. Let me repeat that. We’re watering manure down to where it behaves like water. You don’t need to be a rocket scientist to understand that.”

Gibbs has heard the suggestion that no-till soil is at fault. Get rid of the worm holes and there’s no conduit for the manure.

Not true.

“Preferential flow will occur in conventional tillage through cracks and around the soil structure,” he said. “We need to stop confusing the issue with tillage. The issue is that we’re adding too much water.”

This is a situation that needs to be addressed, Gibbs said.

“We need to keep on top of this. We really do. I think some basic research could solve the problem.”

Maybe the percentage of solids needs to be up to four or five percent, he said. Or, from what he learned in Europe, even higher.

The Dutch method

With so many Dutch farmers investing in this area, Gibbs decided to take a trip to the Netherlands to see how they farmed in that country. He was in for a surprise.

He didn't see any of the watered down manure that the large dairies are using here. The solid content was at about eight percent.

He noticed a plastic membrane spread over a storage lagoon with rain water waiting to be pumped from an overnight storm. Gibbs figured it was to keep the water out of the lagoon, but he was wrong. It was to control odor.

Gibbs watched as a farmer loaded his applicator with manure and inserted a paper form into equipment that recorded his position by GPS. Once in the field, additional data was stamped onto the form. A sample bag of manure was collected to send for analysis by a government agency.

If manure exceeds the allowable nitrate rates, Gibbs was told, the farmer receives a bill from the government.

The Dutch farmer joked about having one government official for every farmer, but it isn't the heavy regulation that's hurting agriculture in Holland, he said, it's simply a lack of space.

Gibbs returned home knowing that the practice of watering down manure didn't come from Europe.

"That's our technology," he said. "We're going to all the work of writing up Comprehensive Nutrient Management Plans and then where does it go? Into the tile. We just need a little bit of research to figure this thing out so we don't have to scrap the whole thing."

Gibbs said he's made attempts to urge agricultural agencies to study the issue, but it's never gone far.

"Everybody's going off in other directions," he said. "We need to work together. We don't have to destroy our soils. We don't need to rip our tile out.

"What we should do is look at solids. Eight percent isn't that much. I don't know why we can't tweak that."

- Aug. 30, 2006

Stop it in the root zone

A visit to Wisconsin gave soil scientist Frank Gibbs additional hope for the future.

“They have some really good things going on there,” he said.

For example, the custom manure applicators have formed an association. They have standards and training, for those who choose to join the group. They work closely with the EPA. They practice cleanup of spills for when something goes wrong.

Gibbs was impressed with the beautiful crops growing on rolling hills. The key was the soil.

“They’ve got hay and they’ve got alfalfa and they put manure on it,” he said.

In this area, it’s almost always corn and soybeans, year after year. It’s the root system of a plant such as alfalfa that breaks up the soil to prevent compaction.

Custom applicators have to work with what they’re given, Gibbs said, and sometimes control structures are in order. Gibbs has built shut-off valves at the property line to stop the flow of liquid manure. A catch basin is added to collect the flow—a septic tank will do the job—and the manure can be pumped out and applied in a safe area between tile lines.

It’s just a Band-Aid approach, Gibbs said, not a solution, but it’s better than using rubber tile plugs in which case a farmer has no idea if the manure has left the tile. Besides, he asks, do we know where all the tile is? And if we miss one, who’s fault is it?

That’s when the arguing and finger-pointing begins. When manure flows into a drain, who is at fault—the farmer who owns the animals, the owner of the land where it’s being applied, or the person in charge of the application?

“If we do it the wrong way,” Gibbs said, “it’s going to be a mess.”

Any time manure enters a tile line, it’s wasted. At that point, Gibbs said, the nutrient is too deep to be absorbed by plants.

“We have to stop it in the root zone,” Gibbs said.

Smoke test highlights no-till

As a long-time proponent of no-till farming, Frank Gibbs often tries to convince other farmers to give it a try.

One of his early attempts was to dig out a cubic foot of his no-till soil and place it next to a sample from his neighbor’s sugar beet field that suffered from a lot of compaction due to trucks. Then he would pour a bottle of water onto each and watch it soak into his soil and run off his neighbor’s.

“It was kind of hokey,” Gibbs said. “Farmers would say, ‘You’re from the government. You probably poked holes in it.’ I needed a different way to show the value of no-till.”

He remembered a blower contraption a friend created for planting beans—it never worked right—and as a fan of Red Green, Gibbs got out the duct tape to rig up a device for blowing smoke into a tile line.

“I could make smoke come out of millions of worm holes,” he thought.

The smoke test shows good soil conditions and at the same time, it shows the avenue that liquid manure takes to reach tile lines. It takes the easiest route, Gibbs said, the path of least resistance. Through worm holes and cracks in the glacial till, manure can quickly makes its way to tile.

To set up the Center of Excellence Field Day at Bakerlads Farm, Gibbs dug a hole to reach a tile line. He found two hand-laid tile lines, then a plastic line, then another older line. Tile is everywhere.

He set up his blower, dropped in a smoke bomb and watched for smoke to start rising out of a soybean field. Smoke started to run toward the bean field, but the line made a turn and headed back into the cornfield. That’s the trouble with tile lines, he said, you never know how many there are or where they end up.

Watching smoke rise out of the soil is a great demonstration, Gibbs said, and a real attention-getter.

“It’s hard for folks to deny this stuff happens when there’s smoke coming up under their feet.”

Exhibit 11

DECLARATION OF DEVON HALL

I, DEVON HALL, declare and state as follows:

1. My name is Devon Hall. I am African-American, and I am 66 years old. I live at [REDACTED] in Warsaw, Duplin County, North Carolina. Duplin County is a rural area with a significant proportion of low-income African-American residents. I was born and raised in Duplin County, and I have lived here my whole life. My three brothers and three sisters live in Duplin County too, and our children grew up together here. Our roots are here.

2. In 2002, I co-founded the Rural Empowerment Association for Community Help (“REACH”). Currently, I am REACH’s Executive Director. REACH works to address social, economic, and environmental inequities in and around Duplin County. We work to help people understand that everybody is somebody and has a right to be heard. I co-founded REACH because I saw that there was a lack of resources in Duplin County to help people like me and my family, and I worried that my grandchildren’s generation might not have any future here.

3. For years, much of REACH’s work has focused on pollution from concentrated animal feeding operations (“CAFOs”). According to the North Carolina Department of Environmental Quality (“NC DEQ”), there are more than 520 swine CAFOs in Duplin County. Together, these facilities confine almost two-and-a-half million pigs. Because there are so many swine CAFOs, some people call Duplin County the “hog capital of the world.”

4. As the map below shows, there are at least 30 swine CAFOs within three miles of my home. Together, these CAFOs confine up to 150,388 pigs. All 30 CAFOs operate under North Carolina’s Swine Waste Management System General Permit, rather than permits issued under the Clean Water Act’s National Pollutant Discharge Elimination System. According to NC DEQ data on the number of animals confined in each CAFO, I understand that at least 12 of

these 30 CAFOs are allowed to meet or exceed the threshold for a “Large CAFO” set by the U.S. Environmental Protection Agency (“EPA”). The closest CAFOs of any size are only about a half-mile from my home. I drive by those CAFOs almost every day, and I can see the confinement barns when I drive by. The closest Large CAFOs are about a mile-and-a-half from my home.



Source: See N.C. Dep’t of Env’t Quality, List of Permitted Animal Facilities – 4-1-2020, <https://deq.nc.gov/cafo-map>; see also Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community.

5. By a conservative estimate, the pigs in the 30 CAFOs near my home together generate more than 250,000 tons of manure each year,¹ which is more than the amount of fecal matter annually produced by the combined population of North Carolina's five largest cities.² Almost all the CAFOs near my home store the pigs' urine and feces in giant uncovered pits, which the industry calls "lagoons." There are at least 48 lagoons within three miles of my home.

6. Hurricanes, storms, and even relatively light rainfall can cause lagoons to breach or overflow, flooding surrounding areas with urine and feces. After Hurricane Florence hit North Carolina in 2018, NC DEQ reported that 49 CAFO lagoons had breached or overflowed, releasing waste into surrounding areas. The flooding disrupted people's access to safe drinking water. Samples of private well water taken after the hurricane showed an increase in the presence of *E. coli*.³ I worry that, because climate change is causing strong storms to hit the area more and more frequently, we will continue to experience flooding and flooding-related water pollution from CAFOs. But even light rainfall can cause lagoons to overflow. In June 2020, it

¹ According to NC DEQ, the CAFOs are permitted to confine a combined 150,388 pigs, which is approximately 21,860 1,000-pound animal units. According to the Natural Resources Conservation Service, hogs and pigs produce 63.1 pounds of manure per day per 1,000-pound animal unit, which amounts to 11.5 tons of manure per year per 1,000-pound animal unit. See Nat. Res. Conservation Serv., *RCA Issue Brief #7* (Dec. 1995), https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/technical/nra/rca/?cid=nrcs143_014211#table1.

² According to EPA, a person produces 0.5 pounds of fecal matter per day, which amounts to 0.091 tons of fecal matter per year. See EPA, *Risk Assessment Evaluation for Concentrated Animal Feeding Operations* 9, Tbl. 3.3 (2004). The combined population of Charlotte, Raleigh, Greensboro, Durham, and Winston-Salem is 2,183,425. See U.S. Census Bureau, *Quick Facts*, <https://www.census.gov/quickfacts/fact/table/US/PST045219> (enter "Charlotte," "Raleigh," "Greensboro," "Durham," and "Winston-Salem" in the search bar).

³ See John Murawski, *The Amount of E. coli and Fecal Matter in NC Wells Has Spiked Since Hurricane Florence*, *The News & Observer* (Oct. 25, 2018), <https://amp.newsobserver.com/news/business/article220561095.html>.

was reported that just two inches of rainfall flooded a lagoon in Sampson County, which is directly west of Duplin County, killing over 1,000 fish in surrounding waterways.⁴

7. To get rid of the waste stored in the lagoons, the CAFOs apply it to fields using mechanized sprinkler systems that spray it high into the air. There are sprayfields within three-quarters of a mile in either direction of my home. I know from my work at REACH that once waste is applied to fields, it can seep into groundwater and run off into nearby rivers and streams.

8. I have seen CAFO workers apply waste in ways that increase the risk that the waste will run off the field. For example, I have seen workers spray waste on fields during rainy weather, when the soil is more likely to become oversaturated and unable to absorb all the waste. I have also seen waste being sprayed when no one was monitoring the equipment to make sure it wasn't broken or overapplying the waste. In addition, I've seen workers spraying waste day and night when rain is forecasted, in order to reduce the amount of waste in the lagoons. Because the workers' main concern is reducing the waste in the lagoons, I think it's likely that they overapply it on the fields.

9. In addition to witnessing CAFOs apply waste in ways that are likely to cause water pollution, I have seen CAFO waste in ditches that lead to waterways. The waste is red and smells like manure. Once the waste is in the ditches, it's almost certain that it runs downstream into waterways.

10. I am concerned about the negative health and environmental consequences of water pollution from so many CAFOs being released in one relatively small area, in and around Duplin County. Because of my concerns, I have changed my behavior and given up activities I

⁴ See Lisa Sorg, *1,000+ Dead Fish: NC DEQ Releases More Troubling Details on Hog Lagoon Spill*, NC Policy Watch (July 17, 2020), <https://pulse.ncpolicywatch.org/2020/07/17/1000-dead-fish-deq-releases-more-troubling-details-on-hog-lagoon-spill/#sthash.wHd88Yfu.dpbs>.

enjoy. For instance, I was once an avid fisherman, but I have not been fishing near my home in over a decade. I stopped fishing after I began to catch fish with open sores. I believe these sores are caused by bacteria and other pollution from CAFOs, and I do not think that fish with open sores are safe to eat. I have spoken with multiple REACH members who have also given up fishing after catching deformed fish, seeing dead fish floating in the water, and noticing that the water had turned an unusual color or begun to give off an unpleasant odor. Duplin County is a rural community; hunting and fishing are a way of life, and most people do not have extra income to spare. By forcing people to buy fish at the store, instead of fishing in the creeks and streams near their homes, CAFOs are harming our recreational interests and our economic interests, too.

11. In addition to giving up fishing, I have given up drinking tap water. The same is true for many REACH members. Most people in Duplin County used to drink well water, but many now receive county water instead. Even though my water comes from the county, I am not confident that it is safe to drink. I do not think that county water is any safer than well water; I am concerned that both water sources are contaminated with pollution from CAFOs. Some REACH members have complained that county water tastes like chlorine or that it looks milky. Most people buy bottled water instead. We always buy bottled water to serve at REACH meetings, and we distribute bottled water to community-members during and after hurricanes and other emergencies.

12. Not only do CAFOs pollute our water, but they also produce terrible odors. At first, I didn't know what chemicals were in the air, causing it to smell so terrible. I began to work as a citizen scientist in 2004, because I wanted to understand exactly what I was breathing and how it was likely to affect my body, so that I could better protect myself and help my

neighbors protect themselves. I learned that CAFOs smell terrible because they release toxic gases, like ammonia and hydrogen sulfide.

13. The odors that CAFOs produce cause serious health problems. I have personally experienced watery eyes, headaches, and nausea on days when the smell is bad. I have also spoken to hundreds of people whose health has suffered as a result of exposure to these gases. People have shared that they have experienced nausea, shortness of breath, watery eyes, and runny noses. I am also familiar with studies showing that CAFO odors cause people's stress levels to increase.

14. To avoid the nearly constant stench of animal waste, most people in Duplin County close their windows and stay indoors, relying on expensive air conditioning to keep cool. People here have given up some of the most cherished aspects of rural life, like gardening, drying clothes on a line, hosting cookouts, and spending time outdoors. Many of us worry about declining home values. One REACH member has said that he looks for excuses to leave home and stays away longer than necessary, "because the smell that is there depresses [him]."

15. My own published research confirms that under-regulated CAFOs pose serious risks to people living nearby. For instance, I contributed to a study showing that kids who attend school downwind of swine CAFOs are exposed to relatively high levels of hydrogen sulfide, putting them at greater risk of symptoms like difficulty breathing and impaired lung function.⁵ I also worked on a study finding that the children of people who work in swine CAFOs are more

⁵ See Virginia T. Guidry et al., *Hydrogen Sulfide Concentrations at Three Middle Schools Near Industrial Livestock Facilities*, 27 J. Exposure Sci. & Env't Epidemiology 167 (2017).

likely to carry dangerous antibiotic-resistant bacteria on their bodies—even though those children never set foot in industrial hog-growing operations themselves.⁶

16. The CAFO problem in Duplin County is only getting worse. Now, energy companies are collaborating with CAFOs to trap and sell the methane and carbon dioxide that CAFO lagoons generate. These “biogas” projects involve capping the lagoons to trap the methane and carbon dioxide, transporting it through pipelines, constructing facilities to process it, and injecting it into existing natural gas pipelines. These projects rely on and further the outdated and unsafe system of storing animal urine and feces in lagoons and spraying it on fields, which causes water and air pollution. Biogas projects may in fact worsen this pollution. I understand that capping CAFO lagoons causes an increase in ammonia and other harmful pollutants in the liquid waste that remains in the lagoons and is then sprayed on fields.⁷

17. In addition to the growing biogas industry, I have witnessed the poultry industry expand dramatically in Duplin County. It seems like I can’t travel two miles from my house or from REACH’s office without seeing a new poultry facility being built. I am aware of one report from 2016 that estimates that industrial poultry operations confine more than 16 million chickens and turkeys in Duplin County alone.⁸ That report is old now, and, based on my personal experience, I believe the number of poultry operations has continued to increase. Like pig

⁶ See Sarah M. Hatcher et al., *The Prevalence of Antibiotic-Resistant Staphylococcus aureus Nasal Carriage Among Industrial Hog Operation Workers, Community Residents, and Children Living in their Households: North Carolina, USA*, 125 *Env’t Health Persps.* 560 (2017).

⁷ See Cameron Oglesby, ‘This Plan Is a Lie’: Biogas on Hog Farms Could Do More Harm than Good, *Southerly* (Mar. 24, 2022), https://southerlymag.org/2022/03/24/biogas-could-do-more-harm-than-good-hog-industry/?utm_source=ActiveCampaign&utm_medium=email&utm_content=Weekend+Reader%3A&utm_campaign=Weekend+Reader+Email.

⁸ *Env’t Working Grp. & Waterkeeper All., Exposing Fields of Filth: Locations of Concentrated Animal Feeding Operations in North Carolina by County: Duplin County* (last visited July 18, 2020), https://www.ewg.org/interactive-maps/2016_north_carolina_animal_feeding_operations_bycounty.php.


operations, poultry facilities usually dispose of waste by applying it to fields without appropriate prior treatment. Poultry waste, too, can seep into groundwater or wash into nearby waterways. In light of the growing poultry and biogas industries in Duplin County, both of which contribute to water pollution, it is all the more important to ensure that CAFOs and the water pollution they cause are properly regulated.

18. In my experience, many of the CAFOs in Duplin County are essentially self-regulated. NC DEQ does not have enough people to inspect all the CAFOs appropriately, to ensure that they are properly permitted and complying with their permits. In light of NC DEQ's difficulties, EPA should act to require CAFOs to apply for the correct permits.

19. EPA action is also important because it difficult for community members to hold the CAFOs accountable for the pollution they cause. For example, I once made an anonymous complaint to NC DEQ after I saw a CAFO spraying waste when it was raining, which is a violation of the Swine Waste Management System General Permit. Later in the day, the CAFO operator called me and said that he knew that someone with my phone number had made a complaint about the CAFO. I invited the CAFO operator to come to the REACH office to talk about the issue, but he didn't take me up on the offer. After I got off the phone with the CAFO operator, I called NC DEQ and told them that they had dropped the ball by giving out my information. If complaints aren't kept anonymous, it deters people from reporting permit violations. The state legislature has also made it more difficult for community members to hold the CAFOs accountable. In 2018, the legislature passed a bill that makes it more difficult for neighbors to bring nuisance suits against CAFOs. Because it can be difficult for community members to hold CAFOs accountable at the state level, I think it would be beneficial to have more federal involvement in CAFO permitting in North Carolina.

20. REACH has no interest in putting anybody out of business. But we believe it is possible for CAFOs to be more environmentally friendly and more community friendly. It is very upsetting to me that some of the corporations providing jobs in our community are also polluting the environment, destroying quality of life, and making people sick. We only have one Earth, and everyone should want to help take care of it.

I declare under penalty of perjury that, to the best of my knowledge, the foregoing is true and correct. Executed this 28 day of September, 2022.

A handwritten signature in black ink that reads "Devon J. Hall". The signature is written in a cursive style and is positioned above a horizontal line.

Devon Hall

Exhibit 12

DECLARATION OF DANIELLE WIRTH

I, DANIELLE WIRTH, declare and state as follows:

1. I am 69 years old, and I live with my husband and our two English Labradors at [REDACTED], Boone County, Iowa. Boone County is a rural area with a population of about 26,700 people. My husband and I have lived here for 43 years, and during that time, we have done our best to restore and care for our land. Among other things, we pay close attention to the plants, the animals, and the weather cycles.

2. I am a naturalist, ecologist, and environmental educator. I hold a Ph.D. from the College of Agriculture and Life Sciences at Iowa State University, where I served as a lecturer in environmental ethics, with an emphasis on empirical science. For 10 years, I served as an assistant professor in Drake University's Environmental Science and Policy Program, where I taught courses on environmental science, ecological restoration, and nature writers throughout history. I also have worked at the Iowa Department of Natural Resources ("IA DNR"), both as a regulator in the Environmental Protection Bureau and as an education specialist, helping to run an environmental education facility. Before that, I served as a federal park ranger. Although I am retired now, I still try to make myself available as a resource and helper to young people who are working to protect our land and water.

3. As an engaged citizen of Iowa and a naturalist, ecologist, and environmental educator, I know that industrial animal agriculture—including concentrated animal feeding operations ("CAFOs")—heavily pollute rivers and streams in my state, degrading important and fragile ecosystems. CAFOs generate, store, and spread large amounts of manure, which contains high levels of nitrogen. When this manure is released in excessive quantities, as the result of spills or improper application, the nitrogen in the manure contaminates water in the form of

nitrate and nitrite, both of which promote algae growth. Algae, in turn, depletes dissolved oxygen levels and endangers aquatic species. Blue-green algae is particularly dangerous because it produces microcystins, a class of toxins that can cause serious health problems for humans, including dangerous skin infections. Microcystins can also cause liver damage in canines, potentially killing them within three hours of contact with contaminated water. In addition to nitrogen, CAFO manure also can carry dangerous pathogens that threaten human health, such as *E. coli* and Methicillin-resistant *Staphylococcus aureus*, a bacterium that is nearly impossible to kill with traditional antibiotics. It does not take a science degree to realize that we should do our best to keep these pollutants out of our water.

4. Many people assume that the rural Midwest is a bucolic place, full of red barns and animals grazing on green pastures, but that image has not been the reality for many decades. Now, many smaller, independent farms have been replaced by industrial agriculture facilities. According to the IA DNR, there are 42 concentrated animal feeding operations (“CAFOs”) in Boone County, confining over 111,000 swine, along with 120,000 chickens and more than 4,000 cattle.¹ The swine CAFOs in Boone County *alone* produce about 285 million pounds of manure every year,² nearly eight times as much as the sanitary waste produced annually by the entire

¹ See Iowa Dep’t of Nat. Res., *Animal Feeding Operations Databases*, <https://programs.iowadnr.gov/animalfeedingoperations/> (click “Search,” input Boone in “County” dropdown).

² This estimate is calculated using data available in the IA DNR Animal Feeding Operations Database, including animal type, number, and average weight, as well as daily manure production estimates. See Jeff Lorimor et al., *Manure Characteristics: Manure Management Systems Series 13* (2004), https://www.canr.msu.edu/uploads/files/ManureCharacteristicsMWPS-18_1.pdf.

human population of Boone County.³ Based on the information made available by IA DNR, I do not believe that any CAFOs in Boone County have federal permits authorizing them to discharge water pollution.

5. As industrial agriculture has taken over in Iowa, water quality has deteriorated, and I believe that CAFOs bear significant responsibility for the problem. I have seen CAFOs engaging in practices that pose serious risks of water pollution, such as applying manure to frozen ground. And I have collected data suggesting that these risky practices, in fact, are polluting our water. Starting in the 1990s, I helped to develop a statewide water quality testing program implemented by volunteers, including students, teachers, and other engaged citizens. At first, our testing revealed higher nitrate levels in the spring, when farmers typically apply synthetic fertilizers to crop fields. Around 2010, however, we began to observe very high nitrate levels in the fall, correlating with the land application of CAFO manure. When our findings started to get attention, Iowa DNR stopped allowing us to input our data. Soon after, the testing program was shut down. I believe that the decision to shut down the program was motivated by a desire to hide evidence that CAFOs degrade surface water quality.

6. Not only do I believe that CAFOs have degraded surface water, but I also am concerned that CAFOs threaten drinking water. To learn more about these threats, several friends and I requested and studied manure management plans submitted to IA DNR by CAFO owners and operators. With help from my husband, who is an archaeologist familiar with

³ Based upon the 2020 U.S. Census, 26,715 people live in Des Moines, Iowa. The U.S. Government Accountability Office estimates that humans produce 3.72 pounds of sanitary waste per person per day. See U.S. Gov't Accountability Off., *Concentrated Animal Feeding Operations: EPA Needs More Information and a Clearly Defined Strategy to Protect Air and Water Quality from Pollutants of Concern* 58 (2008), <https://www.gao.gov/assets/gao-08-944.pdf>. Thus, the human population in Boone County produces 36.2 million pounds of sanitary waste per year.

superficial and subsurface geology, I identified a CAFO from which discharge would flow directly into the Des Moines River, near the headwaters of Saylorville Lake. It's my understanding that Saylorville Lake is a source of drinking water for the city of Des Moines, but water from the lake is often too polluted for the city to use.⁴ Based on my research, I believe the CAFO that I identified could be partly responsible for this problem.

7. My husband and I used to drink water from our well, until agricultural pollution made our well water unsafe. Now, we get our drinking water from Xenia Rural Water District, which is quite expensive compared to well water. Xenia Rural Water District purchases water from the city of Des Moines, which is about 35 miles southeast of our home. As a former employee of IA DNR, I know that Des Moines has had to develop one of the most sophisticated water treatment plants in the country, because it treats water that is heavily polluted by CAFOs and other industrial agriculture facilities. Not every city can afford such a sophisticated plant, and we cannot rely on industry to clean up on its own.

8. Because of my concerns about water pollution from CAFOs and other industrial agriculture facilities, I am no longer able to enjoy Iowa's waterbodies as I once did. For example, my husband and I love to canoe and kayak, but we no longer paddle in the Raccoon River near our home. I understand that there are 727 CAFOs, including 355 Large CAFOs, in the North and South Raccoon watersheds,⁵ and we are concerned about coming into contact with pollution from these CAFOs that could threaten our health. In addition, we've stopped eating

⁴ See Perry Beeman, *Water Works pays for Saylorville water too polluted to use, eyes \$50M plant expansion*, July 6, 2021, <https://iowacapitaldispatch.com/2021/07/06/water-works-pays-for-saylorville-water-too-polluted-to-use-eyes-50m-plant-expansion/>.

⁵ See Iowa Dep't of Nat. Res., *Animal Feeding Operations Databases*, <https://programs.iowadnr.gov/animalfeedingoperations/>; see also Snoflo, *North Raccoon Watershed*, <https://snoflo.org/hydrology/watershed-h07100006-north-raccoon>; Snoflo, *South Raccoon Watershed*, <https://snoflo.org/hydrology/watershed-h07100007-south-raccoon>.

fish from the river. And, much to their dismay, I will not allow my two English Labradors to swim there, because I do not want them to be exposed to pollution. I have reason to be concerned. While I was teaching, I heard from a colleague who took a class canoeing on the river that one student had developed a skin infection, and another had suffered an E. coli infection. After hearing this, I made sure that all my students wore protective gear when touching the water. But one should not have to wear nitrile gloves while paddling.

9. I enjoy viewing and identifying aquatic species—including clams, mussels, fish, frogs, otters, and great blue herons—and I am concerned that water pollution from CAFOs and other industrial agriculture facilities could be putting these species at risk. Our home is less than a quarter mile from the Des Moines River. Turtles used to climb up from the creek that runs through our land to try nesting in our yard, but I have not seen some of my favorite turtle species for many years. I believe that pollution from CAFOs and other industrial agriculture facilities has damaged these species' habitat and reduced their numbers. Piping plovers, wonderful little shorebirds that nest and feed along waterways, already are listed as endangered in Iowa—in part, because of our degraded water. And, recently, otters have been reintroduced to Iowa. I am thrilled to have otters back in waterbodies near my home, but I worry that pollution from CAFOs and other industrial agriculture facilities might prevent otters from thriving here.

10. CAFOs damage more than the environment. All across Iowa, small businesses are disappearing, and small towns are dying. Our young people are leaving the state, and I think it's because rural Iowa is being hollowed out by industrial agriculture. I see notices of small farms up for sale in the paper every day. Often, these small farms are bought by industrial operations. These days, there are very few independent farmers raising animals near me.

11. I think Iowans have been let down by officials who are too closely associated with industrial agriculture. I am especially disappointed with IA DNR; they are not transparent, and they are not thorough. For instance, it was extremely difficult for my friends and me to obtain the manure management plans mentioned above. In the end, we had to pay \$600 for copies of those plans, because IA DNR did not have electronic versions available. And, based on conversations I have had with IA DNR staff, I believe the agency's CAFO permitting program is far too lax. It's my understanding that IA DNR staff do not always visit CAFOs to investigate whether they discharge. Instead, staff sometimes rely on maps and snapshots that don't show the full picture.

12. If the U.S. Environmental Protection Agency ("EPA") were to grant this petition and significantly increase the number of discharging CAFOs with NPDES permits, I would feel relieved and encouraged. In particular, I would welcome the opportunity to submit comments and attend public hearings about CAFO permits. The current system simply does not work, but increased oversight of CAFOs under federal law could be a first step toward protecting surface and drinking water, restoring recreation opportunities, helping aquatic species to recover, and rebuilding rural communities. Without action from EPA, Iowa's rural communities don't stand a chance against pollution from CAFOs and other industrial agriculture facilities.

I declare under penalty of perjury that, to the best of my knowledge, the foregoing is true and correct. Executed this 25th day of October, 2022.



Danielle Wirth

Exhibit 13

DECLARATION OF SANDY BIHN

I, SANDY BIHN, declare and state as follows:

1. I live in Lucas County, Ohio with my husband, Frank Bihn. I am the Executive Director of Lake Erie Waterkeeper. I founded Lake Erie Waterkeeper in 2004, and we became a licensed member of Waterkeeper Alliance in 2005.

2. Lake Erie Waterkeeper serves the entire Lake Erie watershed, which includes parts of Michigan, New York, Ohio, Indiana, and Ontario. We seek to ensure fishable, swimmable, and drinkable water throughout the watershed, and we advance this goal using advocacy, education, litigation, and innovation.

3. Lake Erie is an extremely important resource for the region. The lake provides drinking water for over 11 million people across the United States and Canada, and it is home to more fish than all the other Great Lakes combined. The lake is also an economic engine, attracting visitors who use the lake for sailing, swimming, kayaking, and other recreational activities.

4. I have always loved Lake Erie, ever since I first visited during family vacations as a kid. In 1987, my family built our home on the shores of Maumee Bay/Lake Erie, which is located in the western part of Lake Erie. My love for the lake is one reason why I was inspired to found Lake Erie Waterkeeper. The other reason is that, after seeing parts of the lake turn green with algae in the late 1990s, I realized that Lake Erie needed a spokesperson. So, I began advocating for the lake, which eventually led me to found Lake Erie Waterkeeper.

5. Concentrated animal feeding operations (“CAFOs”) started coming to the Lake Erie watershed in the late 1990s, around the same time that the lake’s water started to turn green. While farmers in the watershed used to raise animals in pastures, CAFO operators keep their

animals confined in buildings on small pieces of land. The animals in these CAFOs generate an enormous amount of urine, feces, and other waste. The swine and dairy cow CAFOs in the region store this waste in liquid form in concrete pits under the confinement buildings or in large open pits, and they get rid of it by spreading it on fields. There is a stark contrast between how CAFOs manage animal waste and how we manage human sewage. We make individuals repair their septic tanks to make sure their waste is treated, but CAFOs with millions of animals do not have to treat their waste at all before spreading it on the ground.

6. Most CAFOs in the Lake Erie watershed are located in the western portion of the watershed, in Indiana, Michigan, and Ohio. There are now approximately 2,500 confined animal feeding operations in the Western Lake Erie watershed, which together confine about 400,000 cows, 1.8 million pigs, and nearly 24 million chickens and turkeys.¹ The Ohio Department of Agriculture estimates that between 2002 and 2017, the number of animals in the Maumee watershed, which makes up just part of the Western Lake Erie watershed, increased by 88 percent.²

7. The massive amount of manure that is generated by animals in the Maumee/Western Lake Erie watershed and applied to fields by CAFOs and smaller operations overwhelms the soil and ends up in waterways. The Maumee/Western Lake Erie watershed has over 14,000 miles of ditches (which drained the Black Swamp) and the most tile-drained fields in the U.S. Tile drains are underground pipes with holes in them that take excess water out of the

¹ See Ethan Bahe et al., *EWG Analysis: In the Western Lake Erie Basin, Newly Identified Animal Feeding Operation Hot Spots Produce Excess Manure, Threatening Waterways and Human Health* (2022), <https://www.ewg.org/research/ewg-analysis-western-lake-erie-basin-newly-identified-animal-feeding-operation-hot-spots>.

² See Ohio Lake Erie Comm'n, Ohio Lake Erie Commission Meeting (June 9, 2021), https://lakeerie.ohio.gov/static/Meetings/Ohio+Lake+Erie+Commission_meeting+minutes_June_2021.pdf.

soil. When CAFO operators apply manure to these fields, it enters the drain tiles and flows directly into ditches, streams, and other waterways. Manure also washes off the fields when CAFO operators apply it before or during rainy weather.

8. I strongly suspect that CAFO operators commonly overapply manure on fields close to their confinement buildings, because it is too expensive for them to transport the manure to fields that are farther away and might have more need for the nutrients in the manure. My suspicions are based in part on an Ohio program called H2Ohio, which launched in 2019 and is meant to help CAFO operators reduce phosphorus runoff from manure application. Under the program, the state pays operators \$35 per acre to apply poultry manure and \$60 per acre to apply all other manure to fields that have phosphorus levels of 50 parts per million or less.³ I think the state has decided to pay operators to apply manure on fields with lower phosphorus levels because, without the financial incentive, the operators will continue to apply it on fields that don't need additional phosphorus, which causes runoff.

9. CAFO manure causes serious water pollution throughout the Lake Erie watershed. Both Michigan and Ohio have declared that Western Lake Erie is an impaired waterbody under the Clean Water Act because of the massive toxic algal blooms that occur in the lake each year. The harmful algal blooms are caused by excess nutrients in the water. The state agencies acknowledge that agriculture is a primary source of the excess nutrients, but they don't distinguish between nutrients from commercial fertilizer and CAFO manure. However, it's clear that manure is a significant source of the excess nutrients. For example, in 2019, the region had a very rainy spring that prevented many farmers from planting crops, which meant that they

³ See H2Ohio, Manure Incorporation (2020), <https://hancockswcd.com/wp-content/uploads/Grants/H2Ohio/H2Ohio-Program-Manure-Incorporation-Guideline-Sheets.pdf>.

applied less commercial fertilizer. But the algal bloom in 2019 was one of the worst that we've had. I think the algal bloom was so bad because the CAFO operators still had to get rid of their manure by spreading it on the fields, even though the fields weren't planted with crops. A lot of that manure then made its way to the lake and contributed to the algal bloom. In addition, scientific studies connect manure from CAFOs to nutrients in waterways. A recent study found that adding a CAFO to a region leads to an increase in phosphorus in the region's drainage basin.⁴

10. The annual toxic algal blooms in Lake Erie have serious consequences each year, but the one in 2014 was especially harmful. That year, an algae-induced toxin from the lake was found in a water treatment plant that supplied drinking water for Toledo. The governor declared a state of emergency and banned people from drinking and showering in the water. The ban affected nearly half-a-million people for almost three days.

11. To address the harmful algal blooms in Lake Erie, the United States and Canada entered into the Great Lakes Water Quality Agreement. As part of the Agreement, the countries set a goal of reducing the amount of nutrients entering Lake Erie by 40 percent by 2025.⁵ The United States' domestic action plan requires reductions in nutrient runoff from Indiana, Michigan, and Ohio—where CAFOs in the Western Lake Erie watershed are concentrated—and the Canadian plan requires reductions from Ontario.⁶

⁴ See Zach Raff & Andrew Meyer, *CAFOs and Surface Water Quality: Evidence from Wisconsin*, 104 Am J. Agric. Econ. 161 (2022).

⁵ See Kevin Bunch, International Joint Commission, *Binational Plans Call for 40 Percent Reduction to Algal-Fueling Nutrients* (Apr. 5, 2018), <https://www.ijc.org/en/binational-plans-call-40-percent-reduction-algal-fueling-nutrients>.

⁶ See *id.*

12. In addition to causing toxic algal blooms, manure that enters waterways can kill fish. In 2017, three CAFO operators in Ohio applied manure to fields shortly before a heavy rainstorm, and the manure washed off into nearby creeks. Ammonia in the manure depleted oxygen levels in the creeks, which killed nearly 67,000 fish.⁷

13. CAFO pollution has disrupted my ability to enjoy the water near my home. After we built our home on Maumee Bay, we swam and drove WaveRunners in the water. But when the water started turning green with algae, it clogged the intakes of our WaveRunners and prevented us from using them. We installed a pool because we no longer wanted to swim in the bay, and we got rid of the WaveRunners. Then, during the 2019 algal bloom, the algae-laden water from the bay flowed into a ditch on our property and along a bike path in the area, and the smell was so bad that people didn't use the bike path all summer. The water had a putrid, septic smell that made people sick. The city spent about \$40,000 to prevent it from happening again.

14. Exposure to harmful algal blooms can cause illness in humans and animals. I once got a call from people who had gone in the water when it was green, and they had gotten diarrhea. In another incident, water from the bay was on a slide in Maumee Bay State Park, and children who used the slide got severe diarrhea, which led to the slide being removed from the park. I also know of people who have gone into the water with open cuts and gotten infections. And I know of dogs that have died after coming into contact with the algae in the water.

15. The algal blooms also cause serious economic harm in the region. Reports show that the algal blooms reduce tourism, which costs the region both income and jobs. They also

⁷ See Associated Press, *Fines Handed Out after Manure Spills Kills 67,000 Fish in Ohio*, Outdoor News (Oct. 13, 2017), <https://www.outdoornews.com/2017/10/13/fines-handed-manure-spills-kill-67000-fish-ohio/>.

lower property values and drive up people's water bills, which is the result of the increased cost of treating the polluted water.

16. In addition to causing destructive pollution, the CAFOs in the region have driven out small, independent farmers, which creates a rural environmental justice issue. Since the CAFOs came to the area, they have put about 80 percent of small farmers out of business. When I've visited the rural communities where those farmers once were, the people have told me that the number of churches and stores in the community has declined, which has reduced their quality of life.

17. CAFO pollution is also an urban environmental justice issue. Urban areas that get their drinking water from Lake Erie have to spend millions of dollars to treat the water, and this cost gets passed on to residents, who are often people of color. For example, one report found that in Toledo, where the percentage of residents of color is higher than the state average, a family of five's water bill includes almost \$100 each year just to cover the cost of treating their drinking water.⁸

18. Although the Western Lake Erie watershed is full of CAFOs that are causing extensive water pollution, most CAFOs in the watershed do not have National Pollutant Discharge Elimination System ("NPDES") permits under the Clean Water Act. CAFOs avoid getting NPDES permits by claiming that they do not discharge any water pollution, but it's clear from the algal blooms in the watershed that this isn't true. CAFOs that avoid getting NPDES permits instead operate without water pollution permits at all or under state-law permits. This means that in the Western Lake Erie watershed—where CAFOs are located across three states—

⁸ See All. for the Great Lakes, *Western Lake Erie Basin Drinking Water Systems: Harmful Algal Bloom Cost of Intervention* (May 2022), <https://greatlakes.org/wp-content/uploads/2022/05/FINAL-COI-Report-051622.pdf>.

CAFOs are subject to a patchwork of different rules. These disjointed rules fall short of the collective efforts that are necessary to protect the watershed.

19. I track when CAFO operators apply for construction permits, and I know that Ohio is reviewing permits for approximately 6,400 more dairy cows; 16,950 more pigs; and 120,000 more chickens and turkeys. Given the ongoing growth in the CAFO industry, at a minimum, the U.S. Environmental Protection Agency and states need to ensure that CAFOs have NPDES permits to better regulate the water pollution they cause.

I declare under penalty of perjury that, to the best of my knowledge, the foregoing is true and correct. Executed this 25th day of October, 2022.

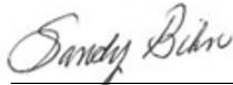

Sandy Bihn

Exhibit 14

DECLARATION OF KEMP BURDETTE

I, KEMP BURDETTE, declare and state as follows:

1. I am 48 years old. I live in Pender County, North Carolina with my partner and two daughters, aged 13 and 15. I am the Cape Fear Riverkeeper at Cape Fear River Watch (“CFRW”), and I have held this position for 12 years. Before that, I served as CFRW’s Executive Director from 2009 to 2014. I have been a member of CFRW for 17 years.

2. The Cape Fear River Basin is the largest river basin in North Carolina, encompassing about 9,164 square miles, or approximately 16.5 percent of North Carolina’s total land area. Nearly one-third of the State’s population lives in the Cape Fear River Basin, and about 20 percent of North Carolinians get their drinking water from the Cape Fear River Basin, including people living in Greensboro, Fayetteville, and Wilmington. The Cape Fear River Basin also boasts some of North Carolina’s most impressive remaining natural biodiversity, providing habitat for a variety of native, threatened, and endangered species and supporting a thriving tourism economy for recreational boaters, birders, and other nature-lovers.

3. As the Cape Fear Riverkeeper, I work to protect and improve the water quality of the Lower Cape Fear River, its estuary, tributaries, wetlands, and groundwater. I respond to citizen complaints of water pollution; carry out patrols in the air, on the ground, and on the water to identify threats to water quality; and collaborate with members, local partners, regulators, and legislators at the local, state, and federal levels to eliminate identified threats. I also conduct water-quality sampling in the Black, Northeast Cape Fear, and Cape Fear Rivers and associated waters, and I share this data with the public, so they know if and when it is safe to recreate in the water.

4. Concentrated animal feeding operations (“CAFOs”) that confine swine and poultry are more densely concentrated in the Cape Fear River Basin than they are anywhere else on Earth. Each year, CAFOs in this region raise about 316 million birds and more than 10 million pigs.¹ Collectively, these animals generate a staggering quantity of waste, much of which finds its way into the Cape Fear River and associated waters.

5. Swine CAFOs typically store animal urine and feces in huge, uncovered pits, and they get rid of the waste by spraying it on fields. These practices cause a tremendous amount of water pollution. To illustrate the scale of this problem, I think it is helpful to compare the management of swine waste with the management of human waste. There are about 10 million people and 10 million pigs in North Carolina. Unlike the human population, however, swine are not distributed throughout the State; instead, almost all the pigs are concentrated in Eastern North Carolina. Each pig produces six to 10 times more waste than a person, which means that, in Eastern North Carolina alone, pigs are producing roughly as much waste as 100 million people. Although human waste is treated before disposal, swine waste typically is not. So, when CAFOs spray swine waste on fields in Eastern North Carolina, it’s not too different from spraying untreated waste from a city with a population of 100 million out in the open, right near people’s homes, which no one would ever dream of doing.

6. I have firsthand experience of water pollution from CAFOs in the Cape Fear River and associated waters. At CFRW, we patrol the river and surrounding areas by air at least once a month. From the air, it’s easy to see that the basin is full of CAFOs, and many are very close to waterways. I don’t think we have ever done an aerial patrol that didn’t reveal either a

¹ See *CAFOs*, Cape Fear River Watch, <https://capefearriverwatch.org/cafos/> (last visited Sept. 28, 2022).

swine or poultry CAFO violating state waste management rules in a manner that poses serious risks to our waterways. For example, we have seen swine CAFOs continuing to spray waste even as the waste runs off into waterways or pools on the field, which increases the risk of runoff. We have also seen swine CAFOs spraying waste into ditches that lead to waterways. During one recent flight, we saw a swine CAFO spraying waste on a field using a leaking pump. The waste leaking out of the pump was flowing right into a nearby stream. Figures One through Six at the end of this declaration show just some of the evidence that we have collected during our aerial patrols of runoff from land application by swine CAFOs.

7. Not only have I witnessed swine CAFOs discharging water pollution during the land application of waste, but I also am aware of CAFOs discharging from waste storage pits. As shown in Figure Seven, one of our aerial patrols revealed a swine CAFO using a hose to pump waste over the side of a waste pit and onto a neighboring field. Waste pit breaches and overflows can also cause discharges. For example, in June 2020, a waste pit at a swine CAFO breached, spilling three million gallons of urine and feces into the waters of the Cape Fear River Basin and killing at least 1,000 fish.²

8. Over the past decade, hurricanes and tropical storms have repeatedly caused CAFO waste pits to breach and overflow, releasing massive amounts of waste into waterways. During Hurricane Matthew in 2016, a number of waste pits in the Cape Fear River Basin overflowed. Just two years later, during Hurricane Florence, at least two waste pits breached and other pits overflowed. I toured parts of the basin affected by Hurricane Florence, and I saw that

² See Lisa Sorg, *1,000+ Dead Fish: DEQ Releases More Troubling Details on Hog Lagoon Spill*, The Pulse, N.C. Policy Watch (July 17, 2020), <https://pulse.ncpolicywatch.org/2020/07/17/1000-dead-fish-deq-releases-more-troubling-details-on-hog-lagoon-spill/>.

the two breached waste pits had released their entire contents, which totaled an estimated seven million gallons, into the flood waters.

9. Flood waters contaminated with CAFO waste have devastating effects. The contaminated waters flow into communities downstream and sometimes remain there for weeks, while animal waste seeps into homes, churches, schools, and anything else in the waters' path. The pollutants in the waste, including dangerous bacteria, can cause illness in people who return to clean up their communities, and they can also contaminate private drinking wells and public drinking water supplies. After Hurricane Florence, several public drinking water systems in North Carolina stopped supplying drinking water because of potential contamination from CAFO waste.³

10. During Hurricane Florence, my family and I experienced firsthand the damage that flooding at CAFOs causes. Our home was flooded, and the water reeked of swine waste. We weren't able to drive back to our home for three weeks, and we had to move out for three years while the damage was repaired. It takes a long time to recover from flooding, and some people aren't ever able to return to their homes. My next-door neighbor's house has been sitting empty since Hurricane Florence, with the door wide open. Other houses near mine have been torn down entirely.

11. In addition to seeing and experiencing water pollution from CAFOs, I have documented the effects of CAFO pollution on water quality. CFRW conducts water-quality sampling upstream and downstream of CAFOs, and we have found unbelievably high levels of bacteria in waterbodies near CAFOs. For example, in Stocking Head Creek, which has over 40

³ See Wynne Davis, *Overflowing Hog Lagoons Raise Environmental Concerns in North Carolina*, NPR (Sept. 22, 2018), <https://www.npr.org/2018/09/22/650698240/hurricane-s-aftermath-floods-hog-lagoons-in-north-carolina>.

CAFOs in its watershed, we have gotten samples with fecal coliform bacteria levels of over 120,000 colony-forming units/100 milliliter (“mL”)—that is, over 600 times the state standard of 200 colony-forming units/100 mL. Exposure to fecal coliform bacteria can cause nausea, vomiting, and diarrhea.

12. CFRW’s water-quality sampling has also found high levels of nitrogen and phosphorus in waterbodies near CAFOs. Because animal waste contains these nutrients, I think CAFOs are responsible for the nutrients in the water. Recent research supports this conclusion. Researchers at the University of North Carolina Wilmington who have been monitoring water quality in the Lower Cape Fear River Basin for more than 25 years recently presented data that show steady and significant increases in nutrients and other indicators of CAFO pollution throughout the Lower Cape Fear River Basin.⁴ The researchers concluded that the increases are likely the result of CAFOs and their waste management practices.⁵

13. During CFRW’s aerial patrols, we have seen numerous algal blooms in the Cape Fear River and associated waters, which are a clear sign that there are too many nutrients in the water. Algal blooms cause serious harm to aquatic plants and animals. Algal blooms form on the top of the water, depriving aquatic vegetation of the sunlight necessary to grow. And when algae decays, it pulls dissolved oxygen out of the water, which kills fish and other aquatic wildlife.

14. Because of the CAFO water pollution that I have seen, my family and I don’t fully enjoy the waterways near our home. I am an avid outdoorsman, fisherman, and bird enthusiast. I grew up in Wilmington, exploring the waterways, wetlands, and swamps of the

⁴ See Michael A. Mallin et al., *Environmental Assessment of the Lower Cape Fear River System*, 2020, at 17 (2021), <https://uncw.edu/cms/aelab/lcfrp/wq%20reports/2020-lcfrp-env-report.pdf>.

⁵ *Id.*

Cape Fear River Basin, and it's important to me that my daughters have the same opportunity to experience our region's incredible waterways. The opportunity to spend time near the water is one reason why we chose to live on the Black River, which is a tributary of the Cape Fear River. However, our home is downstream from many CAFOs; the headwaters of the Black River are in Sampson County, which has over 450 swine CAFOs that confine more than two million pigs, as well as an enormous number of poultry CAFOs. I used to fish in the river regularly, but I no longer fish as often as I would like to. I don't feel comfortable eating fish from the Black River knowing that they may have come into contact with bacteria or other CAFO pollutants. In addition, I don't let my daughters swim in the river very often, because I'm concerned that the CAFO pollutants will make them sick. I wish my family could enjoy the water near our home without having to question whether it is unsafe because of CAFO pollution.

15. In North Carolina, CAFO pollution is an environmental justice issue. Most CAFOs in North Carolina are in Sampson County and Duplin County, where there are high poverty rates, and a large proportion of the population is Black, Latinx, and Native American. The disparity in exposure to CAFO pollution is clear just from driving around the area—you don't see CAFOs next to country clubs or expensive houses; instead, you usually see them next to small homes in low-income communities.

16. To better protect waterways and communities from CAFO pollution, the U.S. Environmental Protection Agency ("EPA") should ensure that discharging CAFOs obtain National Pollutant Discharge Elimination System ("NPDES") permits consistent with the Clean Water Act ("CWA"), as federal law requires. Less than two percent of CAFOs in North Carolina

have NPDES permits,⁶ so I think it is likely that much of the water pollution from CAFOs in the Cape Fear River Basin comes from CAFOs *without* NPDES permits.

17. Increasing NPDES permit coverage would help community members protect themselves and their local waterways from CAFO pollution by increasing transparency and giving people the opportunity to comment on CAFO nutrient management plans. If community members had access to nutrient management plans, they would know whether certain risky practices are allowed, which would help them identify and report permit violations. And if nutrient management plans were available for public comment, community members could help to improve them. For example, if I had the opportunity to comment on nutrient management plans, I would encourage the North Carolina Department of Environmental Quality (“NC DEQ”) to include numeric limitations on the amount of nutrients that CAFOs can discharge, which could help reduce algal blooms in waterways.

18. In addition, EPA and NC DEQ should take more enforcement actions against CAFOs that discharge water pollution without CWA permits or otherwise violate state waste management rules. When my colleagues at CFRW and I witness these violations during our aerial patrols, we report them to NC DEQ, but it doesn’t seem like there are any consequences because the violations keep happening.

19. The Cape Fear River Basin is my home, and I have committed my life to protecting the Cape Fear River and the communities that depend on it. I feel privileged to serve as the voice of the river and to represent the interests of CFRW members against polluting

⁶ See EPA, *NPDES CAFO Permitting Status Report: National Summary, Endyear 2021*, completed 07/20/22, <https://www.epa.gov/system/files/documents/2022-07/CAFO%20Status%20Report%202021.pdf>.

industries. But my work has made clear to me that EPA and NC DEQ need to do more to address the serious harm that CAFOs are inflicting in the Cape Fear River Basin.

I declare under penalty of perjury that, to the best of my knowledge, the foregoing is true and correct. Executed this 26 day of October, 2022.

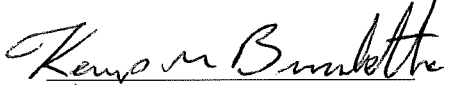

Kemp Burdette



Figure One. Runoff from land application by a swine CAFO.
Source: Kemp Burdette



Figure Two. Runoff from land application by a swine CAFO.
Source: Kemp Burdette



Figure Three. Runoff from land application by a swine CAFO.
Source: Kemp Burdette



Figure Four. Runoff from land application by a swine CAFO.
Source: Kemp Burdette



Figure Five. Runoff from land application by a swine CAFO.
Source: Kemp Burdette



Figure Six. Runoff from land application by a swine CAFO.
Source: Kemp Burdette



Figure Seven. Swine CAFO pumping waste out of a waste pit and onto a neighboring field.
Source: Kemp Burdette

Exhibit 15

DECLARATION OF DIANE ROSENBERG

I, DIANE ROSENBERG, declare and state as follows:

1. My name is Diane Rosenberg. I am 68 years old, and I live in Fairfield, Jefferson County, Iowa. Fairfield is a lively town of about 10,000 people. The town has a university, which has attracted people from all over the country.

2. I love the community and quality of life in Fairfield. For the first 40 years of my life, I lived in very congested suburban areas. I grew up in New York, and I have also lived in Boston and Washington, D.C. I moved to Fairfield in 1995 with my husband at the time. I quickly fell in love with the quiet and the fresh air in this area. The people here are very friendly, and we look out for each other.

3. The character of agriculture in Jefferson County has changed in the time that I have lived here. When I first moved to the area, I would see hogs out grazing, and I found it very charming. However, in the early 2000s, I noticed that I saw fewer hogs grazing. Around 2004, when I was an editor for a local newspaper, the paper published a series of articles on concentrated animal feeding operations (“CAFOs”). The articles alerted me to the prevalence of CAFOs in Jefferson County.

4. There are now approximately 80 CAFOs in Jefferson County. Together, the CAFOs confine nearly 200,000 pigs, which together generate at least 55 million gallons of manure per year. The CAFOs generally store this manure in liquid form in huge pits under the confinement buildings, or in the case of some of the older CAFOs, out in the open in uncovered lagoons, and they get rid of the manure by spreading it on fields.

5. I’m aware of CAFOs spreading manure on fields in ways that pose serious risks of water pollution. For example, I’ve seen workers spreading manure on fields with snow on

them, which is a sure way to cause water pollution. The snow prevents the manure from absorbing into the soil, leaving the manure to sit on the surface of the snow and ground. Then, when the temperature warms, the snowmelt mixes with the manure and carries it into nearby waterways. In addition, I'm aware of stories about CAFOs applying manure shortly before rainfall, which also can carry the manure into waterways. Once, a community member reported that rain had washed manure off a field and into a nearby stream. The manure formed a froth on top of the water. She reported the incident to the Iowa Department of Natural Resources ("IA DNR"), and the agency's water quality testing showed E. coli in the stream. I've even heard of one instance in which a company that had contracted with a CAFO to haul manure just dumped the manure in a field and left it there.

6. Not only do CAFOs apply manure in risky ways, but they also overuse application fields. I've reviewed many manure management plans for CAFOs in Jefferson County, and I worked with a college student to create a map of the fields designated for manure application in each plan. The map shows that some fields are included in more than one CAFO's manure management plan. In fact, some fields are included in four or five CAFOs' plans, and many of the fields that are receiving more than one CAFO's waste are directly adjacent to or near each other. When so many CAFOs are using one field, it's very likely that they are applying more manure than the soil and crops can take up, leaving the excess manure to run off into waterways. And when these fields are close to each other, they put nearby waterways at even greater risk of pollution from runoff. I am also aware that IA DNR can't adequately monitor how much of the manure is going where, when, and at what rates because they use an outdated paper system to file manure management plans, which makes it nearly impossible to keep on top of all the CAFOs' manure application practices.

7. CAFOs have created a water quality crisis in Iowa. Our waterways are full of pollutants that are associated with CAFOs, including nutrients like nitrogen and phosphorus and bacteria like E. coli and Campylobacter. One example that's close to home is Lake Darling in Washington County, just north of Jefferson County. When we first moved here, I would take my children to swim in the lake. Over the years, more and more CAFOs came to Washington County. As the number of CAFOs grew, nutrient and sediment pollution in the lake increased and eventually rendered it unusable. The state took six years and spent \$16 million dollars to restore the lake. Right after it reopened, four CAFOs that together hold approximately 10,000 pigs were added to the watershed, and others have continued to come. Washington County is now home to over one million pigs. The CAFOs have made the expensive restoration of Lake Darling totally useless. Some of the fields that are in four or five CAFOs' manure management plans are in the Lake Darling watershed. Just about every week this year, there have been advisories that it isn't safe to swim in the lake because of high levels of E. coli and microcystin, which is a harmful toxin produced by certain bacteria. Last year, there were also many advisories for E. coli and microcystin. I've read articles warning dog owners to prevent their dogs from going into lakes polluted with microcystin because exposure can make their pets very ill or even kill them. This is just one lake, but it's an example of what CAFOs are doing to waterways all over Iowa.

8. In addition to polluting surface water, the CAFOs also contaminate drinking water. I know a woman in Howard County who had to stop using her drinking well after the water became unsafe to drink. She had to pay for bottled water and then "shock" the well by adding a large amount of chlorine to the water in order to use it again. I also know of other people who have had to stop using their drinking wells altogether and switch to the rural water

system at their own expense. Parts of Iowa—including Howard County—have karst terrain, which puts the aquifer at a particularly high risk of contamination. As we see in the case of the Howard County woman who lives in an area with karst terrain and sinkholes, pollutants from CAFOs are sometimes reaching the aquifer and contaminating drinking wells.

9. CAFOs also pollute the air and create noxious odors. I first smelled a CAFO when I drove by one with my daughter. I had heard how horrible the smell was, and I was curious to experience it myself. I rolled down the windows, and the odor that we smelled was indescribable. It made me sick to my stomach for about 20 minutes. The second time I experienced the smell, I was driving by a field where a CAFO was spreading manure. It was winter and all the car windows were up, but the smell still came inside. I was nauseous for about 20 minutes again. It's a kind of nausea that doesn't go away very quickly. I understand this nausea is caused by inhaling the hydrogen sulfide gas that CAFOs generate and emit, which then affects the central nervous system.

10. CAFO air pollution can harm community members' health. I once went on a bus tour of CAFOs in Davis County, which has even more operations than Jefferson County. After the tour, I developed the most miserable migraine, which I think was from breathing in all the hydrogen sulfide and ammonia that CAFOs emit. I also know of people who developed environmental asthma and irritable bowel syndrome, and who experienced nausea, vomiting, confusion, depression, and migraines from living near a CAFO. And I know of a woman who had to close her home-based elder care business after a CAFO was built nearby, because one of her residents developed respiratory problems, and she didn't want to risk the health of other

residents. Her daughter also stopped bringing her children to see their grandmother because of concerns for their respiratory health.¹

11. I've spent a lot of time collecting information on the CAFOs in Jefferson County, because I think it's important for people to be informed about CAFOs in their community. Knowing where CAFOs and manure application fields are located is essential for protecting public health. For example, I know of studies showing that people who live near CAFOs can be exposed to Methicillin-Resistant *Staphylococcus aureus*, which can cause serious health problems.² People should know if they're close enough to a CAFO to be at risk of exposure. Knowing where manure application fields are located also is important for protecting water quality, and I believe that people deserve to know if their drinking water could be contaminated by CAFO pollutants. And regulators should know where the application fields are so they can ensure that each field receives only an appropriate amount of manure and monitor nearby groundwater and surface water for signs of contamination.

12. IA DNR is not doing enough to oversee CAFOs in the state. I've heard from people who work at IA DNR that they don't have enough staff to thoroughly review CAFO manure management plans. I've reviewed some of the plans myself, and I've found mistakes that impact how much manure the CAFOs can apply. IA DNR mostly leaves it up to the CAFO operators to complete and follow the manure management plans correctly. This self-policing

¹ See Maria C. Mirabelli et al., *Asthma Symptoms Among Adolescents Who Attend Public Schools that are Located Near Confined Swine Feeding Operations*, 118 *Pediatrics* e66, e70 (2006) (finding that children attending schools up to three miles from CAFOs, who were thus estimated to be exposed to CAFO air pollutants, experienced asthma symptoms, including wheezing).

² See Shawn G. Gibbs et al., *Isolation of Antibiotic-Resistant Bacteria from the Air Plume Downwind of a Swine Confined or Concentrated Animal Feeding Operation*, 114 *Env't Health Persp.* 1032 (2006).

policy is like allowing the fox to guard the hen house, with serious consequences for our waterways.

13. IA DNR also fails to take adequate enforcement actions against CAFOs when they pollute waterways. When community members make complaints about runoff, the agency sometimes investigates, but not always. IA DNR doesn't have enough staff to investigate every incident. Over the years, they shifted from issuing more violations and fines to "coaching for compliance," which basically means they advise a CAFO owner on how to avoid the problem again. I don't feel this is a strong enough deterrent to encourage CAFOs to carefully follow regulations and best management practices. Even when IA DNR issues fines, the amounts are pathetic. The fines range from \$3,000 to \$10,000, which is low enough that the CAFOs just treat them as the cost of doing business. The fines provide little incentive for CAFOs to be more careful. The IA DNR has the option to refer more egregious violations to the State Attorney's Office to recommend larger fines, but they rarely do.

14. Right now, there aren't enough safeguards to protect people and the environment from CAFO pollution. While lots of people try to do the right thing, the bad actors take advantage of the system and harm Iowa's public health and environment. Almost every year, the number of polluted waterways in Iowa is the same or greater than the year before. The state's efforts haven't been enough to stop this trend. We need significant federal policy changes to ensure that CAFO pollution doesn't continue to harm people's lives and the environment.

I declare under penalty of perjury that, to the best of my knowledge, the foregoing is true and correct. Executed this 25 day of October, 2022.

Diane Rosenberg

Diane Rosenberg

Exhibit 16

DECLARATION OF JEAN MENDOZA

I, JEAN MENDOZA, declare and state as follows:

1. I am 77 years old, and I live in White Swan, Washington—an unincorporated community on the Yakama Indian Reservation in Yakima County. I am the Executive Director of Friends of Toppenish Creek (“FOTC”), and I have held this position for over 12 years.

2. Together with surrounding areas, Yakima County is a major agricultural hub. Portions of Yakima County and the Yakama Indian Reservation make up the Lower Yakima Valley, an approximately 1000-square-mile area where about half the land is irrigated and comprises the most productive agricultural region in Washington State. Among other things, Yakima County has over fifty dairy cow-confining concentrated animal feeding operations (“CAFOs”). Most dairy CAFOs in Yakima County are clustered in the Lower Yakima Valley, including about five located on the Yakama Indian Reservation.

3. The Lower Yakima Valley is an environmental justice community. About 80 percent of people living in the Lower Yakima Valley identify as Latino, and 10 percent identify as Native American.¹ By contrast, Latinos make up less than 14 percent of people living in Washington State as a whole, and Native Americans make up only two percent.² In addition, people in the Lower Yakima Valley tend to have relatively low incomes, as compared with the rest of the state. The median annual household incomes in Yakima County and the Lower

¹ See Jean Mendoza, Friends of Toppenish Creek, *Life is Cheap in Yakima County*, Front & Centered (Dec. 2, 2015), <https://frontandcentered.org/life-cheap-yakima/>.

² See *QuickFacts: Washington*, U.S. Census Bureau, <https://www.census.gov/quickfacts/fact/table/WA/PST045221> (last visited Oct, 19, 2022).

Yakima Valley are \$55,000 and \$33,000, respectively, both of which fall far below the statewide median annual household income of around \$77,000.³

4. A group of neighbors formed FOTC in 2008 when a dairy CAFO with 7,000 cows threatened to relocate to the banks of Toppenish Creek, an important tributary of the Yakima River, which in turn, is a tributary of the Columbia River. Even though it might seem to be a minor waterbody, Toppenish Creek is vital for our region, which receives relatively little rainfall. Based on our experiences with other dairy CAFOs in the area, my neighbors and I knew that the relocating CAFO would pose a major threat to our water and destroy our quality of life. We succeeded in opposing that CAFO, and we incorporated as a non-profit in 2009. We have since become a leader in the fight for clean water and clean air in Yakima County.

5. These days, FOTC continues to work for the protection and restoration of the Toppenish Creek, Yakima River, and Columbia River watersheds as natural and community resources. Because CAFOs cause significant harm to these watersheds, a major portion of our work focuses on CAFOs. Among other activities, we support community-led initiatives to raise awareness about the threats that CAFOs pose to our water, health, and environment. We gather and disseminate information about the problems we seek to address, including by testing drinking water for CAFO pollutants such as nitrates and phosphates. We regularly engage with the Yakima Regional Clean Air Agency and other government decision-makers. From 2012 to 2019, we were part of the Lower Yakima Valley Groundwater Management Area Advisory Committee, which focused on monitoring and reducing nitrate concentrations in groundwater through the development and implementation of educational campaigns and protective measures.

³ See Don Meseck, Wash. State Emp't Sec. Dep't, *Yakima County Profile* (updated Apr. 2022), <https://esd.wa.gov/labormarketinfo/county-profiles/yakima> (last visited Oct. 19, 2022).

We also collaborate with other groups in advocating for the enforcement of our nation’s Safe Drinking Water Act, Clean Water Act, and Clean Air Act. And we hold state agencies accountable for the implementation and enforcement of the state’s laws and regulations protecting our air, land, and water. FOTC operates under the simple principle that all people deserve clean air, clean water, and protection from abuse that results when profit is favored over people.

6. Dairies have a long history in Yakima County, but the industry has changed significantly over time. In the 1980s, Yakima County had approximately 140 dairy operations, with a total population of roughly 20,000 milk cows. Since then, the number of small dairies has decreased, but the remaining operations have grown dramatically. Now, there are about 50 CAFOs in the area, confining approximately 100,000 milk cows. Each cow produces about as much waste as 23 adult humans. Together, CAFOs in Yakima County generate as much waste as a city of more than two million people,⁴ but unlike cities, these CAFOs don’t have sewage treatment systems to disinfect their waste.

7. CAFOs in the Lower Yakima Valley deplete our precious water supplies. It’s my understanding that a 1945 law has been interpreted to allow CAFOs to withdraw virtually unlimited amounts of groundwater to maintain the animals they confine.⁵ Years ago, that law

⁴ The U.S. Government Accountability Office estimates that each person produces 3.72 pounds of sanitary waste per person per day. See U.S. Gov’t Accountability Off., *Concentrated Animal Feeding Operations: EPA Needs More Information and a Clearly Defined Strategy to Protect Air and Water Quality from Pollutants of Concern* 58 (2008), <https://www.gao.gov/assets/gao-08-944.pdf>. Lactating cows can produce up to 155 pounds of manure each day. See Jeff Lorimor et al., *Manure Characteristics: Manure Management Systems Series* 13 (2004), https://www.canr.msu.edu/uploads/files/ManureCharacteristicsMWPS-18_1.pdf.

⁵ See *Five Corners Family Farmers v. State*, 268 P.3d 892, 900–01 (Wash. 2011) (finding that RCW 90.44.050 allows for the construction of wells and withdrawal of groundwater for stock-watering purposes without a permit and that such withdrawals are not limited to 5,000 gallons per day).

might not have raised alarm, but now, CAFOs withdraw millions of gallons of pure water from deep aquifers every day.⁶ Unless CAFOs are monitored more closely, I worry that there might not be much water left for future generations of people in this area.

8. In addition, I believe that CAFOs in the Lower Yakima Valley routinely discharge water pollution. Based on my research and experience, I know that the vast majority of CAFOs in this area rely on wet manure management systems, which involve storing liquid manure in often-unlined pits before spraying it onto fields. However, storage pits do not prevent pollutants in manure, such as ammonia and nitrate, from leaching into soil and groundwater. In fact, recent samples of soil from the sidewall of a waste pit in Yakima County revealed nitrate concentrations of 113.1 parts per million (“ppm”), which is significantly higher than the target level of 45 ppm.⁷

9. Evidence of CAFO pollutants in wells in the Lower Yakima Valley indicates that CAFOs are discharging water pollution. In 2017, the U.S. Geological Survey determined that about 20 percent of wells tested in the Lower Yakima Valley consistently exceeded safe drinking water standards for nitrates.⁸ The Washington State Department of Ecology also gathers quarterly water samples from 30 monitoring wells in the Lower Yakima Valley Groundwater Monitoring Area, and it found that 45 percent of the initial samples exceeded safe drinking water

⁶ See Mendoza, *supra* note 1.

⁷ See Anchor QEA, *H&S Bosma Dairy Lagoon No. 3 Abandonment Plan 4–5* (2022), attached to petition as Exhibit 24.

⁸ See Raegan L. Huffman, U.S. Geological Survey, *Concentrations of Nitrate in Drinking Water in the Lower Yakima River Basin, Groundwater Management Area, Yakima County, Washington, 2017* (2018), <https://pubs.usgs.gov/ds/1084/ds1084.pdf>.

standards for nitrates.⁹ This is concerning because nitrates in drinking water are associated with a range of health problems, including birth defects, insulin-dependent diabetes, and cancer.

10. In 2015, a federal district judge concluded that several dairy CAFOs in the Lower Yakima Valley were responsible for contaminating neighboring drinking-water wells with nitrate pollution.¹⁰ As part of a settlement agreement, the CAFOs agreed to line their waste pits. Lining the waste pits was supposed to reduce pollution, but unfortunately, nitrate levels have not decreased significantly over time.¹¹ In my opinion, wet manure management—and particularly, the storage of liquid manure—inevitably leads to groundwater contamination; merely lining storage pits is not enough to protect public health.

11. In addition to contaminating groundwater, I believe that CAFOs regularly pollute surface water in this area. There is a strong connection between groundwater and surface water here, so contaminated groundwater also affects creeks, rivers, and streams. In addition, sprayed waste sometimes drifts across fields into nearby waterbodies, and manure spills can reach waterbodies too.

12. I am concerned about surface water pollution from CAFOs because, for me and many other people living in the Lower Yakima Valley, life is intimately connected to fish and the Yakima River. In fact, some Native people believe that human life will cease if salmon do

⁹ See Lower Yakima Valley Groundwater Advisory Committee, *Ambient Monitoring Initial Report Part of GWMA Implementation Plan* (June 20, 2019), <https://www.yakimacounty.us/DocumentCenter/View/21633/GWAC-Presentation---Monitoring-Well-Report-Overview---2019620-v20-1>.

¹⁰ See *Cnty. Ass'n for Restoration of the Env't, Inc. v. Cow Palace, LLC*, 80 F. Supp. 3d 1180 (E.D. Wash. 2015).

¹¹ See Letter from Vincent McGowan, Water Quality Program Manager, State of Wash. Dep't of Ecology, to Edward Kowalski, EPA Region 10 (July 11, 2022), <https://ecology.wa.gov/DOE/files/dc/dc1cc49b-d818-419b-8664-349807c76073.pdf>.

not return to this area to spawn. I moved to the White Swan area in 1995, and in the first few years after my move, I regularly saw people selling fish along the roadsides during fishing season. Fishermen sold locally caught salmon. Eating this beautiful food was one of the joys of my life. However, I no longer see people selling fish by the sides of the road, and locally caught fish is harder to find. Many salmon species in the region are now endangered. I know that there are many threats to waterbodies in this part of the country. Because declining fish populations have coincided with the increasing concentration of CAFOs in this area, I think that water pollution from CAFOs could be at least partly at fault for the population declines. And not only has water pollution from CAFOs contributed to declining fish populations, but it also adds to the mix of pollutants that makes fish caught in this area unsafe to eat.

13. I'm worried that the dairy industry's efforts to expand the use of biodigesters, which capture methane emitted by manure in CAFO waste pits to produce biogas, will exacerbate the contamination impacting our communities. Biodigesters fail to address the water pollution that CAFOs cause, and they ultimately produce little output compared to the effort required.¹²

14. Even though evidence suggests that they discharge water pollution, most CAFOs in this area lack National Pollutant Discharge Elimination System ("NPDES") permits under the Clean Water Act ("CWA"). According to the Washington State Department of Ecology ("WA Ecology"), there are over 100 Large CAFOs in Washington State, but only 24 have active

¹² See Friends of Toppenish Creek, *Air Pollution from CAFOs in Yakima County – Potential Impact of Digesters that Produce Natural Gas from Cow Manure*, <http://www.friendsoftoppenishcreek.org/cabinet/data/Air%20Pollution%20from%20CAFOs%20in%20Yakima%20County%20III.pdf>.

NPDES permits.¹³ Based on my research and experience, I believe that the majority of CAFOs without NPDES permits are discharging water pollution in violation federal law, but I do not think that Washington officials will hold those CAFOs to account.

15. Under-regulated CAFOs in the Lower Yakima Valley threaten the health of people living in our community. For example, Campylobacter infection is very common here. Campylobacter species are widespread in dairy cows and other mammals, and campylobacter infection is a leading cause of diarrhea in humans. Rates of Campylobacter infection are about four times higher in the Lower Yakima Valley than they are elsewhere in the state.¹⁴ And bacteria aren't the only problem. Agriculture-related ammonia pollution is almost twice as high in Yakima County as it is in any other county in Washington,¹⁵ and Yakima County has high rates of health conditions associated with exposure to this pollution, including pre-term birth, myocardial infarction, and lung disease.¹⁶

16. I do not believe that Washington officials take adequate enforcement actions against CAFOs that discharge. Last spring, while I was visiting friends who live near a dairy CAFO, I noticed that a truck transporting liquid manure had spilled manure on the road. I reported the incident to the Washington State Department of Agriculture and WA Ecology. In

¹³ See Dep't of Ecology State of Wash., *Clean Water Permit for Large Livestock Operations, Manure Lagoons Available for Review* (updated July 7, 2022), <https://ecology.wa.gov/About-us/Who-we-are/News/2022/June-22-Clean-water-permit-for-large-livestock-ope>.

¹⁴ See Margaret A. Davis et al., *Risk Factors for Campylobacteriosis in Two Washington State Counties with High Numbers of Dairy Farms*, 51 J. Clinical Microbiology 3921 (2013).

¹⁵ See EPA, *Envirofacts about Ammonia on Washington State in Agriculture Sectors* (2020), <https://enviro.epa.gov/envirofacts/embed/nei?pType=SECTOR&pReport=county&pState=&pState=53&pPollutant=&pPollutant=NH3&pSector=&pSector=38&pSector=18&pSector=31&pYear=2017&pCounty=&pTier=&pWho=NEI> (last visited Oct. 19, 2022).

¹⁶ See Wash. State Dep't of Health, *Washington Tracking Network*, <https://fortress.wa.gov/doh/wtn/WTNPortal/#!q0=370>.

addition, I took photos of the spill and submitted those photos to the agencies. Although the agencies were required to notify me of the outcome of their investigation, I never received an update. Instead, when I reached out for news, WA Ecology staff told me to submit a public records request. When I eventually received the investigative report, I saw that WA Ecology had waited several days to investigate my complaint. By that time, there was no manure on the road. WA Ecology staff ignored my photographs and concluded that the CAFO was following best management practices. They recommended that I ask the county to repave the road, but I do not believe that repaving is the best way to avoid future spills.

17. Along with others at FOTC, I have invested significant time and effort in working to strengthen Washington's NPDES program for CAFOs, including through successful litigation. But our time and efforts won't pay off unless discharging CAFO actually obtain NPDES permits. Accordingly, I urge the U.S. Environmental Protection Agency to protect public health and the environment by granting this petition and, thus, ensuring that the owners and operators of discharging CAFOs come into compliance with federal law.

I declare under penalty of perjury that, to the best of my knowledge, the foregoing is true and correct. Executed this 25 day of October, 2022.

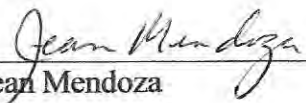

Jean Mendoza

Exhibit 17

DECLARATION OF RONALD J. WYSE

I, RONALD J. WYSE, declare and state as follows:

1. I am 83 years old, and I live with my wife in Mt. Pleasant, Henry County, Iowa. My wife and I moved to our current home in town about two years ago, but before that, we lived outside of town at [REDACTED], Henry County, Iowa. We lived there for about 40 years, and during some of that time, my son and his wife lived about a half mile down the road from us. After we moved into town, my son and his wife moved into our old home [REDACTED]. We have a herd of six grass-fed beef cows there, and I like to visit the farm just about every day.

2. In 2012, when my wife and I were living at our old home, a swine concentrated animal feeding operation (“CAFO”) was built about 2,200 feet away from us. The CAFO confines just under 2,500 hogs in a single large confinement building. The CAFO stores the hogs’ urine and feces in a pit below the confinement building, and it gets rid of the waste by spreading it on fields that are very close to our old home.



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community.

3. One Sunday morning about two years after the CAFO was built, the CAFO operator applied waste on their field before heavy rains, which caused the waste to run off their field and into a creek that is on our property. As we were leaving for church, we noticed that the CAFO operator was applying waste on a field just 1,800 feet from my son's home and 2,200 feet from our home. The field the CAFO operator was using has tile drains, which are underground pipes that take excess water and manure runoff out of the soil. The tile drains empty into a creek on our property that our cattle drink from. The field also has terraces that are meant to prevent waste from running off the field. Later that day, we got about three inches of rain, which caused the waste to run through the tile drains and into our creek. The rain also caused the waste to spill over the top of the terraces and into our creek. The liquid spilling onto our property was green and foamy, and it smelled terrible.

4. Two days after the waste spilled into our creek, I took a water sample and sent it to the University of Iowa to be tested. The tests showed that the levels of E. coli and nitrate in the water were just under the state's maximum acceptable level. Because two days had passed between the runoff and the sampling, the E. coli and nitrate levels likely would have been above the acceptable level right after the runoff. I reported the runoff and the test results to the Iowa Department of Natural Resources ("IA DNR"), but they said they couldn't do anything because they hadn't done the testing themselves. However, they did make a note of the incident. Since the incident, the CAFO operator has made the terraces taller, and waste hasn't spilled over them again.

5. Even when we don't have a heavy rain, CAFO waste still enters our creek because the tile drains empty into it. Around the time when my wife and I moved into town, we learned that if a pregnant cow drinks water contaminated with CAFO waste, it can kill the calf.

Our cattle could drink out of our creek, and we didn't want to risk losing a calf, so my son put up fences to prevent the cattle from accessing the creek. The fencing was expensive, and it felt unfair that we had to pay to protect our business from the CAFO's pollution.

6. In addition to polluting our creek, the CAFO also pollutes the air. The pollutants smell terrible, and they have made me sick. The CAFO smells nothing like the farms that I am used to being around. One of my neighbors has a herd of 50 beef cows, and when the wind blows from that direction, it is a pleasant smell that I don't mind. That is not the case for the CAFO.

7. I remember two incidents when the smell from the CAFO was particularly bad. The first incident happened one morning when I was mowing the lawn at our old home. When I went outside to start mowing, I immediately noticed a strong smell from the CAFO that was hardly bearable. As I was mowing, I started feeling sicker and sicker. After about two hours of mowing, I went inside and told my wife that I had a terrible headache and felt sick. She told me that my clothes smelled like I had been right next to the CAFO. I changed my clothes, took some aspirin, and continued mowing. When I was back outside, I started feeling sick again, but I was able to finish mowing. The second incident happened at about 3:00 in the morning when I got up to stoke the fire in our fireplace. I walked outside to get some wood, and it smelled so terrible that I almost went right back inside. The smell hit me like a brick wall. I quickly grabbed the wood and retreated inside.

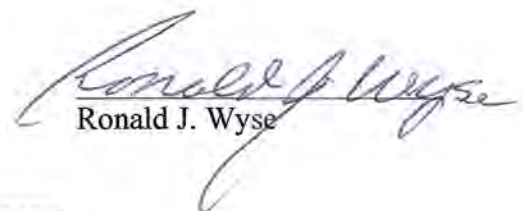
8. Although these two incidents are particularly clear in my mind, the smell from the CAFO is a constant problem. When we lived at our old home, we couldn't ever use the screened-in porch in the evenings, because when the wind blew from the direction of the CAFO and/or the air settled down around the house, the smell of the CAFO was terrible. The porch is

on the first floor of our old home, which is about eight feet lower than the land where the CAFO sits. The air pollution and odor from the CAFO settles down in the low-lying land. I felt angry and disappointed that the smell prevented us from fully enjoying the home that we had lived in for so long. Now, I drive by the CAFO every time I visit my son at my old home, and I smell the odor most of the times I drive by.

9. I wonder whether some of the illnesses I've had over the last nine years are because I've been exposed to the CAFO's air pollution. I've had respiratory problems, and I have to monitor my lungs very closely. I know that exposure to CAFO air pollution can cause respiratory problems, so I think the illnesses I've experienced could be from living next to a CAFO for so long.

10. It is increasingly difficult for community members to hold CAFOs accountable for the pollution they cause. I'm disappointed that IA DNR did not investigate or penalize the CAFO after I told them about the discharge into our creek and provided them the test results showing high levels of E. coli and nitrate in the creek. I was also disappointed to learn of the Iowa Supreme Court's recent decision making it more difficult for people to sue CAFOs for causing a nuisance.¹ Given the difficulties community members face holding CAFOs accountable, IA DNR, state legislators, and the U.S. Environmental Protection Agency need to do more to prevent CAFO pollution from occurring in the first place.

I declare under penalty of perjury that, to the best of my knowledge, the foregoing is true and correct. Executed this 22 day of October, 2022.


Ronald J. Wyse

¹ See *Garrison v. New Fashion Pork LLP*, 977 N.W. 2d 67 (2022).

Exhibit 18

15. U.S. EPA Region 5

Comments on Ohio's Preliminary Modeling Results for the Maumee Watershed Nutrient TMDL
EPA comments dated 08/17/2022

- 1. General Comment:** EPA requests Ohio EPA (OEPA) to clarify the endpoint/location of the Maumee Watershed Nutrient (MWN) TMDL and describe how it will attain and maintain applicable WQS for Lake Erie. Is the compliance point the Waterville gage, the mouth of the Maumee River, or both?

 - Wherever OEPA decides that endpoint(s) to be, please review the draft PMR document and address any language which may be inconsistent with the choice of an end point (e.g., p. 95, *“...the TMDL target that will primarily be measured at the Waterville gage.”* Updating this sentence would be necessary if the mouth of the Maumee River location was chosen to be the endpoint)

- 2. General Comment:** OEPA does a sound job of explaining that the TMDL allocations described in the draft PMR are applicable to the “spring” season of March 1 through July 31. EPA is curious to understand OEPA’s thoughts about the applicability of the TMDL, which is calculated to meet targets during 3/1 to 7/31, for remainder of the calendar year (August 1 through February 28).

 - Can one assume that allocations calculated to meet the spring season (i.e., 3/1 to 7/31) apply all year round? If yes, OEPA should state that someplace in the PMR.
 - Are there any assumptions built in for the 8/1 to 2/28 time period for wasteload allocations (WLAs) and/or permits?
 - Section 2.2.4 (pp. 44-47) of the PMR document discusses numerous impacts on the delivery of phosphorus and time lags regarding phosphorus. Given this information, further discussion is needed on why it is appropriate to have WLAs that apply to the spring season only.

- 3. General Comment:** How is the TMDL applicable to the period outside of the spring season? How will climate change be factored into the TMDL/TMDL analysis, including outside of the spring season?

 - Section 3.8.1, Pg. 90 - *“Phosphorus pollutant reduction targets are correlated with the HABs to serve as actionable acceptable levels related to Ohio’s impairment metrics. These targets were developed by the binational Annex 4 subcommittee of the GLWQA (Annex 4, 2015). The phosphorus that directly contributes to the growth of the HABs was determined by the subcommittee to be primarily delivered with springtime snowmelt and rain. This resulted in targets limited to phosphorus delivered to Lake Erie from the Maumee River in the “spring” March 1 through July 31 period each year. The TMDL allocations are therefore only applicable during this spring season.”*

- 4. General Comment:** EPA appreciates that OEPA assigned individual WLAs to individual facilities/permittees within the Tables of Appendix 3. EPA notes that an EPA TMDL approval typically applies to WLAs assigned to individual facilities; the use of Group WLAs will need to be discussed with EPA, and that the use of watershed permits, compliance schedules, etc., will need to be addressed through the NPDES permit process. Please be aware that 40 C.F.R. §122.44(d)(1)(vii) provides that water quality-based effluent limits in NPDES permits must be consistent with the assumptions and requirements of a WLA in any approved TMDL.

- 5. General Comment:** In several locations in the document, it is stated that dissolved reactive phosphorus (DRP) is the focus or the goal of the MWN TMDL (i.e., bottom of p. 2). However, this seems to imply that the MWN TMDL will address DRP, when the MWN TMDL is for total phosphorus (TP) only. Suggest replacing “focuses” with “includes discussion” or some other similar phrase. The current wording, especially so early in the document, implies that the TMDL is

addressing DRP, when the TMDL is developing loads for TP only. The language as noted below (Comment #34 below) is a better example.

6. General Comment: EPA requests additional information on how other sources of TP to the Western Lake Erie Basin (WLEB) are being addressed/considered in the MNW TMDL.

- Phosphorus contributions from other watersheds (e.g., Cedar-Toussaint Watershed, Portage Watershed) and how those contributions will be accounted for in the consideration of water quality, and the attainment of water quality targets for Western Lake Erie assessment units.
- Air deposition of phosphorus directly to waterbodies.
- Other contributions stated to be “negligible”, such as direct discharges of manure (Section 2.2.1.1) and natural sources (Section 2.2.1.5). (Comment #10 below)

7. General Comment: EPA requests OEPA provide additional detail on the impaired uses and how designated uses and criteria will be attained. This detail can be provided in the revised PMR or the draft TMDL report.

- **p. 4, Section 2.1, 3rd paragraph below Section 2.1 heading:** The paragraph discussing the Lake Erie HAB recreation assessment methodology needs to be expanded. Annex 4 developed loads of TP and DRP to address algal blooms in Lake Erie. A notation that OEPA will “adhere” to the Annex 4 targets and “therefore” is directly applicable to the impairment will likely need further linkage. Suggest adding a paragraph or more on information from the 2022 IR regarding time periods (10 days), areal coverage (30%), and frequency (2 out of 6 years), and concentration (20,000 cells). Since there are no specific numeric criteria, there needs to be a clear link between the Annex 4 load and how the WQS will be attained.
- **p. 4, Section 2.1, 4th paragraph below Section 2.1 heading:** Similar to the comment above, further discussion is requested regarding the drinking water use. The discussion in the LAP (pp. 15 and 16) and 2022 IR (pp. H-4 and H-5) both contain important details on how HABs impact the use. We note that the LAP does not state that “...these impairments can be removed...” when the Annex 4 targets are achieved; microcystin sample results indicate use attainment, not algal bloom size.
- **p. 4, Section 2.1, 5th paragraph below Section 2.1 heading:** Regarding the aquatic life use (ALU) discussion in this paragraph. Similar to above, additional details are requested on the linkage between TP loads and aquatic life use. It is clear in this document and in others that OEPA is in the process of developing ALU assessment targets for the impaired segments. Since no numeric criteria (or assessment targets) currently exist, it will be important to note explicitly that OEPA is utilizing the goals of the Lake Erie Commission (LEC) to address ALU in the interim and explain why this is appropriate. Please provide reference to where the mesotrophic status goal or the 10-15 µg/L (assuming TP) is from.

8. p. 8, paragraphs beneath Figure 6: EPA requests that, overall, the PMR (and the TMDL) clarify the purpose of the SWAT model.

- EPA requests that the modeling section of the revised PMR or TMDL contains a discussion on the overall modeling approach (Mass Balance used for TMDL loads, SWAT for implementation details) to clarify which models are used for what purpose.
- EPA requests that the revised PMR or TMDL includes a summary paragraph of the Mass Balance model: how it was developed, how it was used, and potentially cite/direct the reader to any other resources (e.g., a more detailed report on the model, assuming there are other resources out there).
- EPA requests that the revised PMR or TMDL includes a summary paragraph on SWAT: what it is, and what it will be used for during this project.

- 9. p. 16, 1st paragraph beneath *Fertilizer contribution to phosphorus pollution* heading:** This paragraph discusses phosphorus entering stream networks – is this both chemical and manure, or just chemical?
- **2nd paragraph beneath *Fertilizer contribution to phosphorus pollution* heading:** EPA recommends that OPEA clarify what “direct discharge(s)” of fertilizer means. Not all readers will understand that runoff from fields might not be considered as a “direct discharge”. Given the high visibility regarding CAFOs and animal operations, suggest being very clear on terms and definitions. How is it known that direct discharges are a negligible proportion of the overall loading?
 - **4th paragraph beneath *Fertilizer contribution to phosphorus pollution* heading:** Manure overapplication from CAFOs/CAFFs is noted as not being widespread in fields controlled by CAFO/CAFFs. It would be important to note the areas which are typically controlled by a CAFO – do most CAFOs control the land their manure is spread upon? What about the smaller non-CAFO designated facilities, do those facilities control the lands where manure is spread? It is also unclear where in Section 2.3 there is further discussion on the critical source areas regarding CAFOs and manure spreading.
- 10. *General comment:*** Factors that are “negligible” or “minor” seem to be discounted, and EPA requests additional discussion/rationale of how these are handled.
- **p. 16, Section 2.2.1:** EPA requests additional rationale for how these direct discharges are addressed. *“While detrimental to the aquatic life of receiving streams during an episode (i.e., the near-field), direct discharges that have occurred represent a negligible proportion of the Maumee’s overall seasonal far-field phosphorus load.”*
 - **p. 42, Section 2.2.2.2:** Stormwater discharges are 20% of WLA, but are considered minor here. *“Combined with information presented above, and the overall small proportion of developed land, stormwater from developed land is expected to be minor source of phosphorus to the Maumee.”*
- 11. p. 19:** There are a number of percentages noted on this page; some seem to imply differing messages. For example, the first paragraph notes that SWAT modeling noted that commercial fertilizer contributes an average of 58% TP and 42% DRP to Maumee Bay, and manure contributes 12% and 8% respectively. However, the last paragraph notes that the delivery ratio of phosphorus for commercial and manure fertilizer is 3% and 1%, which may imply that despite the predominance of fertilizer use, little is getting to Maumee Bay. While these are two different statistics (load vs ratio), it could be misinterpreted that these sources do not contribute to the problems in Maumee Bay.
- 12. p. 21, 3rd paragraph below *Fertilizer’s role in increased DRP to Lake Erie* heading:** The discussion on the IJC report suggests the impact conservation tillage has on DRP loads. This will need to be considered as the Reasonable Assurance Section is developed; relying on conservation tillage will be much more nuanced when this information is considered.
- Is there any way to quantify the impacts of conservation tillage, such as through modeling of scenarios under which conservation tillage is adopted by various percentages of acreage?
 - Is the reduction in TP (particulate) phosphorus greater than the increase in DRP? This is somewhat discussed on Page 22, but a more explicit determination is needed.
- 13. *General comment:*** EPA requests additional discussion regarding the nature of “legacy” phosphorus, how it is defined, and how it can and will be addressed.

- **p. 22-23, Soil and Legacy Sources Section:** “Legacy” phosphorus may be interpreted to be phosphorus that cannot be controlled, or is “just there”. It will be important to emphasize that controlling legacy phosphorus will rely not only on controlling soil runoff, but also “turning off the tap” by reducing fertilizer use/reducing activities which add more phosphorus to the soil. EPA notes that subdividing phosphorus inputs to current fertilizer use vs legacy phosphorus could lessen the importance of many of the nonpoint source controls needed to reduce phosphorus.

14. p. 26, top paragraph: This paragraph regarding the Muenich et al (2016) scenarios should be carefully reviewed in regards to reasonable assurance.

15. p. 32, Title of Subsection 2.2.2: EPA recommends revising the heading of this subsection to “NPDES permitted point sources (including permitted stormwater) of phosphorus” to reference NPDES permitted point sources and to reflect the types of permitted facilities addressed in the subsection.

16. p. 32, Table 3: As discussed in the comment immediately below, NPDES Permits for CAFOs must be included in the summary of types of NPDES permitted entities in Table 3. EPA’s NPDES program has identified 6 CAFOs within the Ohio portion of the Maumee Basin with NPDES permits, and 70 CAFOs without such permits. If confirmed by OEPA, please revise Table 3 to reflect this information.

17. p. 34, 5th paragraph: The first sentence reads, “*There are no NPDES permitted CAFO facilities within the Maumee Watershed.*” Concentrated animal feeding operations are point sources under the CWA. EPA’s NPDES program has identified 76 CAFOs in the Ohio portion of the Maumee watershed, 6 CAFOs with a NPDES permit and 70 CAFOs without a NPDES permit. EPA requests that OEPA characterize existing phosphorus loads from this point source sector, and establish allowable loads for all 76 identified CAFOs, including related production and land application areas, in the wasteload allocation portion of the forthcoming TMDL.

Such loads should account for (1) all releases from production areas and (2) all releases from land application areas that do not qualify for the agricultural storm water exclusion under the Act. *See* 40 C.F.R. § 122.23(e). Releases that qualify for the agricultural storm water exclusion may be placed in the load allocation portion of the TMDL. Releases that should be placed in the WLA include, but are not limited to, releases to a jurisdictional water (1) through artificial subsurface drainage (i.e., tile drainage), as well as (2) through ground water “if the addition of pollutants ... is the functional equivalent of a direct discharge from the point source to navigable waters.” *See* 140 S. Ct. 1462 (2020).

EPA offers the above as a point of emphasis in light of the statements on p. 34 and in Table 3 (p. 32) that no CAFOs in the watershed possess NPDES permits and the lack of CAFO discussions in the existing point source loading or waste load allocation sections of the draft PRM, as well as the following quote from p. 52, “... *85 percent of Ohio’s contribution of total phosphorus load was sourced from agricultural lands.*”, as CAFOs operate within the broader agricultural sector.

18. p. 36, paragraph beneath Figure 19: The last sentence reads, “...*point sources contribute a similar proportion of phosphorus as manure fertilizer sources.*” and potentially highlights why the splitting of fertilizer into direct and legacy phosphorus sources may be misinterpreted. This could imply that point sources and manure are not really significant sources, and thus, make implementation of phosphorus source controls more difficult. It seems that manure inputs contribute not only to the

direct sources of phosphorus to the system, but also slow phosphorus loss/reduction from the legacy phosphorus “pool” within soils of the basin.

- It seems that in this last sentence of the paragraph beneath Figure 19, OEPA is summarizing an argument from the Kast et al. (2021) study and not making a definitive statement regarding the proportion of phosphorus from point sources vs. phosphorus contributions from manure?

19. pp. 38-40, Existing facility-based (discharging) point source reduction efforts Section: There appears to be no discussion of DRP reduction efforts in the existing facility discussion; is there a reason why DRP was left out of this section? DRP is acknowledged and discussed as part of the source discussion for numerous other sources in the draft PMR document.

20. General comment: EPA requests additional supporting language and rationale behind several conclusions including:

- **p. 74, Section 3.3.3:** Please provide more clarification for excluding these SSOs. Please provide more rationale behind the 15 percent removal and greater than 6 percent removal: *“Therefore, SSOs are excluded from the analysis unless flow volumes are reported. This report uses a wet weather loading nutrient concentration of 0.75 mg/L for total phosphorus, the median concentration of 131 samples reported from September 2014 to August 2017 by two Ohio sewer districts that are required to monitor total phosphorus at select CSO outfalls in their NPDES permit. When bypasses go through primary treatment, 15 percent removal is assumed by Ohio EPA to account for settling and sludge removal. This value is set to be greater than the 6 percent removal from septic tanks but not as high a removal rates observed when fine solids are removed via extended settling and/or anaerobic digestion.”*
- **p. 75, Section 3.3.4:** Please provide additional discussion/rationale: *“For this study, 80 percent efficiency will be used because the studies reviewed by Beal used fresh soil columns and did not consider a reduction in efficiency with system age.”*
- **p. 75, Section 3.3.4:** Please provide additional discussion/rationale: *“The value used for this study is 40 percent total phosphorus removal for failing soil adsorption systems, or half that is assumed for properly working systems.”*
- **p. 76, Section 3.3.4, Table 14:** Please provide additional discussion/rationale to explain how this was adapted: *“Proportions of total HSTS systems grouped into categories for Ohio’s Nutrient Mass Balance Study. Adapted from the 2012 ODH statewide inventory (ODH, 2013).”*
- **p. 78, Section 3.3.5.3:** Please provide additional discussion/rationale: *“Without adequate monitoring data to compare with other land uses, a small positive bias of 0.1 lbs./acre/year is assumed for natural lands.”*
- **p. 83, Section 3.4.1.2:** What is the rationale behind the using the “second greatest?” *“With only a few exceptions, the individual wasteload allocation for each of these facilities is set based the second greatest spring season load each facility has discharged in the last five spring seasons (2017-2021). Many of these facilities do not monitor total phosphorus in their effluent. Similar assumption to those used to calculate the 2008, “existing”, loads were used to determine these facilities total phosphorus concentrations.”*

21. p. 81 and Appendix 3: It is important for EPA to understand how the individual WLAs in Tables A2.1 and A2.2 were calculated. Are the WLAs in the Appendix 3 tables calculated using the concentrations described in Table 17 (i.e., for GP1 facilities – flow * 0.5 mg/L * conversion factor...GP2 facilities – flow * 0.47 mg/L * conversion factor...etc)? Or are the WLA’s in the Appendix 3 tables calculated using 1.0 mg/L?

- Are there any additional assumptions at play related to the calculation of WLAs in the Tables in Appendix 3? If yes, please explain.
- Please add additional columns to the Tables in Appendix 3 which include the flows and concentration values used to calculate the WLAs.

22. p. 81, Footnote #1: EPA R5 TMDL and OEPA TMDL staff had previous discussion (i.e., May-June 2022) regarding a scenario where a permittee has two assigned WLAs, one WLA from an earlier near-field TMDL (i.e., those projects described in Appendix 4) and a second WLA calculated in the development of WLAs for the MWN TMDL. EPA and OEPA came to the understanding that under these circumstances when there are two WLAs assigned to the same facility, ultimately the permit issued to the permittee must be consistent with the more stringent WLA.

- Please include language which explains this scenario and expectation that the more stringent WLA will be incorporated into the permit. This language can be included within the revised PMR or TMDL document.
- Unsure if the language in Footnote #1 is fully accurate given this understanding. Namely that all prior WLAs calculated for previous near-field TMDLs are not impacted by the WLAs from the MWN TMDL. The language of Footnote #1 could be interpreted to suggest that all WLAs from earlier near-field TMDLs would be more stringent than the WLAs calculated in the MWN TMDL.
- It would be very helpful for OEPA to designate (e.g., asterisk) those permittees that have a pre-existing WLA from an earlier near-field TMDL within the Tables of Appendix 3. Another option would be to include the previously approved WLA in Appendix 3 with a notation, so the PMR/TMDL would serve as the overall source of information regarding approved WLAs.
- Appendix 4 identifies many of the WLAs as annual loads. Please update any WLAs represented with annual loads to include a daily expression of the WLA in Appendix 4.
- EPA reminds OEPA that permits for discharges to impaired waters in the WLEB upstream from the mouth of the Maumee, which do not yet have a TMDL calculated to address that upstream impairment, must have a pre-TMDL Water Quality Based Effluent Limit (WQBEL) when the discharge is at a level that will cause, have the reasonable potential to cause, or contribute to an excursion above the applicable numeric or narrative water quality criterion.

23. p. 82, Table 17: Table 17 indicates that major publicly-owned treatment works that have a design flow equal to or greater than 10 million gallons a day (mgd) will receive a WLA equal to design flow times 0.37 milligrams per liter (mg/L) for a 153-day spring season, and that a monthly average effluent limit of 0.5 mg/L in a permit will drive performance to the 0.37 mg/L level. EPA appreciates the reference to an effluent limit of 0.5 mg/L for such POTWs because the *Great Lakes Water Quality Agreement (GLWQA)* provides that the United States and Canada are to, “assess and, where necessary, develop and implement programs such that municipal wastewater treatment facilities that discharge one million liquid gallons or more per day major municipal wastewater treatment plants discharging to the Lake Erie basin achieve a maximum of one-half of a milligram per liter of phosphorus in effluent.” This quote from the international *Agreement* is not confined to the spring (i.e., March 1 to July 31). Furthermore, algae blooms can occur or continue after July 31, and phosphorus loadings outside of the spring timeframe contribute to legacy loads that the TMDL seeks to address. For these reasons, should the WLAs in the forthcoming TMDL (including those addressed

in the comment immediately below) apply during the growing season, an annual period that may end between September 30 and October 15?

- 24. p. 82, Table 17:** Table 17 indicates (with language that is confusing) that POTWs that have a design flow equal to or greater than one but less than 10 mgd will receive a WLA equal to design flow times 0.47 mg/L for a 153-day spring season, and that a monthly average effluent limit of 0.66 mg/L in a permit will drive performance to the 0.47 mg/L level¹. An effluent limit of 0.66 mg/L will not achieve the outcome to which the United States agreed in *GLWQA* (see quote in comment immediately above). EPA requests that OEPA explain how the WLAs are consistent with the objectives under the *GLWQA*. EPA notes that Ontario and Michigan are or will be applying an effluent limit of 0.5 mg/L to all of their major POTWs, including those with design flows equal to or greater than one but less than 10 mgd. Application of such limits to all major POTWs in the Ohio part of the Maumee basin will address equity across the three jurisdictions from the head of the Detroit River to the mouth of the Maumee.
- 25. p. 83, Section 3.4.1.2, 2nd paragraph:** The text mentions that, “...*the individual wasteload allocation for each of these facilities is set based on the second greatest spring season load each facility has discharged in the last five spring seasons (2017-2021).*” The EPA requests further explanation of these assumptions and why they are appropriate. Would it be possible to provide an actual example WLA calculation using this method looks like? E.g., Flow * TP concentration (X mg/L) * conversion factor.
- Assume this calculative approach was used to set WLAs assigned in Table A2.2 in Appendix 3?
- 26. p. 84, Section 3.4.1.3:** Is it appropriate to use 5/12 of the year for determining the CSO season?
- Are the CSOs effectively year-round, or are they more common in the spring?
 - To clarify, no WLA (WLA=0) is assigned to SSOs? An explicit statement of this would be good.
 - Note that this section would be a good place to identify presence and status of a Long Term Control Plan (LTCP).
- 27. p. 85, Section 3.4.2, 1st sentence:** The text mentions “*natural infrastructure projects*”; can OEPA provide some examples of what these types of projects are? Are they green infrastructure (e.g., bioswales, rain gardens, impermeable pavement, curb cut etc.) related projects?
- 28. p. 87, Section 3.4.5:** Is there any connection (i.e., story to tell) between the breakout of Landscape Allocations (i.e., Agricultural Land, Developed Land and Natural Land) from the Ohio 2020 DAP (e.g., Tables A5, A6, etc.) and this project effort?
- If, one were able to subdivide the LA value of Table 21 and Table 25 of the draft PMR into the landscape components (Agricultural, Developed and Natural) on the HUC-12 scale, would those values roughly agree with the summation of landscape estimates from the Ohio 2020 DAP (e.g., Tables A5, A6, etc.)?
 - Would there be differences between these two sets (i.e., the Ohio 2020 DAP Landscape Allocation numbers (e.g., Tables A5, A6, etc.) and a hypothetical split of the Load Allocation (LA) on the HUC-12 scale for this TMDL effort) of values? If yes, what would those differences be and why?
 - The draft-PMR document shares the message that the NPS contributions are the source which really needs to be improved upon (i.e., reduction of 92 MT to enhance NPS sinks and reduction of 366 MT to improve NPS management in Figure 44) to ultimately meet the WLEB total

¹ The GP2 text in Table 17 appears not agree with the final sentence in the GP2 narrative on page 83.

phosphorus (TP) targets. How will local stakeholders know what their goals/targets are for reducing nonpoint source contributions without greater specificity at the HUC-12 scale?

- It would be worthwhile for OEPA to provide more detail on LA and/or explain why it has chosen to have minimal detail on the LA.
 - Suggest a citation to 40 CFR 130.2(g) regarding the definition of “load allocation”. *The portion of a receiving water's loading capacity that is attributed either to one of its existing or future nonpoint sources of pollution or to natural background sources. Load allocations are best estimates of the loading, which may range from reasonably accurate estimates to gross allotments, depending on the availability of data and appropriate techniques for predicting the loading. Wherever possible, natural and nonpoint source loads should be distinguished.*
- Is there an opportunity to highlight the LA portion of the TMDL for implementation purposes? To connect it to other documents (e.g., the DAP or existing Nine Key Element planning documents) which provide greater specificity to aid implementation planning?

29. pp. 87-88, Section 3.4.7: Can OEPA add some additional discussion regarding how it calculated the “*out of state boundary condition*” at 228.7 MT? How is the boundary condition divided between IN and MI (e.g., IN has 128.7 MT and MI has 100 MT)?

- Also, has OEPA consulted with TMDL staff at IDEM and MEGLE regarding this boundary condition calculation? Are their staff aware of this boundary condition set at the state border of IN-OH and MI-OH?

30. pp. 88-89, Section 3.6, Margin of Safety: The text mentions that, “*...conservative assumptions are made through TMDL development and implementation.*” What are the specific conservative assumptions used in the report? These assumptions must be explicitly identified, and a detailed discussion of why they are conservative (i.e., what effect did the assumption have on the loading calculation, or what effect did the assumption have on reduction efforts, etc.?).

- Are there any conservative assumptions used in the Annex 4 target development, or the modeling effort?
- Explicit MOS: Why is 3% considered appropriate for the MWN TMDL? A detailed discussion, perhaps highlighting the significant data source at Watertown as well as other monitoring efforts, the SWAT modeling in progress that will provide more detailed analysis of loading and impacts, and any other work that will further refine the data should be considered and discussed when developing the MOS.
- In Section 4.2, 11.1 MT are noted as “unassigned” in the allocations. Can those 11.1 MT be used as MOS? That would raise the MOS to 4.8%.

31. p. 89, Section 3.7, Allowance for Future Growth: To confirm, Allowance for Future Growth (AFG) was considered, but there is no explicit, line item of AFG as part of the final TMDL, but OEPA did consider AFG as part of its implementation approach for certain NPDES facilities. Also, AFG was incorporated as part of OEPA’s assumptions used to quantify the single WLA for the minor facilities covered under the Small Sanitary General Permit (OHS000005), and referenced in Section 3.4.1.2 on pp. 83-84. This approach is almost like an implicit AFG approach.

- Are there any other instances for AFG was considered or incorporated as part of the draft PMR effort?
- EPA recommends that OEPA revise Section 3.7 to expressly address
 - Proposed future increases in the number of animals at existing CAFO;
 - Proposed future increases in the number of animals at small- or medium-sized animal feeding operations such that a given operation would become a Large CAFO;
 - Proposed construction of new CAFOs;

- Proposed increases in the design flow of POTWs;
- Proposed construction of new (non-domestic) sources or increases in discharge from existing non-domestic sources;
- Proposed construction of new POTWs;
- Proposed expansion of the service area for municipal separate storm sewer systems; and
- Construction sites at which one or more acres of land will be disturbed. OEPA should consult with the Ohio Department of Agriculture regarding (1), (2), and (3) in the above list.

32. p. 90, Section 3.8.2, Critical Conditions, 1st paragraph, 4th sentence: EPA requests that the sentence that starts with “Because of this, the ...” be reworded or potentially even deleted. *“Phosphorus delivered by the stream network that makes up the Maumee Watershed is causing the impairments in western Lake Erie. Because of this, the “near-field” concerns that phosphorus may bring out within the stream network near the point or non-point source areas are not applicable to this particular project.”*

- Is this sentence in reference to the idea that the MWN TMDL will not address impairments for “near-field” areas at this time? E.g., waters in the basin which still require TMDLs (e.g., the Lower Auglaize subwatershed) will not be addressed via the MWN TMDL and a future TMDL to address these impairments will still need to be developed in the future?

33. p. 90, Section 3.8.2, Critical Conditions: The discussion of critical condition seems to contradict some of the basis for the MWN TMDL, e.g., *“...the specific timing of phosphorus delivery, within the “targeted” spring period, is not relevant.”* Using the Annex 4 targets for the spring season (March 1 to July 31) would seem to imply that March 1 to July 31 is the critical period, especially for phosphorus loading in order to attain the MNW TMDL calculations. While blooms may occur or continue later in the year, runoff from the spring season seems to have been identified in Annex 4 as the critical time to control phosphorus loading. The language of Section 3.8.2 will need additional clarifying language to present this point. The goal of the TMDL is to attain and maintain WQS throughout the year.

34. p. 90, Section 4.1: The last sentence on the page appears appropriate for discussion of DRP (*“Reducing the DRP portion of total phosphorus as much as possible is an explicit goal of the implementation plan for this TMDL”*). It appears to be more accurate to note this as a goal of the implementation plan and not the TMDL.

35. p. 92, Section 4.2, Allocations for the Waterville monitoring point: Confused by the different loading capacity values, 620.2 MT of TP (presented in Table 25) and 631.3 MT of TP (shared on p. 88 in the 2nd paragraph). We gather the difference between both values is 11.1 MT but what is happening to this 11.1 MT and why was it subtracted from the 631.1 MT value?

- The text mentions further explanation of the 11.1 MT difference is found in Section 3.4.8 of the draft PMR document, but there doesn’t seem to be a Section 3.4.8 of the draft PMR document.

36. p. 93, Section 4.3: This information should be considered when determining the adequacy of the MOS and much of this information should also be summarized within the MOS discussion of Section 3.6. Demonstrating that the model and calculations are conservative can be used to determine/support how much MOS is needed in a TMDL. This is likely something we will need to discuss further.

37. p. 95, Section 5: The document describes adaptive management as a process to monitor the implementation of a TMDL over time. Section 5, describes how OEPA will adjust and assess the implementation of the TMDL. EPA recommends that Section 5 of the document be revised to reflect

that any adaptive management plans included in the implementation section of the TMDL will include specific milestones and timeframes that would trigger consideration and implementation of alternative strategies if certain metrics are not met within specific timeframes.

38. p. 107, Section 5.3.1.1, above Ditch and Streamside Sources paragraph: Should there be a paragraph here to discuss Non-Agricultural Stormwater?

39. p. 115, Section 6, Reasonable Assurance: EPA was interested to see the draft Reasonable Assurance discussions as part of the draft PMR document. Let's (EPA and OEPA) continue to brainstorm on content for this Section as part of the draft TMDL document, to be shared in December 2022. EPA is happy to look at early iterations of the draft Reasonable Assurance Section prior to December 2022.

40. General Comments for upcoming Reasonable Assurance (RA) discussion:

An analysis of RA is required for TMDLs with mixed point and nonpoint sources. In order to appropriately evaluate RA in the context of this TMDL, EPA requests that OEPA provide additional information on Reasonable Assurance, including discussion on the following details:

- What actions and activities have the various State, counties, SWCDs, and Federal Programs implemented in the basin over the last decade or so.
 - This should include information on funding, timelines, milestones, monitoring results (if any), and any estimates of pollutant reductions.
- What actions and activities are currently being developed in the basin by the various State, counties, SWCDs, and Federal Programs?
 - This should include information on funding, timelines, milestones, critical areas, monitoring results (if any), and any estimates of expected pollutant reductions.
- What actions and activities are planned in the basin by the various State, counties, SWCDs, and Federal Programs?
 - This should include information on funding, timelines, milestones, critical areas, monitoring plans, and any estimates of expected pollutant reductions.
 - This should also include the roles and responsibilities of the various organizations/governments.
- EPA requests that discussion be provided to better understand how the RA and implementation efforts will be adjusted over time. As noted in Section 2.2 of the PMR, SWAT modeling is ongoing in the basin. A process for incorporating the results of the SWAT model and BMP follow-up monitoring will be important in utilizing the adaptive management process envisions in the PMR.
- EPA requests that the upcoming discussion will also address the impacts of climate change on existing and proposed BMPs and projects.
- It will also be important to explain the process for overseeing all the various projects planned or underway in the basin, to ensure the overall goals of the TMDL are addressed. Many NPS projects are developed at the HUC-14 level, and understanding how all these various projects will "fit together" in an overall plan will be important. To date, ODNR and ODA have been active participants in the stakeholder meetings, and it will be important to identify how all these efforts will be overseen to ensure the goals of the TMDL are attained.

41. General Comment: Please describe how climate change impacts/influence were considered during the development of the draft PMR and the use of the empirical mass balance model.

42. Appendix 3, Tables A2.1, A2.2, A2.3 and A2.4: Please delineate/identify the facilities that are above Waterville and those below Waterville in these tables? Perhaps add an asterisk to their facility name within the Facility Name column?

43. Appendix 3, Expression of WLAs: Appendix 3 expresses WLAs in terms of mass (kilograms), so it is unclear if the proposed WLAs would result in reduced allowable pollution loads compared to existing effluent limits set in current NPDES permits. Please expand Appendix 3 or some other portion of the PMR to compare existing loadings and proposed WLAs, which would highlight any expected reductions from current discharges.

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Minor Edits:

+ **p. 21, 2nd to last paragraph above Section 2.2.1.2, last sentence:** Text reads, “*It shows that high improving fertilization rate, timing and placement of phosphorus could quickly reduce DRP loads.*” It appears “high” may be a typo.

+ **p. 81, Section 3.4.1, 1st paragraph, last sentence:** Text mentions, “*...between currently authorized and actual loads shown above in Figure 21.*” Should this be Figure 22 instead of Figure 21?

+ **pp. 82-83, Table 17 and language beneath GP2 paragraph:** In Table 17, the WLA calculation method for GP2 describes a concentration of 0.47 mg/L (which approximates to a 0.66 mg/L monthly limit over the 153 day spring season). Later in the language of the GP2 paragraph on p. 83, the numbers described are slightly different, 0.48 mg/L (long-term average) and a monthly concentration limit of about 0.59 mg/L.

- Should there be consistency between these two sets of numbers (i.e., Table 17 and GP2 paragraph)?

+ **Appendix 3:** Should the table names in this Appendix should read A3.1, A3.2 etc. Please double check.

Exhibit 19

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	CURRENT SPDES	FACILITY NAME													
2	NYA00E158	DUEPPENGIESSER DAIRY													
3	NYA00E164	AQUEDUCT RACETRACK													
4	NYA00E165	COON BROTHERS FARM, LLC.													
5	NYA00E166	ACE FARM, INC.													
6	NYA00E167	HAROLD BREY & SONS INC													
7	NYA00E168	HVFG, LLC													
8	NYA00E171	LABELLE FARM INC													
9	NYA00E173	BELLA POULTRY INC.													
10	NYA00E170	HITS-ON-THE-HUDSON													
11	NYA00E102	STANTON FARMS													
12	NYA00E180	BERKSHIRE VALLEY DAIRY, LLC.													
13	NYA00E176	WIL-ROC FARMS													
14	NYA00E253	HAGER FARMS													
15	NYA00E384	R & R Rarms LLC/DYKEMAN & SONS, INC.													
16	NYA00E331	GLENVUE FARM, LLC													
17	NYA00E385	MILK TRAIN, INC													
18	NYA00E373	SOUTHTOWN DAIRY													
19	NYA00E250	COOPERSTOWN HOLSTEIN CORPORATION													
20	NYA00E372	HEMLOCK VALLEY FARM, LLC													
21	NYA00E252	STITZEL'S WATERPOINT FARMS													
22	NYA00E275	CDS TILLAPAUGH													
23	NYA00E091	THREE L FARM													
24	NYA00E088	ADIRONDACK FARMS													
25	NYA00E097	CARTER FARMS, INC.													
26	NYA00E098	BUBBINS FARM													
27	NYA00E109	RUSTY CREEK FARM													

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
28	NYA00E45 0	GIROUX'S POULTRY FARM													
29	NYA00E40 7	CHA-LIZ FARMS													
30	NYA00E10 6	DIMOCK FARMS													
31	NYA00E09 3	REMILLARD FARMS													
32	NYA00E09 4	ASHLINE DAIRY													
33	NYA00E09 2	TRAINER FARM													
34	NYA00E11 0	OOMSVIEW HOLSTEINS													
35	NYA00E09 6	PAPAS DAIRY													
36	NYA00E09 9	BILOW FARMS													
37	NYA00E09 0	CARSADA DAIRY													
38	NYA00E12 5	SARATOGA HARNESS RACING													
39	NYA00E45 1	EILDON TWEED FARM													
40	NYA00E08 9	WELCOME STOCK FARM													
41	NYA00E10 7	KINGS-RANSOM FARM													
42	NYA00E10 8	BARBER BROTHERS DAIRY													
43	NYA00E10 5	TIASHOKE FARM													
44	NYA00E04 1	BROTHERHOOD FARM LLC													
45	NYA00E02 2	ALLENWAITE FARMS, INC.													
46	NYA00E30 5	KA SUNSET VIEW FARM, LLC.													
47	NYA00E12 0	WOLFF FARMS													
48	NYA00E30 4	CHAMBERS VALLEY FARMS, INC.													
49	NYA00E11 8	WOODY HILL FARMS, INC.													
50	NYA00E11 9	LANDVIEW FARM, LLC.													
51	NYA00E02 3	INSIGHT DAIRY													
52	NYA00E33 4	DANUBE DAIRIES													
53	NYA00E39 1	ENTWISTLE Bros, Farm, LLC													
54	NYA00E04 0	MURCREST FARMS													

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55	NYA00E39 0	WOOD FARMS, LLC.													
56	NYA00E42 9	CTS DAIRY													
57	NYA00E43 1	BIRCH CREEK FARM													
58	NYA00E29 0	ONE MORE FARM													
59	NYA00E28 4	HILLCREST FARMS													
60	NYA00E03 9	SHELAND FARMS													
61	NYA00E43 0	BUTTERVILLE FARMS													
62	NYA00E42 4	MURROCK FARMS													
63	NYA00E29 1	HANCOR HOLSTEIN'S II													
64	NYA00E42 8	PORTERDALE FARMS													
65	NYA00E03 7	MILK STREET DAIRY													
66	NYA00E28 6	HANCOR HOLSTEINS													
67	NYA00E02 5	MOSERDALE DAIRY													
68	NYA00E03 4	KENNEL FARMS													
69	NYA00E28 9	DOUBLE E DAIRY													
70	NYA00E02 7	DEMKO DAIRY													
71	NYA00E42 5	BUTLER CREEK DAIRY FARM													
72	NYA00E42 6	HANNO FARMS													
73	NYA00E28 5	MARKS FARMS													
74	NYA00E38 8	HILLTOP FARMS													
75	NYA00E02 6	WOODS HILL FARMS													
76	NYA00E11 7	TRUANDVIN DAIRY													
77	NYA00E43 5	CURTIN DAIRY													
78	NYA00E43 8	CHAMPION FARMS													
79	NYA00E44 7	GALLAGHER FARMS													
80	NYA00E43 7	FINNDALE FARMS													
81	NYA00E00 3	VAILL BROTHERS DAIRY													

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
82	NYA00E43 6	BRABANT FARM													
83	NYA00E45 2	WOODCREST DAIRY LLC													
84	NYA00E45 4	BRANDY VIEW FARMS													
85	NYA00E11 5	ROYAL-J-ACRES													
86	NYA00E45 5	FOBARE FARM													
87	NYA00E37 4	Winsor Acres													
88	NYA00E41 0	GLEZEN FARMS, LLC.													
89	NYA00E00 7	OAKWOOD DAIRY LLC													
90	NYA00E31 0	CONQUEST CATTLE FEEDERS													
91	NYA00E00 8	SPRUCE HAVEN FARM LLC													
92	NYA00E41 9	LINCOLN DAIRY, LLC.													
93	NYA00E03 8	WILLET DAIRY LLC													
94	NYA00E00 9	AURORA RIDGE DAIRY, LLC													
95	NYA00E12 4	GREEN HILL DAIRY, INC.													
96	NYA00E46 0	ALLEN FARMS													
97	NYA00E04 2	VANS RIDGE FARM													
98	NYA00E42 2	PETER'S DAIRY, Inc													
99	NYA00E12 3	PATTERSON FARMS, INC.													
100	NYA00E41 7	ROACH FARM													
101	NYA00E03 1	SUNNYSIDE FARMS, INC.													
102	NYA00E41 8	PINE HOLLOW DAIRY, LLC													
103	NYA00E42 0	RIDGECREST DAIRY, LLC													
104	NYA00E42 1	HANEHAN FAMILY DAIRY LLC													
105	NYA00E34 0	RIVERSIDE DAIRY, LLC													
106	NYA00E46 2	WILLOW BREEZE FARM													
107	NYA00E46 1	CURRIE VALLEY DAIRY, LLC.													
108	NYA00E39 6	PREBLE HILL FARM, LLC													

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
109	NYA00E41 5	WHITE EAGLE FARMS, LLC													
110	NYA00E27 9	SPRINGWATER FARMS													
111	NYA00E30 6	HUDSON EGG FARMS													
112	NYA00E39 5	HOURIGAN DAIRY FARM, LLC													
113	NYA00E33 6	VENTURE FARMS LLC													
114	NYA00E12 2	BARBLAND FARMS, INC.													
115	NYA00E33 8	FABIUS GREENWOOD FARM LLC													
116	NYA00E40 9	ALLEN FAMILY FARMS LLC													
117	NYA00E30 9	ELMER RICHARDS & SONS													
118	NYA00E31 4	VOLLES DAIRY FARM													
119	NYA00E41 3	HOURIGAN FAMILY DAIRY, LLC													
120	NYA00E45 8	CO-VALE HOLSTIENS, LLC.													
121	NYA00E46 4	FESKO DAIRY, LLC.													
122	NYA00E30 8	TWIN BIRCH DAIRY													
123	NYA00E45 6	AA DAIRY													
124	NYA00E34 9	FARVIEW FARMS LLC													
125	NYA00E31 1	BECK FARMS, LLC.													
126	NYA00E41 6	MILLBROOK FARM													
127	NYA00E12 1	WALNUT RIDGE DAIRY, LLC.													
128	NYA00E47 3	LLOYDS USA DEVELOPMENT, INC.													
129	NYA00E01 7	MCCORMICK FAMILY DAIRY													
130	NYA00E35 3	OFFHAUS FARMS, INC.													
131	NYA00E40 1	LOR-ROB DAIRY FARM													
132	NYA00E01 6	BASKIN LIVESTOCK													
133	NYA00E18 4	ZUBER FARMS													
134	NYA00E18 6	MILLER'S SONSHINE ACRES													
135	NYA00E18 5	REYNCREST FARMS													

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
136	NYA00E35 5	OAK ORCHARD DAIRY, LLC.													
137	NYA00E35 0	CY HEIFER FARMS, LLC													
138	NYA00E19 0	TORREY FARMS DAIRY, INC.													
139	NYA00E00 2	MAIN FACILITY													
140	NYA00E14 0	STEIN FARMS													
141	NYA00E02 9	LAMB FARMS													
142	NYA00E18 7	HILDENE FARMS													
143	NYA00E35 1	COYNE FARMS, INC.													
144	NYA00E35 2	MULLIGAN FARM, INC.													
145	NYA00E12 6	SPARTA FARMS, LP.													
146	NYA00E34 2	LA CASA DE LECHE, LLC.													
147	NYA00E44 4	DAIRY KNOLL FARMS, LLC.													
148	NYA00E13 0	THORNAPPLE DAIRY													
149	NYA00E43 9	MT. MORRIS DAIRY FARMS													
150	NYA00E14 2	ROLL-N-VIEW FARMS													
151	NYA00E14 5	T. JOSEPH SWYERS FARM													
152	NYA00E35 4	WALKER FARM													
153	NYA00E12 7	LAWNEL FARMS 2													
154	NYA00E34 1	DONNAN FARMS													
155	NYA00E40 0	ERNEST GATES & SONS, LLC													
156	NYA00E04 5	NOBLEHURST FARMS													
157	NYA00E14 7	FINGER LAKES RACING ASSOCIATION													
158	NYA00E13 2	WILLOW BEND FARM													
159	NYA00E13 5	WILL-O-CREST FARMS, LP													
160	NYA00E13 4	SCHUM-ACRES DAIRY OPS													
161	NYA00E46 6	DEBOOVER FAMILY FARMS LLC													
162	NYA00E44 1	HEMDALE FARMS													

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
163	NYA00E31 7	HATHORN FARMS													
164	NYA00E31 8	LAWNHURST FARMS													
165	NYA00E13 6	HEIFER HAVEN FARMS													
166	NYA00E46 7	PHALEN FARMS													
167	NYA00E40 2	J. MINNS FARMS, LLC.													
168	NYA00E12 8	BONNA TERRA FARMS													
169	NYA00E19 2	JOHN, MARK, MAUREEN J. TORREY PA													
170	NYA00E44 0	BERGEN FARMS													
171	NYA00E46 9	CANOGA SPRING FARMS													
172	NYA00E47 0	HARTY HOG FARMS													
173	NYA00E05 6	MAYBURY-ROSENKRANS REAL ESTATE. LLC													
174	NYA00E47 4	GEORGE FAMILY FARMS, LLC													
175	NYA00E02 8	J.P. SWINE ENTERPRISES, LLC													
176	NYA00E15 0	WILKINS DAIRY FARM													
177	NYA00E13 7	DUNLEA DAIRY FARM													
178	NYA00E14 4	LENT HILL DAIRY FARM													
179	NYA00E14 1	LISMORE DAIRY													
180	NYA00E14 9	KARR DAIRY FARMS													
181	NYA00E03 3	DAMIN FARM													
182	NYA00E32 6	STONY BROOK FARM													
183	NYA00E15 1	WHITESVILLE POULTRY													
184	NYA00E31 6	RUTT FARMS													
185	NYA00E32 0	WAYNE COUNTY EGGS													
186	NYA00E03 5	MERRELL DAIRY, LLC													
187	NYA00E38 3	MAYLINE FARMS													
188	NYA00E38 2	BAINBRIDGE FARM													
189	NYA00E36 6	R & D ADAMS DAIRY FARMS, LLC.													

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
190	NYA00E19 7	EDELWEISS FARMS													
191	NYA00E36 5	C & J DAIRY FARMS, INC.													
192	NYA00E21 8	MALLARDS DAIRY													
193	NYA00E36 2	BEAVERS DAIRY FARM, LLC.													
194	NYA00E36 4	SCHWAB DAIRY FARM, LLC.													
195	NYA00E36 1	COUNTRY AYRE FARMS, LLC.													
196	NYA00E36 7	RIDGELINE FARM, LLC.													
197	NYA00E03 6	SCHOFIELD FARMS, LLC													
198	NYA00E37 0	PHILLIPS FAMILY FARM, INC.													
199	NYA00E35 7	KREHER'S FARM FRESH EGGS, LLC.													
200	NYA00E36 3	EDEN VALLEY DAIRY, LLC.													
201	NYA00E35 8	PALMER DAIRY FARMS, LLC.													
202	NYA00E21 2	GASPORT VIEW DAIRY FARMS													
203	NYA00E20 1	MCCOLLUM FARMS													
204	NYA00E22 4	CHAFFEE FARMS, LLC.													
205	NYA00E22 8	ATWATER FARMS													
206	NYA00E21 0	LAKESHORE DAIRY, LLC													
207	NYA00E19 9	DZIEDZIC FARMS													
208	NYA00E01 5	BAKER BROOK DAIRY, LLC													
209	NYA00E37 8	PANKOW FARM													
210	NYA00E34 6	SOUTHVIEW FARMS, LP													
211	NYA00E37 6	TABLE ROCK FARM													
212	NYA00E40 6	SCHREIBERDALE HOLSTEINS, LLC													
213	NYA00E20 3	SYNERGY, LLC													
214	NYA00E35 9	MCCORMICK FARMS, INC. - DAIRY													
215	NYA00E22 9	BLISS CATTLE COMPANY													
216	NYA00E23 2	BROUGHTON FARM OPERATION													

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
217	NYA00E47 6	ROBBIEHILL DAIRY FARM													
218	NYA00E20 6	HI-LAND FARMS													
219	NYA00E21 4	BOXLER DAIRY FARMS													
220	NYA00E15 6	OLD ACRE FARM													
221	NYA00E21 6	TRUE FARMS													
222	NYA00E38 1	SUNNY KNOLL FARMS													
223	NYA00E38 0	GARDEAU CREST FARM													
224	NYA00E19 6	EMERLING FARMS													
225	NYA00E37 7	HIGHBANKS DAIRY													
226	NYA00E21 1	VAN SLYKE'S DAIRY FARM													
227	NYA00E21 3	PERL FARMS													
228	NYA00E20 4	BREEZYHILL DAIRY													
229	NYA00E19 8	SWISS VALLEY FARMS, LLC.													
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Exhibit 20



Friends of Toppenish Creek

December 27, 2019

Chery Sullivan
Director Dairy Nutrient Management Program
Washington State Department of Agriculture
Natural Resources Building, 2nd Floor
P.O. Box 42560
1111 Washington St. SE
Olympia, WA 98504-2560

Dear Ms. Sullivan,

Thank you for your e-mail of December 26, 2019 in response to Friends of Toppenish Creek's (FOTC) June 2019 request for information. We have several responsive observations.

1. When FOTC first approached officials with our concerns related to composting dead cows, we spoke with the WA State Dept. of Ecology (Ecology) and the Yakima Health District (YHD), the agencies responsible for environmental issues and public health. Both referred us to the WSDA Dairy Nutrient Management Program (DNMP). This has occurred in other situations. The Yakima Regional Clean Air Agency (YRCAA) and the WA State Board of Health (BOH) have asserted that problems related to dairies are all handled by the WSDA DNMP. As your citations of the law clearly demonstrate this is invalid. It appears to FOTC that some state and local agencies are avoiding their own responsibilities by attempting to shift them to your office.

Earlier this year a resident of the Lower Yakima Valley complained to the YHD about health issues related to manure storage. The health district actually told her to call the WSDA DNMP. Our neighbor shared your email stating that you had no authority but would contact the dairies and ask them to address her concerns. This was very nice but not very helpful overall.

2. Your email failed to include several Washington rules and laws that involve the DNMP.

- Agricultural composting operations are clearly cited under exemptions from solid waste permitting in RCW 70.95.205
- Dairy nutrient management plans are clearly cited under exemptions from solid waste permitting in WAC 173-350-220
- WAC 173-350-220 states, “Producers that fail to meet the conditions of RCW 70.95.306 (composting of bovine and equine carcasses) will be required to obtain a solid waste handling permit from the jurisdictional health department and must comply with all other conditions of this chapter.”
- The only way to know that a dairy fails to meet the conditions of RCW 70.95.306 is through a dairy inspection by the DNMP.

3. Your email cited dairy inspections as the DNMP’s method of detecting water quality violations. Quite frankly, this is insulting. There is one DNMP inspector for all of eastern Washington where 60% of the state’s dairy cows are located. There are three or four inspectors for the Puget Sound area. Inspections occur approximately once every 22 months and last a few hours.

The questions for mortality composting operations that you listed are insufficient to evaluate whether there is leaching to groundwater. A subjective determination that composting takes place on “a hardened pad” is not the same as testing soil permeability. Evidence from the Lower Yakima Valley is clear. There is leakage from composting operations built on “hardened pads”. (See Attachments 1 through 5).

The DNMP essentially ignores air emissions. Turning compost generates large dust clouds. In this case the dust comes from bovine carcasses and is inhaled by neighbors.

4. WSDA and Ecology know, or should know, that the Natural Resource Conservation Service (NRCS) Soil Web Survey considers the area where the mortality composting presumably occurs to be “very limited” for large animal mortality composting after a catastrophic event. Here is the NRCS explanation:

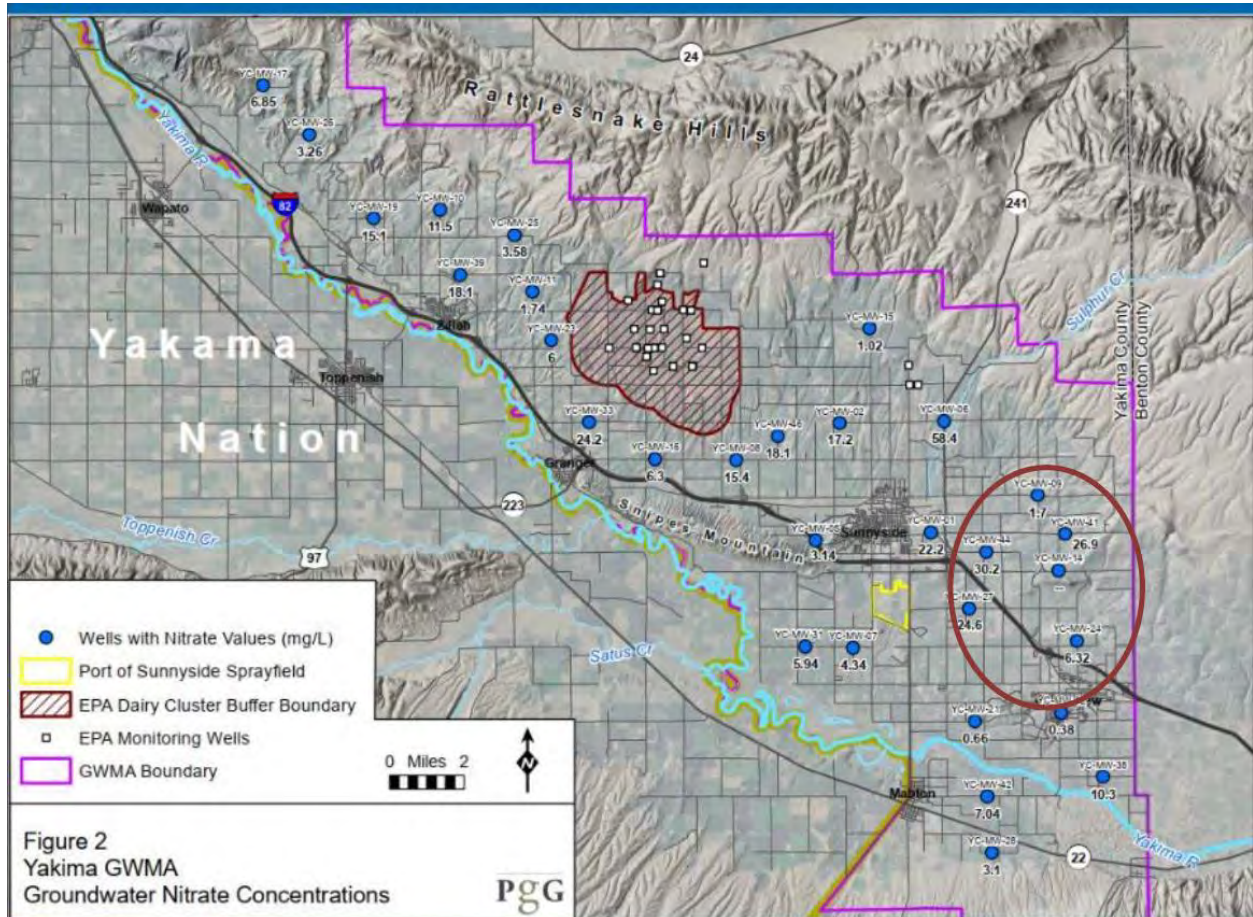
Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. "Not limited" indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected of a properly designed and installed system on these soils. "Somewhat limited" indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. "Very limited" indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil

reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Since the 15th District Legislators are part of this conversation I have attached instructions on accessing NRCS Soil Survey data. (Attachment 6)

All this is complicated by the fact that monitoring wells drilled by the Lower Yakima Valley Groundwater Management Area (LYV GWMA) describe an aquifer that is already contaminated with nitrate. Here is a map from that program with 2019 nitrate levels next to the sites and a circle around the area where public records requests say the mortality composting occurs. Source

<https://www.yakimacounty.us/DocumentCenter/View/21633/GWAC-Presentation---Monitoring-Well-Report-Overview---2019620-v20-1>



5. FOTC still has serious concerns about the impact of this mortality composting on public health. Our questions have not been answered, although it may not be within WSDA's authority to do so.

FOTC firmly believes that none of the officials who directed these operations from their climate controlled offices would allow composting of dead cows next to their own homes and families. The agencies have shown callous disregard for the health and welfare of the people who live in this area.

It now appears that there is no limit to the number of dead animals that can be composted in whatever sized area a CAFO chooses and there is essentially no regulatory oversight. Composting 1,000 animals at a time is the new normal, at least for Yakima County and this will likely change the definition of “agricultural activity” in Washington’s Right to Farm Law, RCW 7.48.300 to 7.48.320. This is wrong and it contributes to mistrust of government to protect the citizens.

6. FOTC asks the WSDA DNMP to:

- Stop providing cover for other agencies that wish to avoid responsibility for environmental and health issues related to animal mortality composting
- Publicly acknowledge the need for groundwater testing around the mortality composting sites as the only way to evaluate leakage and/or spread of waterborne disease
- Publicly acknowledge the need for air monitoring to search for airborne pathogens and elevated levels of particulate matter

Thank you for reading and for addressing these serious observations. We look forward to hearing from you.

Sincerely,

Jean Mendoza

Jean Mendoza

Executive Director, Friends of Toppenish Creek

Exhibit 21

DECLARATION OF BUCK RYAN

I, BUCK RYAN, declare and state as follows:

1. I am 40 years old, and I live in Ada County, Idaho with my wife. I am the Founder, Executive Director, and first Waterkeeper of Snake River Waterkeeper. I founded Snake River Waterkeeper in 2014, and I have been the Executive Director since then. I am also an attorney, and I worked at a law firm in Eastern Idaho for three years before I founded Snake River Waterkeeper.

2. The Snake River is a vital resource for drinking water, recreation, wildlife, and tourism in Idaho. To protect the river and its tributaries, Snake River Waterkeeper monitors water quality, investigates citizen concerns, and demands enforcement of environmental laws. We also issue a SWIM Guide, which provides water quality conditions and safety warnings for sites across the Snake River and its tributaries. Snake River Waterkeeper's work spans the Snake River Basin, from the river's headwaters in Wyoming, across Idaho, to the river's confluence with the Columbia River in Washington. Our work also covers the river's tributaries, including the Clearwater and Salmon rivers. In total, our jurisdiction is approximately 100,000 square miles.

3. As the Executive Director of Snake River Waterkeeper, I have many duties. I do fundraising and accounting, maintain our social media pages and website, plan events, and interact with the group's members. I also speak with our attorneys about any lawsuits that we are involved in, which are aimed at holding polluters accountable and increasing protections for the Snake River and its tributaries.

4. Snake River Waterkeeper focuses much of its work on dams, fish hatcheries, and concentrated animal feeding operations ("CAFOs") in the Snake River Basin. These things are

significant sources of water pollution and harm to wildlife in the area, and the damage they cause is under-addressed.

5. As of 2021, there were at least 365 Large CAFOs in Idaho. Most of Idaho's CAFOs are dairies, and the Large dairy CAFOs confine at least 700 cows each, with some holding up to 150,000 cows in a single operation. The cows in Idaho's dairies produce an enormous amount of manure. Snake River Waterkeeper estimates that Idaho dairy operations generate approximately 4 billion pounds of manure each year. The dairy CAFOs typically store this waste in liquid form in large uncovered pits, and they get rid of it by spreading it on fields, either on their property or offsite. The fields often cannot retain all of the waste that CAFOs spread on them, so the waste runs off into nearby waterbodies, including the Snake River and its tributaries. For example, a prominent article on pollution in the Snake River explains that CAFOs along the river "have discharged manure by spreading it as a liquid three inches thick and miles wide on surrounding farm fields, which are crusted over with dried muck."¹

6. Snake River Waterkeeper has repeatedly found pollutants associated with CAFOs in the river. For our SWIM Guide, we monitor sites along the river and its tributaries for nitrates and total dissolved solids, which can make the water unsafe for swimming. We used to monitor water quality at over 100 sites. For the last three years, we've monitored the 28 sites that are most popular for public use. We've found that, at least once during the summer, about a third of these sites will be too contaminated with nitrates or dissolved solids for children under the age of seven to swim in safely. Some sites are never clean enough to swim in. Nitrates and dissolved

¹ Richard Manning, *Idaho's Sewer System is the Snake River*, High Country News (Aug. 11, 2014), https://www.hcn.org/issues/46.13/idahos-sewer-system-is-the-snake-river?b_start:int=2#body.

solids are an indicator that the water is contaminated with manure, so I think the CAFOs along the river are responsible for the pollution.

7. In addition to polluting surface water, CAFOs in the area also pollute the groundwater. Our groundwater has high levels of nitrates, and I think this contamination is the result of manure percolating through the soil and bedrock after CAFOs apply it to fields, as well as manure seeping out of CAFO waste pits. Contaminated groundwater can enter people's drinking wells. I'm aware of research showing that, based on the bedrock in the area, the manure storage and disposal practices that CAFOs are employing on the surface now will threaten Idahoans' drinking water by 2050. About 95 percent of Idahoans get their drinking water from the Snake River Plain Aquifer, and nitrates and other CAFO pollutants in drinking water can cause serious health problems, so preventing CAFOs in the area from contaminating groundwater is very important.

8. Not only do CAFOs cause water pollution, but they also produce an overwhelming odor. If I'm driving in an area with a lot of CAFOs, I close my car windows and air vents and try to avoid stopping for gas. If you have your windows or air vents open, the odor can make you choke.

9. CAFOs in Idaho are located mostly in low-income communities and rural communities. As a result, these community members often experience the worst of the pollution the CAFOs cause, and they are at especially high risk of developing health problems from breathing the contaminated air and drinking the polluted water.

10. Although CAFOs in Idaho cause extensive water pollution, no CAFOs in the state have National Pollutant Discharge Elimination System ("NPDES") permits under the Clean Water Act. The CAFOs avoid operating under NPDES permits because the U.S. Environmental

Protection Agency (“EPA”) relies on self-reporting by CAFO operators to determine which CAFOs discharge water pollution and, thus, require NPDES permits. But self-reporting is generally only effective when there is monitoring to document discharges, such as equipment at the end of a pipe that records the amount of pollutants that are discharged. CAFOs do not have that type of monitoring, so it is easy for them to claim that they do not discharge. In fact, every CAFO in Idaho claims that it does not discharge water pollution. In the article on pollution in the Snake River, the EPA director for Idaho recognized that Idaho CAFOs have “made the business decision” to not participate in NPDES permitting.²

11. CAFOs in Idaho are also able to avoid operating under NPDES permits because the Idaho Department of Environmental Quality (“ID DEQ”) does very little to monitor them or take enforcement actions against them when they discharge. The lack of oversight from ID DEQ makes it easier for CAFOs to get away with claiming that they do not discharge. It also attracts more CAFOs to Idaho, because they know that they will not be held accountable for causing pollution.

12. From my experience, I think it’s reasonable to assume that all CAFOs discharge water pollution. I have yet to see a CAFO that looks to have enough land to dispose of all the manure the animals generate without any of the manure running off the land and causing water pollution. I am also aware of specific instances of CAFOs discharging water pollution. For example, in 2017, a dairy CAFO with at least 1,000 cows and no NPDES permit discharged a significant amount of manure and other waste from a waste pit into a canal that flows into the

² *Id.*

Malad River and then into the Snake and Columbia rivers.³ The CAFO operators cut the side of the waste pit open to allow the waste to flow into the canal. Because Idaho CAFOs discharge, they should have NPDES permits.

13. Increasing NPDES permit coverage for CAFOs in Idaho would benefit Snake River Waterkeeper and all Idahoans. The Clean Water Act requires that the public have access to CAFO nutrient management plans, which describe how a CAFO will store and dispose of the waste it generates and help CAFOs operators avoid discharging water pollution. Under Idaho law, however, manure disposal is considered a “trade secret,” which is laughable. In Idaho, the public is barred from accessing a CAFO’s nutrient management plan unless the CAFO is operating under a NPDES permit. Without access to information on where a CAFO is land applying its waste, the amount of waste it is applying, and the guidelines it should be following to prevent discharges, it is difficult for the public to monitor CAFOs and hold them accountable for causing discharges.

14. Increasing NPDES permit coverage would also complement Snake River Waterkeeper’s efforts to strengthen Idaho’s NPDES General Permit for CAFOs. ID DEQ is currently revising the NPDES General Permit, and Snake River Waterkeeper is participating closely in the revisions to ensure that the permit complies with the CWA. A permit that complies with the CWA will better protect the Snake River from CAFO pollution. However, our efforts to improve the NPDES General Permit will have less impact if CAFOs continue to operate without NPDES permits.

³ *Shoshone Dairy, Owner Sentenced for Wastewater Violation Stemming from 2017 Flooding*, KMVT News (Mar. 17, 2021), <https://www.kmvt.com/2021/03/17/shoshone-dairy-owner-sentenced-for-wastewater-violation-stemming-from-2017-flooding/>.

15. Lastly, increasing NPDES permit coverage will allow Snake River Waterkeeper to use citizens suits to hold CAFOs accountable for causing water pollution. CAFOs operating under NPDES permits are subject to citizen suits for violating their permits, including by causing discharges. However, Idaho law does not provide for citizen suits. Snake River Waterkeeper identifies wastewater treatment plants and hatcheries that are violating their NPDES permits and brings citizen suits to bring them into compliance with the permits, and it would also do this for CAFOs operating under NPDES permits.

I declare under penalty of perjury that, to the best of my knowledge, the foregoing is true and correct. Executed this 20th day of October, 2022.



Buck Ryan

Exhibit 22

Industrial Hog Operations in North Carolina Disproportionately Impact African-Americans, Hispanics and American Indians

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August 29, 2014

Summary

Background: In 2014, the North Carolina Department of Environment and Natural Resources (NC-DENR) issued a swine waste management general permit (the General Permit), which is expected to cover more than 2,000 industrial hog operations (IHOs). These facilities house animals in confinement, store their feces and urine in open pits, and apply the waste to surrounding fields. Air pollutants from the routine operation of confinement houses, cesspools, and waste sprayers affect nearby neighborhoods where they cause disruption of activities of daily living, stress, anxiety, mucous membrane irritation, respiratory conditions, reduced lung function, and acute blood pressure elevation. Prior studies showed that this industry disproportionately impacts people of color in NC, mostly African Americans.

Methods: We obtained records on the sizes and locations of permitted IHOs from NC-DENR and calculated the steady state live weight (SSLW) of hogs as an indicator of the amount of feces and urine produced at each IHO. We obtained block-level information on race and ethnicity from the 2010 census of the United States. We compared the proportions of people of color (POC), Blacks, Hispanics, and American Indians living within 3 miles of an IHO to the proportion of non-Hispanic Whites. We quantified relationships between race/ethnicity, presence of one or more IHOs, and the SSLW of IHOs, using Poisson regression and linear regression to adjust for rurality.

Results: Analyses based on a study area that excludes the state's five major cities and western counties that have no presence of this industry show that the proportion of POC living within 3 miles of an industrial hog operation is 1.52 times higher than the proportion of non-Hispanic Whites. The proportions of Blacks, Hispanics and American Indians living within 3 miles of an industrial hog operation are 1.54, 1.39 and 2.18 times higher, respectively, than the proportion of non-Hispanic Whites ($p < 0.0001$). In census blocks with 80 or more percent people of color, the proportion of the population living within 3 miles of an industrial hog operation is 2.14 times higher than in blocks with no people of color. This excess increases to 3.30 times higher with adjustment for rurality. Adjusted for rurality, the SSLW of hogs within 3 miles of a census block increases, on average, 100,000, 64,000, 243,000, and 93,000 pounds for every 10 percent increase in POC, Black, Hispanic, and American Indian population ($p < 0.0001$).

Conclusions: IHOs in NC disproportionately affect Black, Hispanic and American Indian residents. Although we did not examine poverty or wealth in this study, the results are consistent with previous research showing that NC's IHOs are relatively absent from low-poverty White communities. This spatial pattern is generally recognized as environmental racism.

Background

Swine production in North Carolina (NC) changed dramatically during the last decades of the 20th century. Between 1982 and 2006 the number of hog operations in the state declined precipitously while the hog population increased from approximately 2 to 10 million (Edwards and Driscoll 2009). Production became concentrated in eastern NC (Furuseth 1997).

Traditional NC producers raised small numbers of hogs, commonly fewer than 25, and hogs were one of several commercial crops on diversified farms (Edwards and Driscoll 2009). In contrast, industrial producers raise large numbers of hogs, often many thousands, in confinement houses that are designed to vent toxic gases and particles into the environment. Animal wastes are flushed into open cesspools and then sprayed on nearby fields. Pollutants emitted by IHOs include hydrogen sulfide, ammonia, a wide array of volatile organic compounds, and bioaerosols including endotoxins and other respiratory irritants (Cole et al. 2000) (Schiffman et al. 2001).

The negative impacts of particles and gases inside IHO confinements on worker health have been extensively described (Cole et al. 2000; Donham 1993; Donham et al. 1995; Donham et al. 2000; Donham 1990). Environmental pollutants from IHOs affect people who are more susceptible than workers due to young or old age, asthma or allergies, or other conditions. An extensive body of peer-reviewed scientific evidence shows that IHOs release contaminants into neighboring communities where they affect the health and quality of life of neighbors. Many of these studies have been conducted in NC. Hydrogen sulfide concentrations within 1.5 miles of IHOs in NC are associated with neighbors' ratings of hog odor and inability to engage in routine daily activities (Wing et al. 2008), increased stress and anxiety (Horton et al. 2009), irritation of the eyes, nose and throat, respiratory symptoms (Schinasi et al. 2011), and acute elevation of systolic blood pressure (Wing et al. 2013). A study of NC public middle school children who participated in an asthma survey, which was conducted by the NC Department of Health and Human Services, found that children attending schools within three miles of an IHO had more asthma-related symptoms, more doctor-diagnosed asthma, and more asthma-related medical visits than students who attended schools further away (Mirabelli et al. 2006). The same study reported a 23% higher prevalence of wheezing symptoms among children who attended schools where staff reported noticing livestock odor inside school buildings twice or more per month compared to children who attended schools where no livestock odor was reported (Mirabelli et al. 2006). Other studies in NC (Tajik et al. 2008) (Wing and Wolf 2000) (Bullers 2005) (Schiffman et al. 1995) and elsewhere (Donham et al. 2007) (Thu et al. 1997) (Radon et al. 2007) also document negative impacts of IHO air pollution on neighbors' health and quality of life.

Liquid contaminants from IHOs are released to the environment through leakage of animal waste storage pits, runoff from land application of liquid wastes, atmospheric deposition, and failure of the earthen walls of waste pits (Burkholder et al. 2007). Overflow of waste pits during heavy rain events results in massive spills of animal waste into neighboring communities and waterways. For example, in late September, 1999, 237 NC IHOs were located in flooded areas identified from satellite imagery provided by the NC Division of Emergency Management (Wing et al. 2002). Parasites, bacteria, viruses, nitrates, and other components of liquid IHO waste pose threats to human health (Burkholder et al. 2007; Cole et al. 2000).

Routine use of sub-therapeutic doses of antibiotics to promote weight gain of hogs promotes antibiotic resistance, making infections in humans more difficult to treat (Silbergeld et al. 2008). Airborne bacteria, including antibiotic resistant strains, have been isolated from IHO air emissions (Schulz et al. 2012) (Green et al. 2006) (Gibbs et al. 2006), and antibiotic resistant bacteria are associated with animal vectors near industrial animal operations, including flies (Graham et al. 2009), rodents (van de Giessen et al. 2009), and migratory geese that land on NC's IHO liquid waste pits (Cole et al. 2005). A recent medical records study from Pennsylvania shows that people living near IHO liquid waste application sites have elevated rates of infection with methicillin resistant *Staphylococcus aureus* (Casey et al. 2013). NC industrial livestock workers carry strains of *Staphylococcus aureus* that are associated with swine, including antibiotic resistant strains (Rinsky et al. 2013). These bacteria could be spread by liquid waste and airborne particles.

Using information from the United States Census of 1990 and locations of IHOs reported by the North Carolina Department of Environment and Natural Resources (NC-DENR) in 1998, we showed that the state's IHOs were disproportionately located in areas where more people of color (POC), primarily African Americans, live (Wing et al. 2000). We concluded that their disproportionate location in communities of color represented an environmental injustice. Since 1998 additional IHOs have obtained permission to operate and others are no longer in business. Additionally, between 1990 and 2010 the state's population size and spatial distribution changed due to births, deaths and migration. In this report we update our previous findings by evaluating whether IHOs operating under the general permit issued on March 7, 2014, will disproportionately impact POC, Blacks, Hispanics, and American Indians.

Materials and Methods

Lacking a list of the unique IHOs operating under the General Permit finalized in 2014, we used a list of all permitted industrial animal operations provided by NC-DENR on January 24, 2013 that we had prepared for prior research. First we excluded all non-swine operations from the list. Next we excluded swine operations with expired permits and permits with an allowable head count equal to zero. We also excluded permits that did not appear on a list of permitted animal operations published by DENR in January, 2014. We merged multiple permits issued for the same facilities to obtain a total head count for each operation. However the head count may be misleading as a measure of the pollution from each IHO because some facilities primarily house small pigs while others primarily house large hogs. We therefore calculated each facility's total steady state live weight (SSLW) using NC-DENR's formula based on the number and average weight of each growth stage of swine permitted at the facility. We interpret SSLW as a summary measure of the feces and urine produced by the swine of different growth stages at each facility.

Following the protocol provided in our previous study we excluded facilities operated by research institutions because they are subject to different location and management decisions than are commercial operations (Wing et al. 2000). Finally, we excluded facilities that do not hold a certificate of coverage to operate under the General Permit because they operate under individual permits or National Pollutant Discharge Elimination System general permits. The resulting facilities should closely approximate those expected to seek to continue operating under

the renewed General Permit. The renewed General Permit takes effect on October 1, 2014, at which time we plan to update the list created for this research.

The vulnerability of people of any race/ethnicity to having polluting facilities nearby can be affected by the race and ethnicity of other people in their community. For example, African-Americans who live in areas primarily populated by non-Hispanic Whites have, generally, a lower susceptibility to being near polluting facilities than African-Americans who live in areas primarily populated by Hispanics or American Indians. We therefore conducted our primary analyses of disproportionate impact using the POC category. We also conducted analyses for specific racial/ethnic categories. We defined the following racial/ethnic categories: non-Hispanic White (non-Hispanics who identified as White and no other race), POC (all people not categorized as non-Hispanic white), Black (people who identified themselves as African-American or Black with or without any other race), Hispanic of any race, and American Indian (people who identified themselves as American Indian with or without any other race). We used block-level race/ethnicity-specific population counts from the US Census of 2010.

As large-scale agricultural facilities, IHOs are not located in major cities. Following the protocol adopted in our prior research, we defined a study area for our primary analyses that excluded census blocks in the five major metropolitan areas of NC (Charlotte, Winston Salem, Greensboro, Durham and Raleigh) as well as 19 western counties that neither have an IHO nor border a county that has an IHO. We conducted additional analyses for the entire state.

We considered residents of blocks to be affected by IHOs within three miles of the block centroid. Blocks were categorized as either having, or not having, an IHO within three miles. Additionally, we calculated the total permitted SSLW of hogs within three miles of the centroid of each block as a measure of the total potential influence of pollutants from nearby IHOs on the residents of the block.

As in our prior study, we also calculated the population density of each block, defined as the number of people per square mile. Population density is a measure of rurality, which is strongly related to the availability of land for agriculture and the price of land. Racial/ethnic groups in NC differ in their urban vs. rural residence, making them differentially susceptible to types of polluting facilities that locate in rural vs. urban locations. For example, a larger proportion of non-Hispanic Whites in NC live in remote rural areas than do Blacks, the racial comparison is affected not only by the susceptibility of Whites vs. Blacks to IHOs, but also by differences in whether they live in rural vs. urban areas. By adjusting for population density (or rurality), we compare racial vulnerability to IHOs for racial groups within each level of rurality. This adjustment is analogous to other statistical adjustments in epidemiology, as when the death rates of two countries are compared: even though death rates at every age may be higher in a poor than a rich country, the poor country may have a lower overall death rate simply because it has a younger age distribution. In that case, age-adjustment is used to compare mortality in the two countries just as we use density-adjustment to compare the proximity to IHOs in areas with different racial/ethnic make-up.

We used weighted Poisson regression to quantify relationships between race/ethnicity and the presence of one or more IHOs within three miles of a block. We used weighted linear regression to quantify relationships between race/ethnicity and the SSLW of hogs permitted within three miles of a block. We used census block populations as weights. In density-adjusted models we included variables for the natural log of population density raised to the first, second and third power. As in our prior analysis, this cubic model fit the data well and additional power terms added little to the model fit (Wing et al. 2000). For the two largest racial/ethnic groups other than non-Hispanic Whites, POC and Blacks, we categorized race/ethnicity in groups of blocks 20% in width compared to blocks with no POC using indicator variables. Due to smaller numbers in these categories we did not fit models with indicator variables for Hispanics and American Indians. We also considered the percent of population of each race/ethnicity as a continuous variable, estimating the added burden of IHOs for a 10% increase in the population.

This study involves neither random sampling nor randomization of exposure to IHOs, therefore statistical significance testing is inappropriate and confidence intervals do not correspond to the probability that the true values of measures of association are within the interval. However, the US-EPA considers statistical significance in its assessment of environmental racism. We therefore report p-values for differences in proportions of each racial/ethnic group within 3 miles of an IHO using t-tests. We report 95% confidence intervals (CIs) as measures of precision of the associations estimated from regression models. 95% CIs that exclude the null value (1.0 for ratios and 0.0 for differences) are commonly considered to be statistically significant at $p < 0.05$.

Results

We estimate that 2,055 IHOs were operating under the General Permit in January 2014, and that they were permitted to house approximately 1.2 billion pounds of swine (Table 1). The 160 (7.7%) IHOs permitted to house between 20 and 100 thousand pounds accounted for only 1% of the total permitted SSLW. The 342 (17.2%) IHOs permitted to house between 1 and 10.2 million pounds accounted for 46.5% of the total.

Table 2 shows that there are over 6.5 million residents of the study area. Approximately 986,000 (15.1%) of these live in census blocks whose centroid is within 3 miles of an IHO that operates under the General Permit. This includes 602,380 non-Hispanic Whites and 383,522 POC. 13.1% of non-Hispanic Whites and 19.9% of POC in the study area live in blocks within 3 miles of an IHO.

Based on the study area population in Table 2, Table 3 shows ratios of percentage of POC living within 3 miles of an IHO compared to the percentage of non-Hispanic Whites living within 3 miles of an IHO. The percentage of POC living within 3 miles of an IHO is 1.52 times higher than the percentage of non-Hispanic Whites. The percentages of Blacks, Hispanics and American Indians living within 3 miles of an IHO are 1.54, 1.39 and 2.18 times higher, respectively, than non-Hispanic Whites. If residents of the study area had been randomized to live within 3 miles of an IHO, the probabilities of observing differences of these magnitudes or greater are less than 0.0001; the observed differences are considered to be highly statistically significant.

We calculated these same ratios based on the entire state population of 9,535,483. The percentages of POC, Blacks, Hispanics and American Indians living within 3 miles of an IHO are 1.38, 1.40, 1.26 and 2.39 times higher than the percentage of non-Hispanic Whites, respectively. These ratios are considered to be highly statistically significant.

Figure 2 shows the percent of people living within 3 miles of an IHO in relation to the percent of people of color in blocks. In areas with less than 20% POC, just over 10% of the population lives within 3 miles of an IHO. In areas with 60-80% POC, over 20% of the population lives so close to an IHO. In areas with more than 80% POC, more than a quarter of the population lives within 3 miles of an IHO.

Table 4 presents ratios of the percent of people living within 3 miles of an IHO in blocks with >0 to <20%, 20 to <40%, 40 to <60%, 60 to <80% and 80 to 100% POC compared to blocks with no POC. The total population in these categories ranges from 526,305 in blocks with 60 to <80% POC to 2,577,015 in blocks with >0 to <20% POC. Ratios are statistically significantly elevated for all areas with more than 40% POC with or without adjustment for rurality. Ratios on the right side of Table 4 are adjusted for rurality. These ratios increase with the percentage POC. The highest ratios occur in areas with more than 80% POC, where over three times as many people live near IHOs, adjusted for rurality, compared to areas with no POC. These excesses are considered to be highly statistically significant.

Table 5 shows the results of analyses for Blacks parallel results to in Table 4 for all POC. Although ratios are somewhat lower for Blacks than POC, the percent of people living within 3 miles of an IHO is statistically significantly elevated in all groups of blocks that are more than 40% Black, with or without adjustment for rurality. In areas that are 80% or more Black, twice as many people live within 3 miles of an IHO compared to areas with no Blacks, a disparity that increases to three times more with adjustment for rurality. These excesses are considered to be highly statistically significant.

Table 6 presents the increased percent of the population living within 3 miles of an IHO for each additional 10 percent of the population of POC, Blacks, Hispanics, and American Indians. This analysis is similar to the results in Tables 4 and 5, but rather than using categories, the relationship between race/ethnicity and proximity to IHOs is modelled as a linear function. For every ten percent increase in POC, the proportion of people residing within 3 miles of an IHO increases, on average, by 10.7%. These values are 9.4, 8.5, and 16.2 for Blacks, Hispanics, and American Indians, respectively. Adjusting for rurality, 14.8% more people reside within 3 miles of an IHO for each additional ten percent POC. Adjusted values are 13.0, 16.3 and 11.8 for Blacks, Hispanics and American Indians, respectively. These linear relationships between race/ethnicity and living near IHOs are considered to be highly statistically significant.

Table 7 shows the difference in SSLW of hogs within 3 miles of residents of blocks with >0 to <20%, 20 to <40%, 40 to <60%, 60 to <80% and 80 to 100% POC compared to blocks with no POC. Blocks in categories with more than 20% POC have, on average, between 177 and 510 thousand pounds more hogs within 3 miles than blocks with no POC. Adjusting for population density, blocks with more than 60 percent POC have, on average, more than three-quarters of a

million pounds more hogs permitted within 3 miles than areas with no POC. These excesses are considered to be highly statistically significant.

Table 8 presents parallel results for percentage Black population. As for POC, areas with more than 20% Black residents have an excess SSLW of hogs compared to areas with no Black residents, and differences are greater with adjustment for rurality. Adjusted for population density, blocks with more than 40% Black residents have between 493,000 and 620,000 more pounds of hogs within 3 miles than areas with no Black residents. These excesses are considered to be highly statistically significant.

Table 9 provides the average additional SSLW of hogs permitted in areas with POC for each percent increase in specific racial/ethnic categories. Adjusted for population density, the permitted SSLW of hogs within 3 miles of blocks increases 100, 64, 242, and 92 thousand pounds for each ten percent increase in POC, Black, Hispanic, and American Indian population, respectively. These linear relationships between race/ethnicity and SSLW are considered to be highly statistically significant.

Figure 3 depicts the data analyzed above. Each dot represents an IHO that was operating under the General Permit in 2014. IHOs are concentrated in NC's Coastal Plain Region, between the Piedmont and Tidewater. The red areas of Figure 3 indicate that this region has more people of color than other parts of the study area.

Conclusion

IHOs operating under the NC-DENR General Permit in 2014 are disproportionately located near communities of color. The disparities are considered to be highly statistically significant for Blacks, Hispanics, American Indians, and all POC. IHOs pollute local ground and surface water. They routinely emit air pollutants that negatively impact the quality of life and health of nearby residents. In addition to their well-documented effects on physical, mental and social well-being, residents of areas with a high density of IHOs, and especially residents of color, have been subjected to intimidation including threats of legal action, violence, and job loss (Wing 2002). The industry's close ties with local and state government officials help it to avoid regulation that could protect neighbors, and creates barriers to democracy in rural communities of color (Thu 2001, 2003). These discriminatory impacts could be reduced by decreasing the density of production and use of technologies that prevent releases of pollutants.

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Figure 1
North Carolina study area, 2014

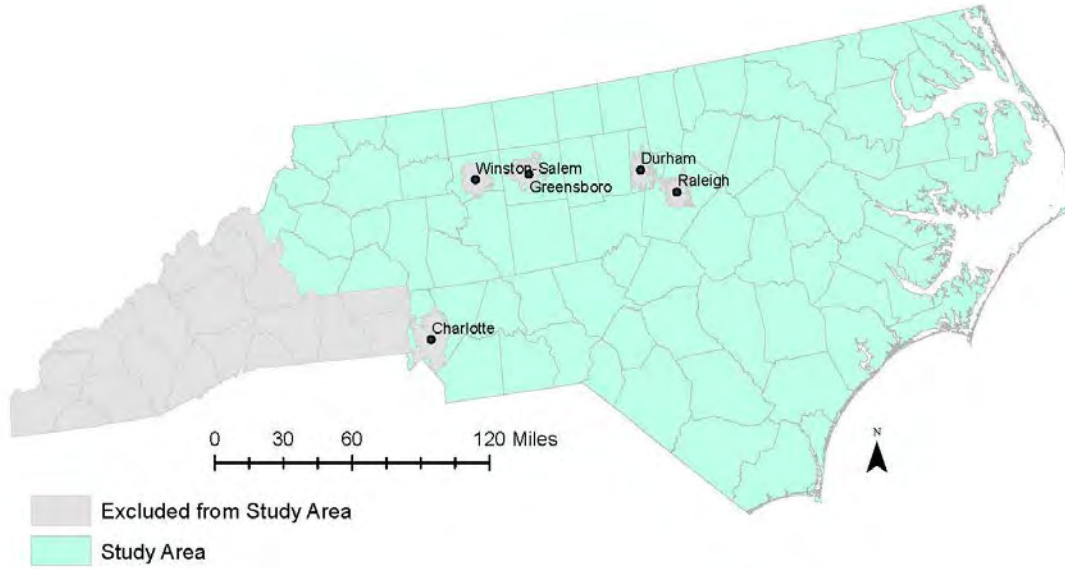


Figure 2
Percent of population living within 3 miles of an IHO
in relation to percent people of color, NC, 2014

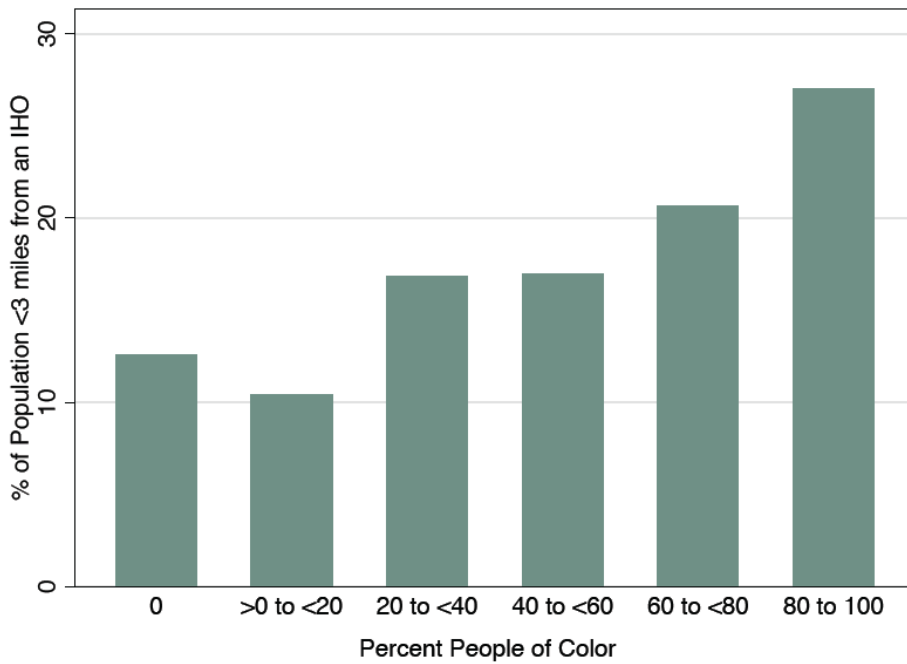


Figure 3
Racial and ethnic composition of census blocks and the locations
of NC IHOs operating under the General Permit, 2014

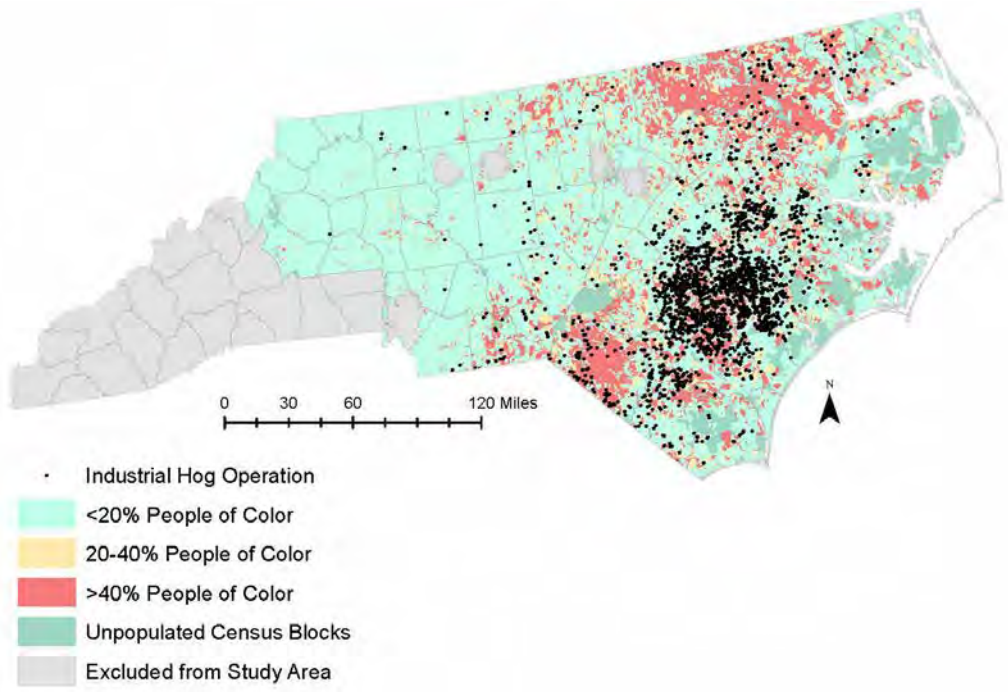


Table 1
Steady state live weight of IHOs
operating under the General Permit, NC, 2014

Permitted SSLW ¹	Number of IHOs	Percent of IHOs	Total SSLW ¹	Percent of total SSLW
20-	160	7.7	12,574	1.0
100-	447	21.6	76,626	5.9
250-	577	28.1	222,003	17.1
500-	529	25.4	383,918	29.6
1,000-10,200	342	17.2	603,354	46.5
Total	2055	100.0	1,298,474	100.0

¹Thousands of pounds

Table 2
Racial and ethnic composition of NC census blocks within 3 miles
of an IHO and more than 3 Miles of an IHO, 2014

Racial Category	<u><3 miles from an IHO</u>		<u>>3 miles from an IHO</u>		Total ¹
	Number	Percent	Number	Percent	
Non-Hispanic white	602,380	13.1	4,003,455	86.9	4,605,835
POC ¹	383,522	19.9	1,548,276	80.1	1,931,798
Black	277,199	20.2	1,096,795	79.8	1,373,994
Hispanic	92,679	18.1	418,292	81.9	510,971
American Indian	40,621	28.5	101,872	71.5	142,493
Total¹	985,902	15.1	5,551,731	84.9	6,537,633

¹POC can be counted in more than one racial/ethnic category. The total population is equal to the number of non-Hispanic Whites plus the number of POC.

Table 3
Ratios of POC compared to non-Hispanic Whites living within 3 Miles
of an IHO operating under the General Permit, 2014

Racial/ethnic Category	Population	<u>≤3 miles from an IHO</u>		Ratio ²	p-value ³
		Number	Percent		
Non-Hispanic white	4,605,835	602,380	13.1	1.00	--
POC ¹	1,931,798	383,522	19.9	1.52	<0.0001
Black	1,373,994	277,199	20.2	1.54	<0.0001
Hispanic	510,971	92,679	18.1	1.38	<0.0001
American Indian	142,493	40,621	28.5	2.18	<0.0001
Total ¹	6,537,633	985,902	15.1		

¹People of color can be counted in more than one racial/ethnic category. The total population is equal to the number of non-Hispanic Whites plus the number of POC.

²Ratio of the percent of people of other racial/ethnic groups to percent of non-Hispanic Whites living within 3 miles of an IHO

³A difference in proportions of this magnitude or greater would be expected to occur less than one time in ten thousand if people of different racial/ethnic groups had been randomized to live within 3 miles of an IHO.

Table 4
Ratios comparing the percent of people residing within 3 miles of an IHO
in blocks with POC compared to blocks with no POC

Percent POC	Population	Unadjusted Prevalence Ratio	95% CI	Adjusted ¹ Prevalence Ratio	95% CI
0	694,747	1.0	referent	1.00	referent
>0 to <20	2,577,015	0.83	0.82, 0.83	1.01	1.00, 1.02
20 to <40	1,364,923	1.34	1.33, 1.45	1.95	1.93, 1.97
40 to <60	799,124	1.35	1.34, 1.36	2.15	2.13, 2.16
60 to <80	526,305	1.64	1.62, 1.65	2.53	2.50, 2.55
80 to 100	575,519	2.14	2.12, 2.16	3.30	3.27, 3.32

¹Adjusted for rurality using a cubic polynomial of the natural log of population density

Table 5
Ratios comparing the percent of people residing within 3 miles of an IHO
in blocks with Black residents compared to blocks with no Black residents

Percent Black	Population	Unadjusted Prevalence Ratio	95% CI	Adjusted ¹ Prevalence Ratio	95% CI
0	1,308,061	1.00	referent	1.00	referent
>0 to <20	2,941,746	0.93	0.92, 0.94	1.20	1.19, 1.21
20 to <40	1,043,277	1.44	1.43, 1.45	2.07	2.05, 2.08
40 to <60	536,198	1.52	1.51, 1.53	2.18	2.17, 2.20
60 to <80	336,232	1.57	1.56, 1.59	2.19	2.17, 2.21
80 to 100	372,119	2.01	1.99, 2.02	3.06	3.04, 3.09

¹Adjusted for rurality using a cubic polynomial of the natural log of population density

Table 6
Percent difference in the percent of people residing within 3 miles of an IHO for a ten percent
increase in the population of each racial/ethnic group

Racial/ethnic group	Unadjusted		Adjusted ¹	
	Percent	95% CI	Percent	95% CI
POC	10.7	10.6, 10.8	14.8	14.7, 14.9
Black	9.4	9.3, 9.4	13.0	12.9, 13.1
Hispanic	8.5	8.4, 8.6	16.3	16.1, 16.4
American Indian	16.2	16.0, 16.4	11.8	11.6, 12.0

¹Adjusted for rurality using a cubic polynomial of the natural log of population density

Table 7
Difference in SSLW of hogs within 3 miles of residents of blocks
with POC compared to blocks with no POC

Percent POC	Unadjusted		Adjusted ¹	
	SSLW ²	95% CI	SSLW	95% CI
0	Referent	-	Referent	-
>0 to <20	-35	-73, 3	190	154, 227
20 to <40	177	136, 219	535	495, 575
40 to <60	308	262, 353	717	672, 762
60 to <80	510	459, 561	896	846, 946
80 to 100	453	403, 503	837	788, 885

¹Adjusted for rurality using a cubic polynomial of the natural log of population density
²1,000s of pounds

Table 8
Difference in SSLW of hogs within 3 miles of residents of blocks
with Black residents compared to blocks with no Black residents

Percent Black	Unadjusted		Adjusted ¹	
	SSLW ²	95% CI	SSLW	95% CI
0	Referent	-	Referent	-
>0 to <20	-4	-33, 25	237	207, 265
20 to <40	190	153, 227	493	457, 530
40 to <60	327	281, 372	620	576, 665
60 to <80	275	221, 330	547	494, 599
80 to 100	165	113, 218	494	444, 545

¹Adjusted for rurality using a cubic polynomial of the natural log of population density
²1,000s of pounds

Table 9
Difference in SSLW of hogs within 3 miles of residents of blocks for a ten percent increase in
population of each racial group

Racial/ethnic group	Unadjusted		Adjusted ¹	
	SSLW ²	95% CI	SSLW	95% CI
POC	67	63, 71	100	96, 104
Black	38	34, 42	64	60, 68
Hispanic	183	174, 192	242	234, 251
American Indian	124	111, 137	92	80, 105

¹Adjusted for rurality using a cubic polynomial of the natural log of population density
²1,000s of pound

Exhibit 23

May 6, 2022

Via First Class and Electronic Mail

Laura Watson, Director
Washington State Department of Ecology
P.O. Box 47600
Olympia, WA 98504-7600

Re: Environmental Justice and Washington Concentrated Animal Feeding Operations Permitting

Dear Director Watson,

Puget Soundkeeper Alliance, Friends of Toppenish Creek, Sierra Club, Waterkeeper Alliance, Center for Food Safety, and Western Environmental Law Center, and their tens of thousands of members, supporters, and volunteers throughout the State of Washington, are writing to express our concern with the Department of Ecology's (Ecology) failure to engage with communities impacted by discharge from Concentrated Animal Feeding Operations (CAFO) while drafting its general NPDES permit.¹

Introduction

As we have made clear in our advocacy during the CAFO permitting process, Ecology must engage with the communities impacted by its regulatory decisions, particularly those already overburdened by past and ongoing environmental discrimination. Because Ecology is the state agency charged with protecting our air and water, this engagement is not only a moral imperative but also a legal requirement.

Ecology acknowledges this moral and legal requirement. Yet, in its efforts to develop a general NPDES permit for CAFOs, Ecology is failing to engage with the people directly harmed by pollution from these operations. Because of this, the agency is uninformed of the true impacts and interests of the people working and living in and around CAFOs, and is at risk of producing yet another inadequate and unprotective general permit.

CAFOs have profoundly negative impacts on the health of workers and the people who live in surrounding communities, including through pollutant discharge into water.² As a result,

¹ We use the terms "impacted" and "affected" to refer to regions and people subject to harms from CAFO discharges ranging from lack of access to healthy drinking water to impacts on fish that are an important source of food. Because there is the tendency for CAFOs to be located in regions where people experience cumulative environmental burdens, these terms overlap with the "vulnerable populations" and "overburdened communities" identified in the HEAL Act. *See* RCW 70A.02.010.

² *See, e.g.,* Grout et al., A Review of Potential Public Health Impacts Associated With the Global Dairy Sector, 4 *GeoHealth* 1 (January 30, 2020); Carrie Hribar, Understanding concentrated animal feeding operations and their impact on communities, National Association of Local Boards of Health at 7, 9 (2020) available at https://www.cdc.gov/nceh/ehs/docs/understanding_cafos_nalboh.pdf.

Ecology must actively engage members of communities affected by CAFO discharge in a dialogue regarding the impact of industrial dairy farms on their water, the legal requirements mandating NPDES permitting of these operations, the scope of the general permit, and the needs and wishes of the members of the local community regarding the regulation of these entities under federal and state clean water law. To do less is unacceptable in any case, but is particularly egregious here given the agency's professed commitment to environmental justice.

I. Ecology's mission and duties mandate attention, consultation, and engagement with people affected by CAFO discharge

Ecology's mission is to “[p]rotect, preserve and enhance Washington's land, air and water for current and future generations.”³ This mandate to protect our natural resources is broad, and is based on the “fundamental and inalienable right of the people of the state of Washington to live in a healthful and pleasant environment and to benefit from the proper development and use of its natural resources.”⁴ To carry out this mission effectively, Ecology, “in consultation with affected constituent groups, [must] continue appropriate public involvement and outreach mechanisms designed to provide cost-effective public input on their programs and policies.”⁵

While the duty to consult with communities affected by pollution is not new, it is now informed by the specific duties of the HEAL Act, passed in 2021, requiring the agency to act towards realizing environmental justice for overburdened communities and vulnerable populations.⁶ Ecology reaffirms this duty by stating that it is “committed to making decisions that do not place disproportionate environmental burdens” on communities in Washington State.⁷ Further, the agency recognizes that full participation by impacted communities in decision-making is an essential step toward environmental justice.⁸ This is consistent with the HEAL Act's requirement that Ecology adopts and implements a plan to engage overburdened communities and vulnerable populations by July 1, 2022.⁹

Because Ecology failed to draft a general permit that met the mandates under state and federal law, CAFOs in Washington State now operate under a permit that expired in March 2022.¹⁰ Ecology's current timeline indicates it plans to release a draft general permit by late

³ Ecology, About Us <https://ecology.wa.gov/About-us> (last visited April 8, 2022).

⁴ RCW 43.21A.010.

⁵ RCW 43.20A.005.

⁶ Engrossed Second Substitute Senate Bill 5141 67th Leg. 2021 Reg. Session (HEAL Act).

⁷ Ecology, Environmental Justice <https://ecology.wa.gov/About-us/Who-we-are/Environmental-Justice> (last visited May 2, 2022).

⁸ *Id.*

⁹ RCW 70A.02.050(1).

¹⁰ Ecology, Concentrated Animal Feeding Operation <https://ecology.wa.gov/Regulations-Permits/Permits-certifications/Concentrated-animal-feeding-operation> (last visited May 4, 2022); *Washington State Dairy Fed'n v. State*, 18 Wash. App. 2d 259, 304, 490 P.3d 290 (2021).

spring 2022 for public comment.¹¹ This means the first stage of drafting will be complete before the July 1 date by which the HEAL Act requires Ecology to adopt its engagement plan. However, any attempt by Ecology to suggest it has some grace period not to engage because its plan is not required at the time the draft permit is released is contrary to stated policy and statutory mandates.

First, as discussed above, Ecology itself states that it is “committed to providing environmental justice to our most vulnerable communities.”¹² It claims that environmental justice “is a priority in our efforts to restore and protect land, air, and water.”¹³ The agency does not tie this commitment to a timeline but indicates it is working towards environmental justice now. Second, under RCW 43.20A.005, the agency has a statutory duty predating the HEAL Act to make at least some effort toward facilitating public engagement.¹⁴ Third, the Clean Water Act requires “[p]ublic participation in the development, revision, and enforcement of any regulation, standard, effluent limitation, plan, or program established by the Administrator or any State.”¹⁵ This was one of the legal mandates that Ecology violated in its last iteration of the permit according to the Washington State Court of Appeals.¹⁶

Finally, apart from policy declarations and statutory duties, any suggestion by Ecology that it is not prepared to effectively engage in outreach is belied by the fact that it already has started outreach efforts under the Climate Commitment Act.¹⁷ Through this program, it is seeking input **from some of the very same communities most impacted by CAFOs**. Despite this overlap, Ecology is not coordinating these efforts.¹⁸ Additionally, Ecology can look to the Environmental Justice Task Force Final Report, produced nearly two years ago, for detailed information about approaches for effectively facilitating community engagement.¹⁹

¹¹ Ecology, Concentrated Animal Feeding Operation <https://ecology.wa.gov/Regulations-Permits/Permits-certifications/Concentrated-animal-feeding-operation> (last visited May 4, 2022).

¹² Ecology, Prioritizing EJ <https://ecology.wa.gov/About-us/Who-we-are/Environmental-Justice/Prioritizing-EJ> (last visited April 12, 2022).

¹³ *Id.*

¹⁴ RCW 43.20A.005.

¹⁵ 33 U.S.C. § 1251(e).

¹⁶ *Washington State Dairy Fed'n v. State*, 18 Wash. App. 2d 259, 304, 490 P.3d 290 (2021).

¹⁷ See Ecology, Improving Air Quality in Overburdened Communities <https://storymaps.arcgis.com/stories/1409205ca61847faa4194072330709cd> (last visited May 4, 2022); See also Ecology, Overburdened communities <https://ecology.wa.gov/Air-Climate/Climate-change/Reducing-greenhouse-gases/Climate-Commitment-Act/Overburdened-communities> (last visited April 12, 2022).

¹⁸ *Id.*

¹⁹ Washington State Environmental Justice Task Force Final Report (Fall 2020).

II. To comply with its own policy goals and its legal duty to realize environmental justice, Ecology must engage those members of overburdened communities and vulnerable populations affected by CAFO discharge²⁰

Environmental justice is an effort to redress the impacts of historical and ongoing racism and poverty on the distribution of environmental benefits and harms and resulting health outcomes. Currently, the pattern seen across the United States and within Washington State is the inequitable distribution of environmental burdens and benefits, where the cumulative harms of pollutants and other environmental risk factors fall hardest on people of color, Indigenous and Tribal people, and low-income residents, among others.²¹ These disparate environmental impacts result in clear patterns of higher mortality rates and worse general health outcomes for people with historically marginalized identities.²² The discrimination driving the decision-making by governmental entities that lead to these patterns is directly related to failures to ensure that people with historically marginalized identities have a voice and power in decisions directly affecting them. Thus, a governmental entity, such as Ecology, in working towards repairing its and other entities' legacies of discrimination must ensure the right of individuals most impacted by environmental decisions to "participate as equal partners at every level of decision-making, including during needs assessment, planning, implementation, enforcement, and evaluation."²³ Waiting until decision-making processes have already reached draft form is too late because, at this point, members of these communities have already been stripped of the power to drive the shape and parameters of the governmental action.

In Washington State, many CAFOs regulated under Ecology's general permit occur in regions, such as Yakima County, with a higher proportion of low-income and Indigenous people,

²⁰ The HEAL Act defines an "overburdened community" as "a geographic area where vulnerable populations face combined, multiple environmental harms and health impacts, and includes, but is not limited to, highly impacted communities as defined in RCW [19.405.020](#)." RCW 70A.02.010(11). It defines "vulnerable populations" as

population groups that are more likely to be at higher risk for poor health outcomes in response to environmental harms, due to: (i) Adverse socioeconomic factors, such as unemployment, high housing and transportation costs relative to income, limited access to nutritious food and adequate health care, linguistic isolation, and other factors that negatively affect health outcomes and increase vulnerability to the effects of environmental harms; and (ii) sensitivity factors, such as low birth weight and higher rates of hospitalization.

RCW 70A.02.010(14)(a).

The Heal Act states that the term "vulnerable populations" "includes, but is not limited to: (i) Racial or ethnic minorities; (ii) Low-income populations; (iii) Populations disproportionately impacted by environmental harms; and (iv) Populations of workers experiencing environmental harms." *Id.*

²¹ See, e.g., Julie Sze, *Environmental Justice in a Moment of Danger* (2020); Clifford Villa et al., *Environmental Justice: Law, Policy & Regulation*, Third Edition (2020).

²² See, e.g., Rachel Morello-Frosch et al., *Understanding the Cumulative Impacts of Inequalities in Environmental Health: Implications for Policy*, 30 *Health Affairs* 879 (May 2011).

²³ See First National People of Color Environmental Leadership Summit, *Principles of Environmental Justice* (1991), available at <https://www.ejnet.org/ej/principles.html>.

people of color, and Tribal members living and working in the area.²⁴ People with these historically marginalized identities who live and work in the regions where CAFOs tend to be clustered experience elevated environmental burdens where community members suffer worse health outcomes as a result of air and water pollution, including higher rates of asthma, lower birth rates, and shorter life-spans.²⁵

Ecology's current regulatory approach for addressing the environmental damage of CAFOs is through its NPDES general permitting program. Under federal law, as reiterated and reaffirmed by the Washington State Court of Appeals in June 2021, Ecology must provide a means for the public to comment on the draft NPDES permit for regulating CAFO discharge. Under state law, Ecology must work to engage and consult with impacted communities. Finally, Ecology's commitment to equity and environmental justice makes it imperative that it ensure the full participation of local communities in the process.

III. Ecology's public outreach to date has been inadequate

So far, unfortunately, Ecology has failed to engage impacted communities sufficiently.²⁶ In contrast, the agency has reached out to and visited the *regulated* community.²⁷ Fortunately, there is still time for Ecology to take the necessary steps to engage the public before finalizing the draft permit.

As Ecology is well aware, the permitting process is complex. Fundamental, therefore, to enfranchising people who are not experts in the technical or legal field, but are experts in their own lived experience, is effectively communicating to the public the impacts of CAFOs on water, the function of NPDES permitting to address these impacts, the process by which Ecology goes about developing these permits, and how affected individuals can be involved in the process. Ecology's website is one obvious place where the agency should host this information.

²⁴ U. S. Census, Quickfacts Washington State <https://www.census.gov/quickfacts/fact/map/WA,US/PST045221> (last visited April 28, 2022).

²⁵ See, e.g., E. Min, Quantifying the Distribution of Environmental Health Threats and Hazards in Washington State Using a Cumulative Environmental Inequality Index, 14 Environmental Justice 298 (2021) (determining that pollution burdens in general, are significantly higher for people of color and those living in poverty in Washington State); Esmey Jimenez, New Map Shows Hotspots Of Environmental Health Hazards For Washington Neighborhoods, Northwest Public Broadcasting (January 10, 2019) (describing Yakima County's reduced health outcomes as appearing like "a big, red blemish" on the Washington State Health Disparities Map) available at <https://www.nwpb.org/2019/01/10/new-map-shows-hotspots-of-environmental-health-hazards-for-washington-neighborhoods/>; Jacques Colon, The Disproportionate Burden of Fossil Fuel Air Pollution on Communities of Color in Washington State, Front and Centered Report (June 15, 2016) (describing shorter life-spans on average resulting from community exposure to cumulative environmental harms).

²⁶ Chelsea Morris mentioned that she was sending information to one community group at our meeting with her on January 7, 2022.

²⁷ Statements by Chelsea Morris during the September 21, 2021 meeting between Ecology's Chelsea Morris, Jeff Killelea, Nathan Lubliner, and members of Center for Food Safety, Friends of Toppenish Creek, and Puget Soundkeeper Alliance.

Currently, Ecology’s website does not provide this information. In particular, it does not explain the permitting process, discuss why permitting is needed for CAFOs, or describe exactly how the agency develops the CAFO permit.²⁸ Instead, the website briefly mentions the current development of the general permit as a direct response to the June 2021 court opinion, with little further information, and no indication of how public input functions as part of what it is considering.

Further, the website’s information about opportunities to comment is stale, as it is limited to links for the two “listening sessions” held in October 2021 and a link to an “online comment form” that closed on Sunday, October 24, 2021.²⁹ Information such as the “Detailed Explanation of the Permits” discusses the previous iteration of the permit and is long and dense rather than user-friendly.³⁰

Ecology has provided a Spanish-language focus sheet discussing the NPDES permit regulation of CAFOs, including a description of the potential for the operations to pollute drinking water, and instructions for reporting contamination.³¹ This sheet provides one possible starting point for developing more information on the website itself. However, it does not provide a discussion of the current permitting process, nor does it invite input.³² So it does not solve the website’s fundamental lack of information regarding the permitting process.

Another approach to outreach is public forums, including listening sessions. Ecology had two virtual listening sessions in October 2021. Unfortunately, these listening sessions did not represent effective forums for communication. They did not provide clear information but rather meandered through the dense technical weeds of the court opinion and Ecology's concerns.

²⁸ The site links to a fact sheet in Spanish that at least provides some basic explanation of the problem. Translating some of this fact sheet back to English, particularly in the discussion of the impact of CAFO discharge on drinking water could be one, of many, ways Ecology could update the landing site to make it more relevant and useful to people affected by CAFO discharge in their region. *See*, Ecology, Hoja de Enfoque: Permiso de Operación de Alimentación de Animales Confinados (April 2022) available at <https://apps.ecology.wa.gov/publications/parts/1710002part1.pdf>.

²⁹ As we communicated to Ecology during the January 7, 2022 meeting, those “listening sessions” were deeply flawed.

³⁰ Ecology, Fact Sheet for the Concentrated Animal Feeding Operation National Pollutant Discharge Elimination System and State Waste Discharge General Permit and Concentrated Animal Feeding Operation State Waste Discharge General Permit (June 15, 2016) available at <https://ecology.wa.gov/DOE/files/a3/a36ceb3d-7767-4a21-a354-d4b7c1965c95.pdf>.

³¹ Ecology, Hoja de Enfoque: Permiso de Operación de Alimentación de Animales Confinados (April 2022) available at <https://apps.ecology.wa.gov/publications/parts/1710002part1.pdf>. The opportunity to report violations is not currently an effective way for people in the community to protect their waters given apparent failures in agency response to these reports. This is, in part, the result of the 2011 Memorandum of Understanding between Ecology and the Washington State Department of Agriculture, which has led to holes between permitting under state and federal clean water law and enforcement in situations where dairies are violating the law.

³² It is a positive step that Ecology provides the possibility of translated materials via contacting Chelsea Morris or Ecology’s Language Access Team. But this service still requires a member of the community know what information it is he/she/they seek, take the step of asking for that information to be translated, and be prepared to wait however long it takes the agency to return the translated materials.

Further, the information provided was not always accurate. The webinars were hosted on a platform that disenfranchised participants because people could not see each other, and the webinars were not moderated in any way to facilitate comments by those not part of the regulated community. Finally, when people, for example from the regulated community, spoke the agency did not provide information about these speakers and their involvement and interests in the process or correct the misinformation that was provided.

Providing clarity of process and a sense that input is valued and can impact agency decision-making is essential to effective engagement. Unfortunately, as described above, Ecology does not explain how it will use public input in its permit development process. And by stating on its website that it “will not create a formal response to verbal or written comments during [its] listening session comment period”³³ it gives the appearance of relieving itself of any duty to consider the comments.

This opacity of process, apparent lack of interest in community dialogue, and failure to even do the minimum on its website or in forums to reduce barriers to access for members of the impacted community is unacceptable. We know Ecology can do better.

V. **Ecology must engage in far more effective outreach as it develops the draft and final CAFO general permit**

As mentioned above, Ecology has the internal knowledge, connections, and resources to far more effectively engage and empower members of impacted communities in the process of CAFO permit development than it has done so far. Given the legal and policy landscape under which it is undertaking this process, the agency does not have a choice. It must do a better job. Although ultimately, it is the agency's role to develop an engagement plan, we provide some basic expectations below for how the agency might improve its outreach and engagement with impacted communities moving forward.

These expectations arise out of our recognition of the barriers to engagement experienced by members of impacted communities resulting from the systems of oppression, including White supremacy, settler colonialism, capitalist hegemony, patriarchy, and Christian hegemony threaded through agency culture and structure.³⁴ These barriers include lack of access and information, failure of effective communication, apathy and a sense of burden, lack of clear and transparent process, lack of resources, lack of a sense of potential for influence, lack of trust, and a failure to recognize different types of knowledge.³⁵ Many of these barriers result from Ecology's fundamental failure to recognize its role as the steward of the state's clean water, and the expertise people in communities impacted by CAFOs have regarding their own life experiences. Realizing environmental justice requires Ecology to approach these communities with humility, an interest

³³ Ecology, Concentrated animal feeding operations, <https://ecology.wa.gov/Regulations-Permits/Permits-certifications/Concentrated-animal-feeding-operation> (last visited May 4, 2022).

³⁴ Washington State Environmental Justice Task Force Final Report at Appendix C (Fall 2020).

³⁵ *Id.* at 64, Appendix C.

in what people can tell them about their experience, and a willingness to allow that information to impact its decision-making.

We recognize that the agency will continue to work through the more fundamental structural and cultural barriers to achieving environmental justice. Related to this, however, Ecology must do a much better job of reaching out to the communities most impacted by pollution from CAFOs. Below are some of the first steps we expect to see from Ecology as it develops the CAFO general permits.

A. Provide better information.

As described above, Ecology has not provided easy access to or effective communication of information about the CAFO permitting process, including how Ecology will consider comments from community members. **Ecology should improve the website, as described above, and host community events, whether virtual or in-person, to provide basic, jargon-free information about the problem, process, and potential for engagement.** Optimally, this information would be provided in English and languages other than English, and delivered through a variety of media, recognizing that providing information only through the written word often presents a barrier in and of itself.

B. Use a variety of platforms and media to communicate information.

Currently, Ecology's failure to widely distribute information across different platforms disenfranchises members of the impacted community. **Ecology must distribute information about CAFOs, their impact, the permits, the permitting process, and opportunities to engage, both online and via meetings, across platforms, to those individuals in regions affected by the permits through electronic and other means (such through churches, colleges, community centers, groceries, food banks, feed stores, hardware stores, the Yakima Herald Republic, Cascadia Weekly, and Radio KDNA).**

C. Coordinate internally to identify groups and individuals in the communities impacted by CAFOs to invite them into the conversations about the CAFO permitting process.

As discussed above, Ecology is already conducting outreach and listening sessions consistent with the Climate Commitment Act in regions also affected by entities covered by the CAFO general NPDES permit. By failing to coordinate internally, the agency disenfranchises members of the communities by failing to make a reasonable effort to reach out to them about CAFO impacts and additionally burdening the local communities with trying to understand the agency's role in the region. **Ecology should therefore coordinate with those agency employees developing the Air Quality in Overburdened Communities Initiative to identify common regions of concern and reach out to people already engaged with the agency in these areas.**³⁶

³⁶ For example, the agency now has a list with addresses and phone numbers of individuals who had expressed concerns about Yakima air quality over the years as a result of efforts on the part of Friends of Toppenish Creek. This is exactly the sort of resource that should be shared within the agency. It is an obvious first step to mail information about the CAFO permitting process, in multiple languages, to these people.

D. Convene organizations and individuals to gather input on how best to reach out to and communicate with those directly impacted by CAFOs

People and organizations in Whatcom County and Yakima are experts in their experience of the impact of CAFOs. They are also knowledgeable about each other and how to communicate with people living and working in these regions. Yet, Ecology has not made an effort to gather input on outreach from these groups and individuals. Instead, it expects the communities and individuals to do the outreach that it should be doing. This further burdens groups and individuals already stretched thin by multiple overlapping crises³⁷ and ensures that barriers to access are strengthened rather than dismantled. **Given the wealth of expertise available and recognizing the burdens already faced by organizations and individuals, Ecology should convene these groups and individuals and collect information from them regarding how best to conduct outreach. These meetings should follow best practices in recognizing barriers to participation in meetings and Ecology should communicate how it intends to use the information. It should also provide follow-up demonstrating that it relied on the information as a way to establish the value of the input of these organizations and individuals.**

E. Host more frequent and more accessible meetings that empower members of the community.

Ecology's approach to meetings creates barriers to access. **Ecology should provide more opportunities for the impacted community to discuss their lived experience of CAFOs with the agency.** Optimally, these opportunities would be in person, although we recognize that the pandemic continues to make this difficult. Regardless, these events must be organized to ensure that people feel empowered rather than excluded. **At a minimum, Ecology must provide the information participants need to feel comfortable speaking up in such a space. Further, participants must be able to see one another, the discussion must be sensitive to different abilities and languages, and Ecology should make sure that, when members of the regulated community provide inaccurate information, that information is challenged.**

VI. Conclusion

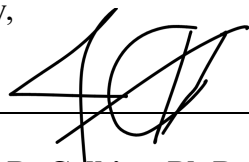
Ecology has a moral and a legal duty to engage people impacted by the entities they regulate, particularly members of those communities harmed by a history of discriminatory environmental decision-making. Yet, in the process of developing its general CAFO NPDES permit, the agency has, time and again, failed to make even the most basic attempt to include impacted community members. We urge Ecology to comply with law and policy as it moves forward in the process.

³⁷ Isabel Carrera Zamanill, Covid-19 Gap Analysis, Front & Centered Report (February 2021) available at <https://frontandcentered.org/wp-content/uploads/2021/02/FC-COVID-19-Gap-Analysis.pdf>; Alison Saldanha and Elise Takahama, Graphics tell story of COVID's unequal toll across WA, Seattle Times (April 12, 2022) available at <https://www.seattletimes.com/seattle-news/health/tracking-covids-unequal-unpredictable-toll-across-washington/>; Brandi Fullwood and Libby Denkmann, Whatcom County in Recovery Braces for More Floods, KUOW (February 3, 2022) available at <https://www.kuow.org/stories/whatcom-county-in-recovery-braces-for-more-floods>.

People most impacted by CAFOs in the state are themselves currently dealing with ongoing emergent situations ranging from the COVID-19 pandemic to flooding.³⁸ Indeed, COVID-19 has had a particularly harmful impact on the lives of people in Yakima Valley.³⁹ These multiplying crises mean that, rather than using COVID-19 as an excuse for its failure to engage the people impacted by CAFOS, the agency must redouble its efforts to protect these communities and empower their members in the process of permit development.

We look forward to supporting Ecology in these efforts. If you have questions or would like to talk with us further please feel free to reach out to Jennifer Calkins, at calkins@westernlaw.org or (206) 607-9867.

Sincerely,



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³⁸ Isabel Carrera Zamanill, Covid-19 Gap Analysis, Front & Centered Report (February 2021) available at <https://frontandcentered.org/wp-content/uploads/2021/02/FC-COVID-19-Gap-Analysis.pdf>; Alison Saldanha and Elise Takahama, Graphics tell story of COVID’s unequal toll across WA, Seattle Times (April 12, 2022) available at <https://www.seattletimes.com/seattle-news/health/tracking-covids-unequal-unpredictable-toll-across-washington/>; Brandi Fullwood and Libby Denkmann, Whatcom County in Recovery Braces for More Floods, KUOW (February 3, 2022) available at <https://www.kuow.org/stories/whatcom-county-in-recovery-braces-for-more-floods>.

³⁹ Isabel Carrera Zamanill, Covid-19 Gap Analysis, Front & Centered Report (February 2021) available at <https://frontandcentered.org/wp-content/uploads/2021/02/FC-COVID-19-Gap-Analysis.pdf>; Alison Saldanha and Elise Takahama, Graphics tell story of COVID’s unequal toll across WA, Seattle Times (April 12, 2022) available at <https://www.seattletimes.com/seattle-news/health/tracking-covids-unequal-unpredictable-toll-across-washington/>.

Exhibit 24

DRAFT



January 18, 2022

H&S Bosma Dairy Lagoon No. 3

Administrative Order on Consent Docket No. SDWA-10-2013-0080



H&S Bosma Dairy Lagoon No. 3 Abandonment Plan

Prepared for H&S Bosma Dairy

January 18, 2022

H&S Bosma Dairy Lagoon No. 3

Administrative Order on Consent Docket No. SDWA-10-2013-0080

H&S Bosma Dairy Lagoon No. 3 Abandonment Plan

Prepared for

H&S Bosma Dairy
5860 East Zillah Drive Road
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Prepared by

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ABBREVIATIONS

Consent Order	Administrative Order on Consent SDWA-10-2013-0080
Dairy	H&S Bosma Dairy
EPA	U.S. Environmental Protection Agency
H:V	horizontal to vertical (ratio)
mg N/kg	milligrams nitrogen per kilogram
Plan	Lagoon Abandonment Plan
SVID	Sunnyside Valley Irrigation District
WA NRCS	Washington State Natural Resources Conservation Service

1 Introduction

This Lagoon Abandonment Plan (Plan) was prepared by Anchor QEA, LLC, on behalf of H&S Bosma Dairy (the Dairy) as required by the U.S. Environmental Protection Agency (EPA) Region 10 Administrative Order on Consent SDWA-10-2013-0080 (Consent Order). The abandonment work described in this plan has been initiated in 2021 and will be completed according to the schedule described in this Plan.

The Dairy is completing the abandonment of Lagoon No. 3 as part of a larger group of lagoon lining and abandonment projects outlined in the *Final Modified Lagoon Work Plan* (Anchor QEA 2016). Lagoon No. 3 was previously used to collect and store stormwater and manure generated from the Dairy's operations. However, the use of the lagoon has been terminated and it has been emptied of manure and associated liquids. The lagoon will no longer be required due to implemented storage and waste management improvements.

As part of lagoon abandonment, the lagoon will be regraded to support crop production. Two active lagoons (Lagoon Nos. 1 and 2) remain to the south of Lagoon No. 3. The abandonment and regrading of Lagoon Nos. 1 and 2 will be addressed in a separate abandonment plan to be prepared during 2022.

This Plan implements the requirements of the *Final Modified Lagoon Work Plan* (Anchor QEA 2016) as approved by EPA. It also exceeds the requirements of Washington State Natural Resources Conservation Service (WA NRCS) *Conservation Practice Standard 360 – Waste Facility Closure* (WA NRCS 2013a) and demonstrates compliance with nutrient management requirements of WA NRCS *Conservation Practice Standard No. 590 – Nutrient Management* (WA NRCS 2013b).

1.1 Report Organization

The remaining sections of this Plan are organized as follows:

- **Section 2 – Existing Conditions.** This section reviews the current conditions of the Dairy and presents the approximate pre-abandonment dimensions of Lagoon No. 3.
- **Section 3 – Abandonment Procedures.** This section discusses the removal of liquids and organic solids and initial soil testing procedures, both of which have been completed. The section also discusses the proposed treatment of elevated soil nutrient levels, confirmation soil testing, and submission of the final completion report.
- **Section 4 –Schedule.** This section outlines the abandonment timeline.
- **Section 5 – References.** This section provides references for the materials cited in this Plan.

2 Existing Conditions

The Dairy is located at 5860 East Zillah Drive Road in Granger, Washington. Figure 1 shows the location of Lagoon No. 3. The estimated dimension and capacity of the lagoon prior to abandonment are provided in Table 1.

The lagoon was originally created within a natural depression in the topography, bounded by Kirks Road and the Sunnyside Canal (owned by the Sunnyside Valley Irrigation District [SVID]), with the addition of earthen berms at the southern ends of what would become Lagoon No. 3. The lagoon is constrained by SVID drainage easement to the west, cropland to the east, Kirks Road to the north, and Lagoon No. 2 to the south.

Lagoon No. 3 has historically been used to store stormwater runoff and manure waste generated from Dairy operations. Liquid collected within the lagoons is stored and then pumped to application fields or to the existing lagoon system.

Table 1
Lagoon No. 3 Approximate Dimensions and Capacity

Lagoon	Length (feet)	Width (feet)	Depth (feet)	Capacity (million gallons)	Capacity (acre-feet)	Approximate Interior Side Slope
3	580	120	10	2.3	7.2	3H:1V

3 Abandonment Procedures

This section describes the lagoon abandonment procedures, including the following:

- Liquids and organic solids removal (completed 2021)
- Initial soil testing (completed 2021)
- In situ soil treatment and testing
- Interim reporting
- Completion report submittal

Most of the lagoon abandonment activities will be performed by Dairy personnel and equipment. Soil confirmation testing, irrigation sensor maintenance, interim reporting, and completion report submittal will be performed by Anchor QEA and Agrimanagement, Inc. The abandonment efforts will be completed consistent with the schedule presented in Section 4.

3.1 Liquids and Organic Solids Removal

Prior to sampling, the liquids and organic solids were removed from the lagoon. Liquids contained within the lagoon were transferred to an in-service, lined lagoon. After liquid removal, organic solids were removed and placed in the composting area. Solids were removed down to the current lagoon soil foundation material. The condition of the lagoon after manure removal is shown in Photograph 1.

Photograph 1
Condition of Lagoon No. 3 in December 2021 Following Manure and Liquids Removal



3.2 Initial Soil Testing

Following removal of the manure, soil testing was conducted within the lagoon to document the ammonia and nitrate concentrations in the subsurface soil. Confirmation testing was conducted at six locations within Lagoon No. 3, including one sample from the lower portion of each sidewall and two samples from the lagoon bottom. Figure 2 shows the actual sampling locations.

Soil sampling from the lagoon interior was performed using the following methods:

1. A backhoe was used to excavate test pits to a depth of 10 feet deep at each testing location. Soil samples were removed with the backhoe bucket at each sampling interval for sampling.
2. Initial soil samples were collected from a depth interval of 0 to 12 inches below ground surface.
3. Subsequent samples were collected at each of nine 1-foot intervals to a depth of 10 feet below ground surface.
4. Sampling personnel recorded the location and depth of each soil sample.
5. After samples were collected, the samples were placed in appropriate containers, and a custody seal bearing the sampler's name or initials and date were placed on the container.

Laboratory analysis of the soil samples was performed by SoilTest Farm Consultants, Inc., a State of Washington-certified analytical laboratory and a North American Proficiency Testing-accredited laboratory located at 2925 Driggs Drive, Moses Lake, Washington. Sample management, packing, shipment, analytical testing, and quality assurance/quality control were consistent with those defined in the *Dairy Facility Application Field Management Plan* (Anchor QEA 2018) as follows:

- Ammonium (as nitrogen) by Western Coordinating Committee S-3.50
- Nitrate (as nitrogen) by Western Coordinating Committee S-3.10

Soil samples were analyzed in a single phase. Results of testing are summarized in Table 2. Results of soil testing demonstrated that ammonia and/or nitrate concentrations in excess of the target level (45 milligrams nitrogen per kilogram [mg N/kg]) were present at depths between 3 and at least 10 feet below ground surface, with an average depth of just over 6 feet. Depths exceeding the target level were greatest for the east and west sidewalls, both of which exceeded the target level at the deepest depths (10 feet below ground surface) sampled.

Table 2
Results of Initial Soil Testing

Station ID	Depth Range (inches)	Nitrate-N (mg N/kg)	Ammonia-N (mg N/kg)	Available N (mg N/kg)	Exceeds 45 mg N/kg?
S-01 (North Sidewall)	0-12	147.7	1.7	149.4	Yes
	12-24	89.5	ND (u)	89.5	Yes
	24-36	47.7	2.6	50.3	Yes
	36-48	93.8	3.1	96.9	Yes
	48-60	18.3	3.6	21.9	No
	60-72	17.3	2.9	20.2	No
	72-84	14.2	3.1	17.3	No
	84-96	28.8	2.6	31.4	No
	96-108	20.3	3.5	23.8	No
	108-120	30.4	3.6	34	No
S-02 (West Sidewall)	0-12	26.8	97.5	124.3	Yes
	12-24	1.0	30.8	31.8	No
	24-36	1.0	23.1	24.1	No
	36-48	1.8	25.0	26.8	No
	48-60	28.5	25.2	53.7	Yes
	60-72	39.9	1.9	41.8	No
	72-84	51.6	3.3	54.9	Yes
	84-96	67.0	8.5	75.5	Yes
	96-108	41.7	ND (u)	41.7	No
	108-120	45.6	7.2	52.8	Yes
S-03 (East Sidewall)	0-12	83.3	ND (u)	83.3	Yes
	12-24	188.2	ND (u)	188.2	Yes
	24-36	103.1	ND (u)	103.1	Yes
	36-48	85.5	ND (u)	85.5	Yes
	48-60	131.3	4.2	135.5	Yes
	60-72	56.6	ND (u)	56.6	Yes
	72-84	44.6	2.3	46.9	Yes
	84-96	69.5	ND (u)	69.5	Yes
	96-108	76.7	1.8	78.5	Yes
	108-120	113.1	2.7	115.8	Yes

Station ID	Depth Range (inches)	Nitrate-N (mg N/kg)	Ammonia-N (mg N/kg)	Available N (mg N/kg)	Exceeds 45 mg N/kg?
S-04 (South Sidewall)	0-12	5.9	67.9	73.8	Yes
	12-24	ND (u)	81.7	81.7	Yes
	24-36	ND (u)	61.6	61.6	Yes
	36-48	2.9	10.7	13.6	No
	48-60	21	21.6	42.6	No
	60-72	1.8	6.0	7.8	No
	72-84	6.6	5.0	11.6	No
	84-96	6.8	6.1	12.9	No
	96-108	3.4	4.5	7.9	No
	108-120	6.9	2.4	9.3	No
B-N (North Bottom Sample)	0-12	23.7	251.3	275	Yes
	12-24	1.9	139.7	141.6	Yes
	24-36	15.4	128.6	144	Yes
	36-48	0.8	208	208.8	Yes
	48-60	ND (u)	20.5	20.5	No
	60-72	4.8	18.5	23.3	No
	72-84	1.1	32.6	33.7	No
	84-96	ND (u)	14.3	14.3	No
	96-108	1.4	10.1	11.5	No
	108-120	0.7	8.2	8.9	No
B-S (South Bottom Sample)	0-12	176.8	109.5	286.3	Yes
	12-24	6.0	92.8	98.8	Yes
	24-36	24.4	6.6	31.0	Yes
	36-48	11.2	65.2	76.4	Yes
	48-60	11.8	118.7	130.5	Yes
	60-72	45.6	10.3	55.9	Yes
	72-84	19.8	5.7	25.5	No
	84-96	9.8	5.6	15.4	No
	96-108	21.0	7.8	28.8	No
	108-120	15.4	10.1	25.5	No

Notes:

ND: Not detected

Bolded available nitrogen values exceed the target value of 45 mg N/kg.

3.3 In Situ Soil Treatment

This section describes how nutrients will be extracted from the soils beneath the lagoon using in situ treatment. Soil treatment will be performed agronomically using a combined forage crop including alfalfa and chicory. Alfalfa and chicory were selected to maximize nitrogen extraction rates, particularly from deep soil horizons, and details are provided as follows:

- **Alfalfa:** Alfalfa is a perennial forage crop that is well suited to deep rooting and high dry matter production (resulting in high nitrogen extraction rates). Research has shown that alfalfa can extract nutrients up to a depth of 120 centimeters (approximately 4 feet) within the first year after establishment. Roots can continue to push deeper through Years 2–4 until extraction has been observed up to a depth of 270 centimeters (over 8 feet) (Entz et al. 2001). In addition to crop age, soil and irrigation conditions can affect the depth of rooting. Even though alfalfa can obtain nitrogen for growth via symbiotic nitrogen fixation, it is also very effective in removing inorganic nitrogen from the soil (Russelle 1991). Research shows that alfalfa is an excellent crop for extraction of inorganic nitrogen from soil (Russelle et al. 2001). At a mono-crop yield of 9 tons/acre per year, alfalfa can typically extract nitrogen at a rate of up to 585 pounds nitrogen/acre per year.
- **Chicory:** Chicory is a deep-rooted, broad-leafed perennial that is very drought tolerant and hardy and responds well to higher levels of nitrogen within the soil. It can send roots over 3 meters (over 9 feet) deep within the first 3 months of growth and extend to 4 meters deep (over 13 feet) by Year 2 (Rasmussen 2020). At a mono-crop yield of 5.5 tons/acre per year, chicory can typically extract nitrogen at a rate of up to 185 pounds nitrogen/acre per year (Ditsch and Sears 2007).

As a mixed crop, the nitrogen extraction rate will likely be between 525 and 585 pounds per year. The mixed crop can be managed and harvested together efficiently. The mixing of the two crops is intended not to drive up overall nitrogen extraction, but rather to optimize the following: 1) the rate of extraction throughout the lagoon area; and 2) the removal of nitrogen from deeper soil horizons. The mixed crop can be expected to recover available nitrogen from depths at and below 10 feet. Removal rates can be expected to be highest in the upper soil horizon. Deeper soil extraction will likely increase over time as shallow soil reservoirs are exhausted.

Advantages of the soil treatment approach in comparison to other methods (e.g., soil excavation, export and backfill with clean soil) include the following:

- **Ability to treat all lagoon areas:** The western portion of Lagoon No. 3 is located adjacent to SVID irrigation infrastructure located within an SVID easement. Excavation of nutrient-rich soils would be precluded within this area, whereas in situ treatment is not.

- **Soil conservation:** The in situ treatment approach will not damage the food production value of the existing soils in comparison to an excavation approach and will not require import of clean soil.
- **Lower fuel consumption:** Overall fuel consumption (and associated production of greenhouse gas emissions) will be much lower for the in situ treatment approach in comparison to an excavation and backfill approach.
- **Incidental treatment of soils below the treatment target:** Though not required to complete lagoon abandonment, the in situ treatment approach will be applied throughout the Lagoon No. 3 footprint with the same deep-penetrating crop mix. This means that nutrient extraction will occur in all lagoon areas, even those that currently are below treatment objectives.

The treatment crop will be planted throughout the former lagoon footprint. Agrimanagement will install an irrigation sensor within the former lagoon bottom to help optimize both yields and deep root penetration while minimizing potential downward flux of nitrogen through soil leaching. Deep root penetration is achieved best by establishing a healthy crop and then restricting its moisture to drive roots deeper in a search for water. This restriction must not, however, be excessive or nutrient extraction rates will fall off.

The irrigation sensor will be consistent with those used to monitor shallow soil moisture levels in the existing nutrient application fields at the Dairy. However, the soil sensors will be installed at the following adjusted depths: 1 foot, 3 feet, and 5 feet below ground surface.

Irrigation will be provided as necessary to support optimal crop growth and root penetration. The irrigation will be provided using solid sets or equivalent. Irrigation will follow irrigation needs estimates provided by Agrimanagement. Irrigation records will be maintained to document the dates and duration of irrigation, and these will be summarized in interim annual reports and in the completion report.

Treatment is expected to require between 3 and 4 years to complete. A single planting with multiple harvests each year is expected to be sufficient for soil treatment. The forage mix will be harvested periodically consistent with standard agronomic practices to remove the extracted nutrients from the treatment area.

At the end of an initial 2-year treatment period, soil confirmation testing will be completed using the same locations, depths, and procedures as described in Section 3.2. Sampling shall be repeated adjacent to each of the six initial testing locations. Testing will document soil ammonia-nitrogen and nitrate-nitrogen to depths of 10 feet at each location and will be used to update the expected treatment duration.

If testing confirms that the target nitrogen concentrations have been reached after 2 years, then treatment will be considered complete. If nitrogen concentrations remain in excess of the treatment target, then treatment will be conducted for an additional 1- or 2-year period. The duration will be estimated based on observed nitrogen extraction rates and soil testing data.

Final confirmation testing will be implemented at the end of the 3- or 4-year treatment period. Final confirmation testing will be completed using the same locations, depths, and procedures as described in Section 3.2. Sampling shall be repeated adjacent to each of the six initial testing locations. Testing will document soil ammonia-nitrogen and nitrate-nitrogen to depths of 10 feet at each location and will be used to update the expected treatment duration.

3.4 Interim Reporting

During the treatment period, an interim treatment report will be submitted to EPA following each calendar year. The report will summarize the following:

- Results of soil moisture monitoring
- Crop yield achieved during the calendar year harvests
- Estimated nitrogen extraction rates
- Results of soil confirmation testing (Year 2 only)
- Recommended final treatment duration (Year 2 only)

3.5 Completion Report

Following completion of soil treatment and final confirmation testing, Anchor QEA will prepare and submit a completion report. That report will include the following information:

- A short narrative describing the lagoon abandonment work completed, including a discussion of crop yields and nutrient extraction accomplished during the treatment period
- Copies of construction photographs showing the lagoon after emptying and during soil treatment
- Results of all soil testing
- Results of soil moisture monitoring
- Statement that the closure followed WA NRCS *Conservation Practice Standard 360 – Waste Facility Closure* (WA NRCS 2013a) practices
- Documentation of site conditions following soil treatment

4 Schedule

The abandonment activities described in this plan are partially complete (manure removal and initial soil testing). Crop planting and soil moisture sensor installation will be completed following EPA approval of this plan. Planting will be conducted during spring or fall months. Planting during the summer months is not recommended for crop health and nutrient extraction performance.

Interim reports will be submitted at the end of each calendar year until treatment is complete. The reports will be submitted to EPA by February 15 following the treatment year.

The completion report will be submitted to EPA by February 15 of the year when treatment targets have been achieved as documented through final confirmation testing. The current expected treatment duration is between 3 and 4 years.

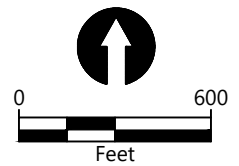
5 References

- Anchor QEA (Anchor QEA, LLC), 2016. *Final Modified Lagoon Work Plan*. Prepared for Liberty Dairy, LLC/H&S Bosma Dairy. December 2016.
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Figures



SOURCE: Aerial from Microsoft (Bing) 4/11/2018
HORIZONTAL DATUM: Washington State Plane South, NAD83, U.S. ft

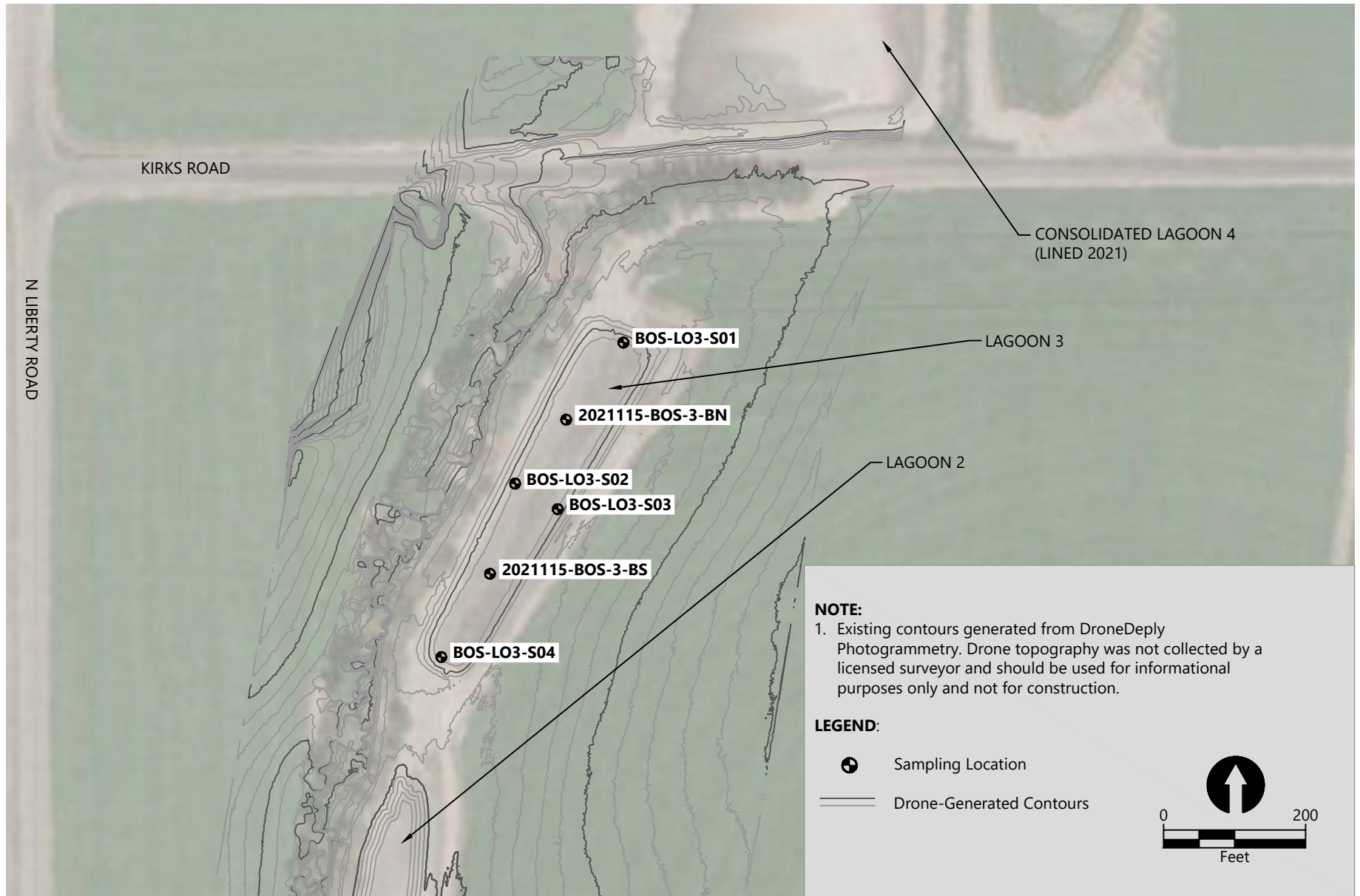


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Figure 1
H&S Bosma Dairy Lagoon Map

Lagoon No. 3 Abandonment Plan
 H&S Bosma Dairy
 0251



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Figure 2
Sampling Locations
Lagoon No. 3 Abandonment Plan
H&B Dairy
0252

Exhibit 25

DEC, Summary of New York State Contamination Incidents Related to CAFOs During Winter and Spring of 2014

DEC Region	County	Town / City	Farm Name	SPDES ID	Incident Description	CAFO	Non--CAFO	Farm Size	Date of Incident
4	Albany	New Scotland	Hill Top	NYA000576	Complaint of manure stockpile in a field possibly contaminated a private well	X		Medium	29--Mar--14
	Montgomery	Florida	STONY BROOK, INC.	NYA000144	Reported that manure spread on a snow covered field ran off into a neighbor's pond during snow melt	X		Medium	Mar--14
	Montgomery	Root			Reported that manure spread on a snow covered field ran off into a neighbor's pond during snow melt		X		Mar--14
	Montgomery	Palentine			Complaint of possible manure contamination of private well.		X		Mar--14
5	Clinton				Report of manure runoff from a field to a roadside ditch. No discharge to surface water or groundwater has been reported.		X		Mar--14
	Clinton	Beekmantown	Fessette Farm	NYA000313	Pt Au Roche Road, 1 well positive for bacterial contamination, other wells in the area were not impacted. Further investigation showed that the well had a surface connection with water infiltrating around the perimeter of casing	X		Medium	3/27/14
	Clinton	Champlain	Leduc's Green Acres	NYA000086	Reported manure spreading incident near Eden Lane. 6 wells were positive for bacterial contamination.	X		Medium	3/31/14
	Clinton	Champlain	Giroux's Poultry Farm	NYA000460	Same as above	X		Large	3/31/14
6	Oneida	Chadwicks	Collins Knoll Farm	NYA000063	Self reported manure runoff event. No water quality violation	X		Large	3/11/14
	Lewis	Harrisville	"Larry Atkin's Farm"		Complaint of manure runoff to surface water		X		12/27/13
	St. Lawrence	Hermon	Gebarten Acres	NYA001325	Complaint of manure runoff to surface water	X		Large	1/13/14
	Jefferson	Adams Center	Porterdale	NYA000038	Self reported manure runoff event. No water quality violation	X		Large	4/3/14
	Jefferson	Adams	Hy--Light	NYA001459	Complaint of manure runoff to surface water	X		Medium	4/1/14
	Jefferson	Clayton	Woods Farm	NYA000351	Complaint of manure runoff to surface water	X		Large	3/4/14
7	Onondaga	Marietta	Ralph Volles	NYA000548	Report of manure runoff into a neighbor's basement through a window.	X		Large	3/11/14
	Onondaga	Marietta	Ralph Volles	NYA000548	Report of an additional runoff event at this farm	X		Large	3/11/14
	Cayuga	Scipio	Allen Farms	NYA000323	Report of manure runoff and well contamination event including runoff to a tributary of Owasco Lake (drinking water source for the City of Auburn)	X		Large	3/11/14

DEC, Summary of New York State Contamination Incidents Related to CAFOs During Winter and Spring of 2014

	Cayuga	Locke	Pine Hollow Dairy	NYA00621	Cayuga County Health Department staff reported ponded manure-contaminated water approximately 100 ft from a private well.	X		Large	3/11/14
	Cayuga	Genoa			ECO observed foam and manure odor in Salmon Creek.		X		
	Cayuga	Venice	Willet Dairy	NYA000002	Reported manure spill from charging drag hose, most contained, some discharged to L. Salmon Ck.	X		Large	5/3/14
	Cortland	Homer	New Hope View Dairy	NYA000636	Reported manure spill during drag line start up due to frozen line. Most contained and cleaned up. Some material entered drainage ditch.	X		Large	3/17/14
	Cortland	Truxton	Whey Street Dairy	NYA000094	Report of manure runoff from frozen field onto neighboring property. Contained, diverted and cleaned up.	X		Medium	3/25/14
	Madison	Canastota	Springwater Farms	NYA000545	Madison County Soil and Water Conservation District responded to a manure runoff event. Runoff was contained. No discharge to surface water	X		Medium	03/20/14
8	Livingston	Caledonia	Stein Family Farms	NYA000241	Manure and septic contamination confirmed for 2 private wells.	X		Medium	2/24/14
	Livingston	Caledonia	D&D Dairy (Stein Family)	NYA000578	Complaint of possible contamination of shallow (26') well with no casing above the ground surface.	X		Medium	3/17/14
	Livingston	Leicester	Thornapple Farms	NYA000242	Reported manure runoff event. No discharge, berms in place to contain runoff.	X		Medium	3/12/14
	Ontario	Seneca Castle	Hemdale Farms	NYA000490	Reported manure runoff event. DER responded and contained	X		Large	3/7/14
	Genesee	Oakfield	Lamb Farms	NYA000123	Reported manure contamination of private wells on Batavia-Oakfield Townline Rd.	X		Large	3/14/14
	Genesee	Oakfield	Lamb Farms	NYA000123	Reported manure runoff incident with impact to a tributary of Oak Orchard Creek.	X		Large	3/7/14
	Monroe				Complaint of manure contamination of private well.				2/28/14
	Steuben	Bath	Leo Dickson and Sons	NYA000178	Discharge of manure from land application. ECO ticket issued to farm for contravention of water quality standards.	X		Medium	3/13/14
	Steuben	Bath	Wilkins Dairy	NYA001520	Complaint of over application of manure, stockpiling of solids and runoff.	X		Medium	12/13; 2/14
	Steuben	Prattsburg	Damin Farms	NYA000121	Complaint of well contamination	X		Large	3/11/14
	Steuben	Prattsburg	Damin Farms	NYA000121	Complaints of manure runoff into Keuka Lake.	X		Large	3/11/14

DEC, Summary of New York State Contamination Incidents Related to CAFOs During Winter and Spring of 2014

	Wayne	Wolcott	Merrell Farms	NYA000120	Complaint of manure runoff, manure flowed onto the property of a church, and may have impacted the basement. .	X		Large	3/31/14
9	Wyoming	Perry	Dueppengies ser Dairy Co	NYA000130	Report of manure discharge to Little Beards Creek.	X		Large	Mar--14
	Allegany	Scio			Non-CAFO farm that is not operating under a CNMP made a manure application on a frozen snow covered field, resulting in alleged manure runoff onto a neighboring yard and into their basement and possibly a nearby creek.		X		3/11/14
	Chautauqua	Ellington	Breeze Acres	NYA000248	Failure in manure transfer pipe resulted in discharge of approx. 6,000 gal. to road ditch. Manure was absorbed into snowpack with minimal impact to Clear Creek. Contaminated snow was collected and field applied.	X		Medium	3/12/14
	Cattaraugus	Freedom			Complaint of milkhouse waste runoff into creek		X		unknown
	Chautauqua	French Creek			Alleged manure lagoon failure and discharge into trib. of French Creek		X		Apr--14

Exhibit 26



JENNIFER M. GRANHOLM
GOVERNOR

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING



STEVEN E. CHESTER
DIRECTOR

April 4, 2008

U.S. Environmental Protection Agency Docket Center
EPA West, Room B102
1301 Constitution Avenue, NW
Washington, DC

ATTENTION: Docket ID No. EPA-HQ-OW-2005-0037

SUBJECT: Revised National Pollutant Discharge Elimination System Permit
Regulations for Concentrated Animal Feeding Operations; Supplemental
Notice of Proposed Rulemaking

The Michigan Department of Environmental Quality (MDEQ) has reviewed the proposed rule published in the March 7, 2008, Federal Register and has several comments. We appreciate the fact that the U.S. Environmental Protection Agency (USEPA) has attempted to respond to the Waterkeeper Decision, and that the USEPA is contemplating various permitting options to deal with both the decision and the practicalities of permitting concentrated animal feeding operations (CAFO) and protecting the nation's waters.

Self-Certification Process

We strongly recommend that the USEPA withdraw the proposal for the voluntary option for CAFOs to certify that the CAFO does not discharge or propose to discharge. We believe that this option as proposed is seriously flawed. This provision appears to have been advanced by the lobbyists for the factory farms as a self-serving means of exempting factory farms from regulation, contrary to any other sector regulated under the Clean Water Act. Instead, we recommend that the USEPA refocus its efforts on clearly identifying the attributes that will constitute a discharge or proposal to discharge, and how these would be determined. We have this recommendation based on the following:

(1) The proposed rule is contrary to the plain language of the Clean Water Act; not responsive to the Waterkeeper Decision in that it does not define what constitutes a proposal to discharge; sets a minimum design, operation, and management scheme that will not prevent discharge; does not provide a clear defined process for determining when a nonpermitted CAFO must apply for a permit; and has the sole purpose to provide liability protection for those who chose not to enter the permitting process.

The self-certification provision is not needed and serves no purpose other than to provide a safe haven for CAFOs that will likely discharge but do not want to apply for a permit. CAFOs should have to decide either to obtain a permit and thus obtain the liability protection for duty to apply that goes along with being permitted; or not obtain a permit and take their chances with the compliance/enforcement actions that may follow a discharge. It is unfair to those CAFOs that do obtain permits to give the same liability protection to those that simply decide to self-certify.

The self-certification process, through the liability protection from the duty to apply, would make it much more difficult to compel CAFOs that have had a discharge or discharges to take the appropriate steps to correct the problems that lead to the discharges. This would be further complicated by the lack of any requirement for self-certified CAFOs to report discharges and a three day period to simply report that they no longer met the certification requirements, which would result in most discharges being dissipated before the agency even knew about them. Also, as written, the certification and recertification process after a discharge would encourage a discharging CAFO to maximize its illegal discharge to acquire more operating capacity to provide time to "correct" a noted problem and then recertify in lieu of obtaining permit coverage.

The immunity from the duty to apply provision is most likely not legal, except to the extent that the USEPA desires to exert enforcement discretion, because it is in conflict with the Clean Water Act. Notably, the immunity from the duty to apply provision is only mentioned in the preamble and is not a part of the regulation *per se*. In fact, we find no authority in the Clean Water Act that allows the USEPA to establish a self-certification process in lieu of a permit for dischargers, let alone to arbitrarily establish such a process for a select group of dischargers contrary to how all other dischargers are regulated. This proposal, if enacted, would undoubtedly result in additional litigation and the resulting confusion that it would bring. This provision also attempts to negate the citizen rights to sue provisions of the Clean Water Act by eliminating a statutory provision by administrative regulations.

The proposed USEPA criteria to be used to determine if a CAFO qualifies for the self-certification are not detailed enough to be useful in specific situations. The criteria need to be much more specific and established by appropriate state or similar regions. Michigan has established criteria in national pollutant discharge elimination system permits for CAFOs with discharges, but the criteria are much more specific than the proposed criteria, and are more specific to the particular conditions in Michigan. It is unlikely that the proposed USEPA criteria will serve any meaningful test to certify that there is no discharge; instead, these criteria will only show that the discharges are less frequent.

The USEPA frequently uses the phrase "in an unlikely event of a discharge from a certified CAFO." We do not agree that such a discharge would be "unlikely." Michigan's experience is that virtually all CAFOs with lagoons and/or land application have discharges. In fact, in administering the CAFO program in Michigan for about 200 CAFOs, we have found that only about five percent of the CAFOs can be determined to have No Potential to Discharge. Michigan has received 17 requests for a no potential to discharge determination. Of these, nine have been determined to meet this determination; however, four other CAFOs who thought they had no discharge were found to be discharging at the time of inspection. To date, the CAFOs in Michigan determined to not discharge are those that are not proximate to surface waters, have their CAFO waste sheltered from the elements (either under barn or in dry storage), and have particularly well managed facilities. Even these situations must be carefully assessed on a facility specific basis, as we have found some operations that met these criteria, did in fact have a discharge. For one such poultry CAFO with dry manure stored inside and no land application, we documented a discharge twice in one month as a

result of exhaust of dust and subsequent storm water run off, with high pollutant concentrations in the discharge (especially biochemical oxygen demand, *E. coli* and ammonia). This serves to point out the difficulty of CAFOs self-certifying that they will not discharge, particularly without very specific criteria to use in making the evaluation.

The proposed certification process essentially gives CAFOs a license to discharge with no consequences, and ties the hands of enforcing agencies. The self-certification process also creates a significant work load for the states without any commensurate additional environmental protection. The burden of handling all of the additional paperwork associated with the certification would be substantial. In addition, considerable additional resources would be required to determine if each facility was actually in compliance with their certification and whether there were discharges or not. The only apparent result of finding a facility not in compliance with their certification or having a discharge would be for the facility to "fix" the problem causing the discharge and then to reapply for a new certification.

In addition, the certification process eliminates the ability of the public to comment on the appropriateness of certifying a facility. Often public comment can be valuable in identifying CAFOs that have had discharges.

This proposal will severely undermine the efforts of those states that have implemented programs to adequately regulate CAFOs. The USEPA has encouraged states to do this in the interim time period between the Waterkeeper Decision and the final promulgation of regulations consistent with that decision by the USEPA. Despite the argument that the USEPA will make that the states are free to implement requirements more restrictive than the federal requirements, the reality is that the states will be under increasing pressure to change their requirements to be "consistent with" the federal requirements. This would result in not only significantly reduced effectiveness of controlling pollution from CAFOs, but also a waste of scarce state resources in the effort to redo their regulations.

If the USEPA persists in this wrong headed effort to have CAFOs self-certify, we recommend the following modifications to at least mitigate some of the worst features of the proposal. However, we must note that even with these changes we find the provision inadequate, contrary to law, and not protective of the environment and public health:

- A. All documents related to the certification should be signed by a registered engineer (for structural issues) or a National Resource Conservation Service (NRCS) certified technical service provider (for other Comprehensive Nutrient Management Plan [CNMP] issues).
- B. Any Nutrient Management Plan (NMP) developed for certification must not only meet NRCS standards but also any standards or conditions established by states that permitted CAFO's must comply. The CAFO must also specifically certify to this fact.
- C. The rule needs to define what constitutes lands "under the control" of the CAFO.
- D. The rule needs to clearly state that before a CAFO could be certified, it must have in place and operating all required elements of the design, operation

- and maintenance plan, and the NMP. A certification cannot be "conditional" based on a schedule.
- E. The rule needs to provide that the certification is null and void if the permitting authority finds that a certified CAFO has or has had a discharge, does not have required records onsite or available, or in any way is not in conformance with the certification conditions.
 - F. The proposed rule states that if the conditions at a certified CAFO change, the CAFO "should" make the necessary adjustments to accommodate the changes. This duty should be a mandate. The word "should" needs to be changed to "shall."
 - G. The certification statement has 5 conditions. Condition 5 should be changed to include, "an official signature that.....make the CAFO legally responsible for its representations to the Director regarding the design, construction, operation and maintenance of the CAFO and the NMP."
 - H. Add a requirement for the certified CAFO to notify the permitting authority whenever a change is made to certifying documents, procedures, or designs.
 - I. All documents related to the certification should be submitted to the Director and available to the public.
 - J. A CAFO that has had, or has a discharge should not be eligible for certification or re-certification.
 - K. A certified CAFO that has had a discharge should be required to report that discharge to the Director immediately, but no later than 24 hours. The report must detail the date, time, volume, duration of the discharge, what actions were taken to minimize the discharge, and the cause of the discharge.
 - L. The immunity from the duty to apply should be eliminated from the proposed regulations.

(2) The use of CNMPs alone to control discharges is not acceptable. In Michigan, we have found that CNMPs similar to the NRCS CNMPs are not sufficient to prevent discharges to surface waters. Also, CAFOs with such CNMPs tend to ignore their CNMPs unless there are specific permit requirements associated with these documents. As such, using CNMPs without associated permit requirements will likely result in improper waste, management, and subsequent discharges.

Instead of self-certification by CAFOs, the USEPA should establish criteria as to what constitutes a discharge. This would include using information that clearly shows discharges occur with lagoons and land application of CAFO waste if there are surface waters nearby. The proximity of surface waters would be a clear criterion for this determination.

(3) The self-certification program should be withdrawn. CAFOs are like other discharges associated with wet weather, such as combined sewer overflows, municipal separate storm sewer system overflows, and industrial storm water discharges. These discharges are inherently different than continuous point sources, like publicly owned treatment works. Wet weather discharges only occur during certain precipitation or snowmelt events, which are uncontrollable. This country has a relatively long history of dealing with continuous point sources, but a relatively short history with wet weather discharges. As such, we do not have a strong technical development of necessary controls and/or numerical effluent limits for wet weather discharges.

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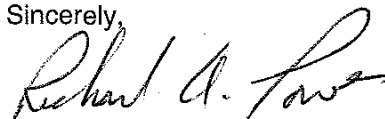
Nor do we have a strong understanding on how and when discharges occur. As such, when dealing with wet weather facilities, a strong understanding of when and how discharges occur is needed before deciding to allow a "self-certification" program that discharges do not occur. We sincerely doubt that the USEPA has such an understanding in regards to CAFOs, and in particular doubt that this has been developed with any rigor for the entire United States. Therefore, we have no confidence in the proposed "self-certification" program, and strongly recommend that it be withdrawn at this time.

Terms of the Nutrient Management Plan

We believe that the three prong approach described in the Preamble has merit. However, it is impossible to thoroughly comment on this issue without having actual draft regulations. We request that the USEPA not act on these rules until such time that the actual draft regulations covering this topic have been public noticed and an opportunity for public comment provided.

We appreciate the opportunity to comment. If you have any questions on these comments, please contact Mr. William Creal, Chief, Permits Section, Water Bureau, at 517-335-4114, or you may contact me.

Sincerely,



Richard A. Powers, Chief
Water Bureau
517-335-4176

cc: Mr. Jim Sygo, Deputy Director, MDEQ
Mr. James K. Cleland, MDEQ
Mr. Frank Baldwin, MDEQ
Mr. William Creal, MDEQ
Mr. Michael Bitondo, MDEQ

To NEJAC-

The Safe Water Drinking Act (SWDA) says that no national agency can require any substance be added to water for the purpose of treating people, but national agencies (primarily HHS & CDC) and private partners spend hundreds of millions of dollars annually promoting fluoridation policy. The 2006 National Research Council (NRC/NASEM) advised the EPA that its maximum contaminant level goal (MCLG) of 4 ppm for fluoride in drinking water was not protective of human health, but EPA has done nothing to address that charge. Moreover, the 2006 NRC advised there was significant evidence of harm to bodies, brains and bones from fluoride in drinking water at concentrations deemed safe by the EPA and no evidence of safety at any concentration for susceptible subpopulations who include pregnant women & their fetuses, bottle-fed infants & young children, the elderly and those in fragile health (such as those with kidney and thyroid disease or diabetics.) Yet, EPA has done nothing in over 16 years to address that gap in science. Approximately 99% of the fluoridation chemicals added to municipal water go directly into the environment along with the tramp contaminants from those chemicals which include arsenic, aluminum, barium, cadmium, manganese, lead, etc. This pollution, much of it imported from China & Mexico, persists in our environment. But EPA has enabled easements for those contaminants and subcontracted oversight to a private agency (NSF) in an effort to put distance between itself and the intentional pollution of our communities, willfully blind to the cumulative effect on American water sources.

Today, we have hundreds of studies documenting that not only are the EPA maximum and secondary contaminant levels for fluoride (and please note that fluoride is a toxin used as a medicine as well as being recognized by the EPA as a water contaminant and developmental neurotoxicant) causing misery in millions of Americans, we also know that the EPA and other players in the fluoridation charade don't care - that they will spend hundreds of thousands of dollars to protect the profitable fluoridation policy in violation of the intent of the SDWA and the explicit regulations of the Toxic Substances Control Act (TSCA) rather than fulfill their mission of protecting health and environment. One of those studies, a 2021 Benchmark Dose Analysis, found that 0.2 ppm fluoride in drinking water has an adverse effect on baby brains similar to lead. Others have documented that 0.5 ppm impedes normal thyroid function. Fluoridation schemes target a 0.7 ppm concentration, and diabetics and kidney patients who drink excessive amounts of water and so get higher doses of fluoride from 'optimally' fluoridated municipal water are in a vicious cycle that damages kidneys. Even analysis of recent NHANES data shows that adolescents living in fluoridated communities have blood markers suggesting they are at heightened risk of kidney and liver disease. And just as fluoride pollution accumulates in our environment, studies document that fluoride accumulates in bones where it causes inflammation and makes the bones more brittle in populations who have consumed this poison for decades. Yet, the EPA protects their policy rather than protect people.

Finally, let me remind you that fluoride facilitates the absorption of lead, copper and other metals into the body. Heck, fluoride leaches lead and copper out of pipes and fixtures. The Sandy, Utah fluoridation overfeed in 2019 ruined appliances and sickened people - resulting in trips to the emergency room of hospitals for many including at least one infant. The Sunset, Utah overfeed in 2022 was less dramatic, but fluoridation overfeeds happen all the time in every state.

And at every opportunity, the EPA not only turns a blind eye to the harm caused by fluoridation schemes, it actively resists fulfilling its mission while its sister agency, Health & Human Services, promotes fluoridation knowing full-well that susceptible sub-populations which disproportionately include environmental justice communities are suffering the worse ill effects.

Do the right thing: Tell the EPA that the MCLG for fluoride should be zero, inform HHS and CDC that fluoridation schemes are neither advisable nor sustainable, and tell states to stop enabling fluoridation schemes that poison us all womb to tomb.

Karen Spencer

Fluoridation Policy: *An Annotated Bibliography of Published Science*

A sampling of the scientific studies and reports relevant to water fluoridation published since the HHS 2015 recommendation to lower the fluoridation target to 0.7 ppm is listed below.

I suggest these items provide compelling evidence that 0.7 ppm is neither optimal nor safe and that any claims to the contrary are ill-founded. Moreover, protests that more study is required before banning fluoridation is a tacit endorsement of human experimentation without individual consent which is medical assault - *Karen F. Spencer*

2022

RIGHT QUESTION: Given the robust and consistent evidence regarding the developmental neurotoxic impact of fluoridation policy, the question that needs to be evaluated by communities should be: is this intervention worth the risk of lowering the IQ of at least certain individuals when we have a viable substitute, i.e. fluoridated toothpastes?

<https://www.karger.com/Article/Abstract/520789>

- Vieira AR The Overlooked Individual: Susceptibility to Dental Caries, Erosive Tooth Wear and Amelogenesis. *Monogr Oral Sci.* Basel, Karger, 2022, vol 30, pp 140–148.

NUTRITION & POLITICS: Private interests played a significant role at the start of 1940s public health endorsements of “fluoride-supplemented high-carbohydrate nutritional guidelines.” This political effort biased scientific processes and required the reversals of three key scientific points in an absence of supporting evidence: 1) potential harms of fluoride exposure, 2) role of nutritional deficiencies in dental caries, and 3) that low-carbohydrate diets are recommended for dental caries prevention. This corrupted bias continues today: “The USDA and the WHO not only ignore the evidence that high-carbohydrate diets may lead to diseases other than dental caries, but also fail to prioritize high-quality evidence over low-quality evidence when writing their nutritional guidelines” per experts in evidence-based grading systems.

<https://www.mdpi.com/2072-6643/14/20/4263/htm>

- Hujoel, P.P. Private Interests and the Start of Fluoride-Supplemented High-Carbohydrate Nutritional Guidelines. *Nutrients* 2022, 14, 4263.

PAROTID GLANDS: Animal study finds fluoride exposure results in oxidative stress and changes in oxidative biochemistry of the largest salivary gland which stimulates compensatory mechanisms and increases risk to the complex cell cytoskeleton.

<https://www.ncbi.nlm.nih.gov/labs/pmc/articles/PMC8794182/>

- Miranda GHN, et al. Effects of long-term fluoride exposure are associated with oxidative biochemistry impairment and global proteomic modulation, but not genotoxicity, in parotid glands of mice. *PLoS One.* 2022 Jan 27;17(1):e0261252.

LOWER PERFORMANCE IQ: Examined children's IQ at three separate time points (age 4, 5, and 6–12 years) to determine longitudinal and domain specific effects of prenatal fluoride exposure on IQ in mother-child dyads from the Early Life Exposures in Mexico to Environmental Toxicants (ELEMENT) cohort. Found prenatal exposure to fluoride, which is primarily from fluoridated salt programs, is associated with sustained impacts on IQ. Non-verbal abilities may be more susceptible to impairment from prenatal fluoride exposure as compared to verbal abilities.

<https://www.sciencedirect.com/science/article/abs/pii/S0013935122003206?via%3Dihub>

- Goodman C, et al. Domain-specific effects of prenatal fluoride exposure on child IQ at 4, 5, and 6–12 years in the ELEMENT cohort. *Environmental Research.* 2022

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IODINE & IQ: MIREC study of child-mother dyads finds “the association between prenatal fluoride exposure and full-scale intelligence previously identified in this cohort was exacerbated by low maternal iodine in pregnancy among boys. These results, which were found among mother-child pairs living in fluoridated and non-fluoridated communities in Canada, underscore the importance of sufficient iodine intake in pregnancy to minimize the neurotoxicity of fluoride in boys.” <https://www.mdpi.com/2072-6643/14/14/2920/htm>

- Goodman CV, et al. Iodine Status Modifies the Association between Fluoride Exposure in Pregnancy and Preschool Boys’ Intelligence. *Nutrients* 2022, 14, 2920.

HISTORICAL CONTEXT: Senior former public health officer and research scientist who has been skeptical about fluoridation since the 1950s with a particular interest in kidneys reflects on science, law, and conversations with notable pro and anti personalities over the decades.

<https://www.mdpi.com/2072-6643/14/17/3507/htm>

- Taves, Donald R. (2022) Fluoride: From Nutrient to Suspected Neurotoxin. *Nutrients* 14, no. 17: 3507.

GENOTOXIC: According to public health authorities, fluoride has a narrow range between the concentration which is beneficial and that which has adverse effects. The primary exposure to the fluoride-ion is through drinking water supplemented with fluorosilicic acid (FA). FA in ‘safe’ doses causes DNA damage in human osteoblast cells, reduces the telomere length and induces oxidative stress. Although combinations of fluoride with other toxins could have a synergistic effect, this study found that FA alone affects the genomic integrity of human bone cells.

<https://pubmed.ncbi.nlm.nih.gov/35483789/>

- Garcia ALH, Matzenbacher CA, Soares S, Rohr P, da Silva J. Fluorosilicic acid and cotinine, separately and in combination, induce genotoxicity and telomeric reduction in human osteoblast cell line MG63. *Mutat Res Genet Toxicol Environ Mutagen*. 2022 Apr-May;876-877:503474.

MALE FERTILITY: Fluoride, alone or in combination with arsenite both of which are common elements in drinking water, significantly suppressed the expression of steroidogenic enzymes and of the genes encoding these enzymes. “In conclusion, this study showed that exposure to As and F at environmentally relevant concentrations dispersed by water decreased testosterone production in Leydig cells, an important cell of the male reproductive system. The deleterious effects of even the lowest concentrations of As and F elements that can reach humans from the environment on the Leydig cell, and therefore on male infertility, emphasize necessity new safe limits for these elements.” <https://pubmed.ncbi.nlm.nih.gov/36182826/>

- Orta Yilmaz B, Aydin Y. Disruption of Leydig cell steroidogenic function by sodium arsenite and/or sodium fluoride. *Theriogenology*. 2022 Sep 22;193:146-156.

BODY & BRAIN: “Fluoride in higher concentrations or continuous exposure to lower doses are both found to induce mental imbalance in animals apart from the genotoxic, immunotoxic, and cytotoxic effects commonly observed. The behavioral profile of fluoride-treated animals has corroborated the clinical symptoms seen in fluoride-poisoned humans.”

<https://pubmed.ncbi.nlm.nih.gov/35488996/>

- Ottappilakkil H, Babu S, Balasubramanian S, Manoharan S, Perumal E. Fluoride Induced Neurobehavioral Impairments in Experimental Animals: a Brief Review. *Biol Trace Elem Res*. 2022 Apr 30.

PROBIOTICS: Adding probiotics to school milk is more effective and less costly than fluoride varnish in preventing cavities in children. <https://pubmed.ncbi.nlm.nih.gov/35567374/>

- Rodriguez GA, Cabello RA, Borroni CP, Palacio RA. Cost-effectiveness of probiotics and fluoride varnish in caries prevention in preschool children. *J Public Health Dent*. 2022 May 14.

Fluoridation Policy: *An Annotated Bibliography of Published Science*

OVARIAN & TESTICULAR: Animal study from in utero through puberty showing adverse impact on reproductive function. “Approximately 80–90% of fluoride absorbed by infants and children accumulates in the body. It can enter into the umbilical cord blood of the child from the mother through the placenta. In addition, significantly high fluoride content in breast milk is indicative of fluoride exposure to infants. Young children show less resistance to the toxic effects of fluoride than adults because of under-developed defense mechanisms and highly permeable blood-brain barrier.” <https://link.springer.com/article/10.1007/s12011-022-03220-8>

- Li, W., Sun, Z., Li, M. et al. Exposure to Fluoride From in Utero to Puberty Alters Gonadal Structure and Steroid Hormone Expression in Offspring Rats. *Biol Trace Elem Res* (2022).

BIRTH ANTHROPOMETRY: Using ELEMENT cohort, authors determined maternal exposure to fluoride affects length and weight of newborns with different susceptibility windows. Advises women avoid fluoride during pregnancy. <https://pubmed.ncbi.nlm.nih.gov/35660617/>

- Ortíz-García SG, Torres-Sánchez LE, Muñoz-Rocha TV, Mercado-García A, Peterson KE, Hu H, Osorio-Yáñez C, Téllez-Rojo MM. Maternal urinary fluoride during pregnancy and birth weight and length: Results from ELEMENT cohort study. *Sci Total Environ*. 2022 Jun 2.

KIDNEY KILLER: Using U.S. NHANES data, finds water fluoridation results in significantly higher plasma fluoride levels in healthy teens with lower renal function, suggesting a vicious feedback loop for those with CKD.

<https://www.sciencedirect.com/science/article/abs/pii/S0013935122009306>

- John Danziger, Laura E. Dodge, Howard Hu. Role of renal function in the association of drinking water fluoride and plasma fluoride among adolescents in the United States: NHANES, 2013–2016. *Environmental Research*. 7 June 2022.

SKELETAL FLUOROSIS: Summary of the adverse effects of ≤ 0.7 mg/L exposure on skeletal and non-skeletal systems finds “low fluoride can indeed cause damage to human health. As a consequence, it is necessary to formulate the more appropriate water fluoride standard by taking into account the effects of low fluoride on various bodily systems. In addition, more and more evidence suggest that there exist individual differences in the effect of low fluoride on the body... most likely due to genetic polymorphisms. Therefore, it is necessary to consider both environmental exposure and the actual genetic situation of the individuals with respect to fluoride exposure.”

<https://pubmed.ncbi.nlm.nih.gov/35661326/>

- Zhou J, Sun D, Wei W. Necessity to Pay Attention to the Effects of Low Fluoride on Human Health: an Overview of Skeletal and Non-skeletal Damages in Epidemiologic Investigations and Laboratory Studies. *Biol Trace Elem Res*. 2022 Jun 6.

BRAIN CONNECTION: Dental fluorosis (DF) is a structural tooth defect associated with a structural brain defects, i.e. “abnormal brain structure and brain function” which impacts concentration, learning, and memory, as well as increasing mental symptoms such as anxiety, tension, and depression. <https://pubmed.ncbi.nlm.nih.gov/36049331/>

- Ren C, Li HH, Zhang CY, Song XC. Effects of chronic fluorosis on the brain. *Ecotoxicol Environ Saf*. 2022 Aug 29;244:114021.

FLUORIDE-INDUCED LIVER INJURY: Animal study validates fluoride disrupted the glycolipid metabolism in the liver and resulted in the differential expression of 35 miRNAs and 480 mRNAs. <https://pubmed.ncbi.nlm.nih.gov/36222057/>

- Zhao Y, Yu Y, Ommati MM, Xu J, Wang J, Zhang J, Sun Z, Niu R, Wang J. Multiomics Analysis Revealed the Molecular Mechanism of miRNAs in Fluoride-Induced Hepatic Glucose and Lipid Metabolism Disorders. *J Agric Food Chem*. 2022 Oct 12.

Fluoridation Policy: *An Annotated Bibliography of Published Science*

NOT BENEFICIAL: Dental fluorosis (DF) is a qualitative defect in enamel from fluoride exposure early in life. DF is associated with other systemic conditions i.e. cognitive deficits, bone problems, thyroid disorders, etc. Significant incidences of DF are found in areas with 0.25 ppm fluoride in water concentration. Remineralization without fluoride exposure is advisable.

<https://www.mdpi.com/1660-4601/19/12/7153/htm>

- Strużycka I, et al. Assessing Fluorosis Incidence in Areas with Low Fluoride Content in the Drinking Water, Fluorotic Enamel Architecture, and Composition Alterations. *Int J Environ Res Public Health*. 2022 Jun 10;19(12):7153.

GENETIC SUSCEPTIBILITY: “In conclusion, there are alleles and genotypes of different single nucleotide polymorphisms involved in increasing or decreasing the risk of developing dental fluorosis.” <https://pubmed.ncbi.nlm.nih.gov/36354656/>

- González-Casamada C, Nevarez-Rascón M, Nevarez-Rascón A, et al. Single Nucleotide Polymorphisms and Dental Fluorosis: A Systematic Review. *Dent J (Basel)*. 2022 Nov 6;10(11):211.

FEMALE GUTS: Animal study details the process whereby fluoride exposure damages intestinal cells in the absence of estrogen which is consistent with a pattern of increased gastrointestinal illness among post-menopausal women in fluoridated communities.

<https://pubmed.ncbi.nlm.nih.gov/36252517/>

- Jin Y, Gao XY, Zhao J, Tian WS, Zhang YL, Tian EJ, Zhou BH, Wang HW. Estrogen deficiency aggravates fluoride-induced small intestinal mucosa damage and junctional complexes proteins expression disorder in rats. *Ecotoxicol Environ Saf*. 2022 Oct 14;246:114181.

INFLAMMATION: Using US NHANES data on children and animal studies, authors determined that fluoride exposure of typical children can and does result in inflammatory responses affecting immune function and disrupting white blood cell (WBC) function resulting in tissue damage. [ncbi.nlm.nih.gov/pmc/articles/PMC9608888/](https://pubmed.ncbi.nlm.nih.gov/36252517/)

- Den Besten P, Wells CR, Abduweli Uyghurturk D. Fluoride exposure and blood cell markers of inflammation in children and adolescents in the United States: NHANES, 2013-2016. *Environ Health*. 2022 Oct 27;21(1):102.

DOSE IN FOOD: Finds that fluoride exposure from foods prepared with fluoridated water have heavy fluoride concentrations not previously suspected that may exceed exposure from drinking water, dependent on dietary habits. Proposes reduction in fluoride exposure especially critical for low weight populations, such as infants, children and the frail.

<https://www.sciencedirect.com/science/article/pii/S0304389422019562>

- Sawangjang B, Takizawa S. Re-evaluating fluoride intake from food and drinking water: Effect of boiling and fluoride adsorption on food. *J Hazard Mater*. 2022 Oct 12.

2021

BENCHMARK DOSE ANALYSIS: Using fluoride studies from MIREC and ELEMENT projects as input, the results of which are consistent with other studies, authors identify 0.2 mg/L as having an adverse impact on neurodevelopment. “The prospective studies offer strong evidence of prenatal neurotoxicity, and the benchmark results should inspire a revision of water-fluoride recommendations aimed at protecting pregnant women and young children.”

<https://pubmed.ncbi.nlm.nih.gov/34101876/>

- Grandjean P, Hu H, Till C, Green R, Bashash M, Flora D, Tellez-Rojo MM, Song P, Lanphear B, Budtz-Jørgensen E. A Benchmark Dose Analysis for Maternal Pregnancy Urine-Fluoride and IQ in Children. *Risk Analysis*. 8 June 2021.

Fluoridation Policy: *An Annotated Bibliography of Published Science*

LIFETIME EXPOSURE: Fluoridation is the primary source of fluoride exposure for 1,629 Canadians between 3 and 79 that finds substantially higher lifetime fluoride exposure in fluoridated communities using CHMS data, increasing with age. Vulnerable subpopulations to adverse effects of fluoride noted as the young, those who are iodine deficient, and post-menopausal women. <https://www.mdpi.com/1660-4601/18/12/6203/htm>

- Julia K. Riddell, Ashley J. Malin, Hugh McCague, David B. Flora, and Christine Till. Urinary Fluoride Levels among Canadians with and without Community Water Fluoridation. *Int. J. Environ. Res. Public Health* 2021, 18(12), 6203.

DF & COGNITION: Indian study finds significant relationship between impaired cognition and dental fluorosis in children. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8680901/>

- Prabhakar A, Abdulkhayarkutty K, Cheruvallil SV, Sudhakaran P. Effect of Endemic Fluorosis on Cognitive Function of School Children in Alappuzha District, Kerala: A Cross Sectional Study. *Ann Indian Acad Neurol.* 2021 Sep-Oct;24(5):715-720.

KIDNEYS: This study of 1,070 adults found every 1 mg/L increment in the urinary fluoride concentrations was associated with significant increases of 22.8% in the risk of kidney function injury after adjusting for potential confounding factors. Authors conclude that long-term fluoride exposure is associated with compromised kidney function in adults, and that urinary NAG is a sensitive and robust marker of kidney dysfunction caused by fluoride exposure.

<https://pubmed.ncbi.nlm.nih.gov/34478979/>

- Wu L, Fan C, Zhang Z, Zhang X, et al. Association between fluoride exposure and kidney function in adults: A cross-sectional study based on endemic fluorosis area in China. *Ecotoxicol Environ Saf.* 2021 Aug 31;225:112735.

BEHAVIORAL CHANGES: Children in Cincinnati Childhood Allergy and Air Pollution Study (CCAAPS) assessed at age 12. Boys in particular did not experience significant anxiety or depression, yet had somatic behaviors based on their childhood urinary fluoride (CUF) concentrations, “seven times more likely to exhibit ‘at-risk’ internalizing symptomology.”

<https://pubmed.ncbi.nlm.nih.gov/34755609/>

- Adkins EA, Yolton K, Strawn JR, Lippert F, Ryan PH, Brunst KJ. Fluoride exposure during early adolescence and its association with internalizing symptoms. *Environ Res.* 2021 Oct 29:112296.

CRITICAL WINDOWS: Using urine samples and test scores from 596 mother-child Canadian pairs in the MIREC prospective cohort, researchers found evidence that developmental neurological damage was based on timing of fluoride exposure and gender, “Associations between fluoride exposure and PIQ (performance IQ) differed based on timing of exposure. The prenatal window may be critical for boys, whereas infancy may be a critical window for girls.”

<https://pubmed.ncbi.nlm.nih.gov/34051202/>

- Farmus L, Till C, Green R, Hornung R, Martinez-Mier EA, Ayotte P, Muckle G, Lanphear B, Flora D. Critical Windows of Fluoride Neurotoxicity in Canadian Children. *Environ Res.* 2021 May 26:111315.

GENES: Several genes make individuals more vulnerable to the neurotoxic impact with gender differences, also affecting mitochondria and suggesting vulnerability to dementia. Chinese study of 952 school children between 7 and 13 using water, urinary, hair and nail fluoride identified multiple neurodevelopmental metabolic pathways that result in adverse effects from low fluoride exposures. <https://www.sciencedirect.com/science/article/pii/S0160412021003068>

- Yu X, Xia L, Zhang S, et al. Fluoride exposure and children's intelligence: Gene-environment interaction based on SNP-set, gene and pathway analysis, using a case-control design based on a cross-sectional study. *Environ Int.* 2021 Jun 4;155:106681.

Fluoridation Policy: *An Annotated Bibliography of Published Science*

GENETIC VULNERABILITY: Dopamine relative genes affect the susceptibility of individuals to fluoride toxicity even in safe water concentrations which result in lowered IQ so that “low-moderate fluoride exposure is inversely related to children’s IQ.”

<https://pubmed.ncbi.nlm.nih.gov/33360592/>

- Zhao L, Yu C, Lv J, et al. Fluoride exposure, dopamine relative gene polymorphism and intelligence: A cross-sectional study in China. *Ecotoxicology and Environmental Safety*. 2021 Feb;209:111826.

BRITTLE BONES: “In this cohort of postmenopausal women, the risk of fractures was increased in association with two separate indicators of fluoride exposure. Our findings are consistent with RCTs and suggest that high consumption of drinking water with a fluoride concentration of ~1 mg/L may increase both BMD (bone mineral density) and skeletal fragility in older women.” <https://pubmed.ncbi.nlm.nih.gov/33822648/>

- Helte E, Donat Vargas C, Kippler M, Wolk A, Michaëlsson K, Åkesson A. Fluoride in Drinking Water, Diet, and Urine in Relation to Bone Mineral Density and Fracture Incidence in Postmenopausal Women. *Environ Health Perspect*. 2021 Apr;129(4):47005.

OSTEOARTHRITIS: Identifies fluoride as an environmental chemical that has adverse effects on articular cartilage and osteoarthritis (OA) risk. “In full sample analysis, a 1 mg/L increase in UF (urinary fluoride) level was associated with a 27% higher risk of OA.”

<https://link.springer.com/article/10.1007/s12011-021-02937-2>

- Sowanou, A., Meng, X., Zhong, N. et al. Association Between Osteoarthritis and Water Fluoride Among Tongyu Residents, China, 2019: a Case–Control of Population-Based Study. *Biol Trace Elem Res* (2021).

NO BENEFIT FOR PRESCHOOLERS: Polish study finds ‘optimal’ fluoride concentrations in water provide no dental benefit. Dental caries experience depended on oral hygiene and diet.

<https://www.sciencedirect.com/science/article/abs/pii/S0946672X2100016X>

- Opydo-Szymaczek J, et al. Fluoride exposure and factors affecting dental caries in preschool children living in two areas with different natural levels of fluorides. *Journal of Trace Elements in Medicine and Biology*. Volume 65. 2021.

ALTERNATIVE: This systematic review and meta-analysis concludes that biomimetic hydroxyapatite-containing, fluoride-free oral care products are effective in reducing dental decay, especially in children without the risk of dental fluorosis and neurotoxicity inherent in topical use of fluoridated products. <https://files.cdha.ca/profession/journal/2752.pdf>

- Hardy Limeback, BSc, PhD, DDS; Joachim Enax, Dr; Frederic Meyer, Dr. Biomimetic hydroxyapatite and caries prevention: a systematic review and meta-analysis. | *Can J Dent Hyg* 2021;55(3): 148-159.

AMERICAN KIDNEYS: Using U.S. NHANES data from two recent cycles, finds ‘optimal’ amounts of fluoridated water results in high incidence of uric acid in adolescents suggesting higher risk of kidney disease and other illnesses. Identifies dose-response trend in plasma fluoride of teens.

<https://www.sciencedirect.com/science/article/pii/S0147651320315074>

- Yudan Wei, Jianmin Zhu, Sara Ann Wetzstein. Plasma and water fluoride levels and hyperuricemia among adolescents: A cross-sectional study of a nationally representative sample of the United States for 2013–2016. *Ecotoxicology and Environmental Safety*. Volume 208. 15 January 2021.

Fluoridation Policy: *An Annotated Bibliography of Published Science*

TODDLERS: The Programming Research in Obesity, Growth, Environment and Social Stressors (PROGRESS) cohort included 948 mother-child pairs from Mexico City. Blinded testing of children between one and 24 months to examine associations between maternal fluoride intake from food and beverages during pregnancy and offspring neurodevelopment in this prospective and longitudinal study found, “higher exposure to fluoride from food and beverage consumption in pregnancy was associated with reduced cognitive outcome, but not with language and motor outcome in male offspring over the first two years of life.”

https://fluoridealert.org/wp-content/uploads/cantoral-2021.final_.pdf

- Alejandra Cantoral, Martha M. Tellez-Rojo, Ashley J. Malin, Lourdes Schnaas d, Erika Osorio-Valencia, Adriana Mercadob, E. Angeles Martínez-Mier, Robert O. Wright, Christine Till. Dietary fluoride intake during pregnancy and neurodevelopment in toddlers: A prospective study in the progress cohort. *Neurotoxicology* 87 (2021) 86–93.

CNS: Study of Chinese children consuming water with the low to moderate concentrations of fluoride considered safe by the US EPA determines that fluoride exposure was associated with the alteration of cholinergic system, dental fluorosis, IQ, and AChE, i.e the central nervous system is adversely impacted concurrent with fluoride exposure which also causes tooth defects and measurable deficits in cognition. <https://pubmed.ncbi.nlm.nih.gov/34808511/>

- Wang S, Zhao Q, Li G, Wang M, Liu H, Yu X, Chen J, Li P, Dong L, Zhou G, Cui Y, Wang M, Liu L, Wang A. The cholinergic system, intelligence, and dental fluorosis in school-aged children with low-to-moderate fluoride exposure. *Ecotoxicol Environ Saf.* 2021 Nov 20;228:112959.

NO SAFE DOSE: Study of Mexican children and their mothers using measurements of urinary fluoride and water concentrations associated dental fluorosis and lowered IQ with fluoride dose consistent with findings of larger studies in other countries. Authors declare WHO fluoride guidelines are unsafe and hypothesize that 0.045 F⁻ mg/day is a protective exposure

<https://www.mdpi.com/1660-4601/18/21/11490/htm>

- Fariás P, Estevez-García JA, Onofre-Pardo EN, Pérez-Humara ML, Rojas-Lima E, Álamo-Hernández U, Rocha-Amador DO. Fluoride Exposure through Different Drinking Water Sources in a Contaminated Basin in Guanajuato, Mexico: A Deterministic Human Health Risk Assessment. *International Journal of Environmental Research and Public Health.* 2021; 18(21):11490.

BABY BRAIN POISON: Exposure to fluoridated water (10 mg/L & 50 mg/L) beginning on the first day of pregnancy and continuing through the last day of breastfeeding shows chemical imbalances, cellular damage and changes in the hippocampus of Wistar rat offspring that would affect neurological development.

<https://pubmed.ncbi.nlm.nih.gov/33096359/>

- Ferreira MKM, Aragão WAB, Bittencourt LO, Puty B, Dionizio A, Souza MPC, Buzalaf MAR, de Oliveira EH, Crespo-Lopez ME, Lima RR. Fluoride exposure during pregnancy and lactation triggers oxidative stress and molecular changes in hippocampus of offspring rats. *Ecotoxicology and Environmental Safety.* 2021 Jan 15;208:111437.

BAD TEETH - BAD BRAIN: Chinese study confirm 1.6 ppm v. 0.1 ppm results in children with both damaged teeth and lower IQ. Authors validate that fluoride affects thyroid function, neurotransmitters and mitochondrial energy enzymes. There were no students with low IQ found in the area with low F level. There was high IQ among the 96.6% of the students who did not experience fluorosis.

<https://www.sciencedirect.com/science/article/pii/S021391121001965>

- Yani SI, Seweng A, Mallongi A, et al. The influence of fluoride in drinking water on the incidence of fluorosis and intelligence of elementary school students in Palu City. *Gac Sanit.* 2021;35 Suppl 2:S159-S163.

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GUTS & BRAINS: Memory function was reduced and gut microbiota structure was significantly altered in fluoride-exposed mice.

<https://www.sciencedirect.com/science/article/pii/S0147651321002190>

- Xin J, Wang H, Sun N, Bughio S, Zeng D, Li L, Wang Y, Khaliq A, Zeng Y, Pan K, Jing B, Ma H, Bai Y, Ni X. Probiotic alleviate fluoride-induced memory impairment by reconstructing gut microbiota in mice. *Ecotoxicol Environ Saf.* 2021 Jun 1;215:112108

INFLAMED GUTS: Exposure to fluoridated water at both doses (10 mg/L & 50 mg/L) inflame guts in rats and alters the gut microbiome as compared to control (0 mg/L).

<https://pubmed.ncbi.nlm.nih.gov/33508686/>

- Dionizio A, Uyghurturk DA, Melo CGS, Sabino-Arias IT, Araujo TT, Ventura TMS, Perles JVCM, Zanoni JN, Den Besten P, Buzalaf MAR. Intestinal changes associated with fluoride exposure in rats: Integrative morphological, proteomic and microbiome analyses. *Chemosphere.* 2021 Jan 11;273:129607.

PUBERTY: Black girls consuming optimally fluoridated water have earlier menarche.

<https://doi.org/10.1007/s12403-021-00448-y>

- Malin, A.J., Busgang, S.A., Garcia, J.C. et al. Fluoride Exposure and Age of Menarche: Potential Differences Among Adolescent Girls and Women in the United States. *Expo Health* (2021).

HARMFUL ADEQUATE INTAKE (AI): Study found "the levels of dietary F- intake were below the current AI, were greater towards the end of gestation and in women who were moderately and highly compliant with Mexican dietary recommendation" in ELEMENT cohort and recommended changing future dietary recommendations due to evidence of developmental neurotoxicity at even low dose exposure. <https://pubmed.ncbi.nlm.nih.gov/33602354/>

- Castiblanco-Rubio, G., Muñoz-Rocha, T., Cantoral, A., Téllez-Rojo, M., Ettinger, A., Mercado-García, A., Peterson, K.E., Hu, H., Martínez-Mier, E. (2021). Dietary Fluoride Intake Over the Course of Pregnancy in Mexican Women. *Public Health Nutrition*, 1-25.

CALCIUM & FLUORIDE IN PREGNANCY: Calcium intake during pregnancy lowers urinary fluoride (UF) concentrations by some unknown mechanism in ELEMENT cohort.

<https://pubmed.ncbi.nlm.nih.gov/34176079/>

- Castiblanco-Rubio GA, Muñoz-Rocha TV, Téllez-Rojo MM, Ettinger AS, Mercado-García A, Peterson KE, Hu H, Cantoral A, Martínez-Mier EA. Dietary Influences on Urinary Fluoride over the Course of Pregnancy and at One-Year Postpartum. *Biol Trace Elem Res.* 2021 Jun 26.

SAFETY: Evidence of dental fluorosis and other adverse effects to bodies and brains from supposed safe concentrations is alarming. "The safety of public health approach of drinking water fluoridation for global dental caries reduction are urgently needed further research."

<https://www.sciencedirect.com/science/article/pii/S0147651321005510?via%3Dihub>

- Dong H, Yang X, Zhang S, Wang X, Guo C, Zhang X, Ma J, Niu P, Chen T. Associations of low level of fluoride exposure with dental fluorosis among U.S. children and adolescents, NHANES 2015-2016. *Ecotoxicol Environ Saf.* 2021 Jun 22;221:112439.

SKELETAL FLUOROSIS: This Chinese study of the pathogenetic progression of skeletal fluorosis, details how local signaling pathways, hormones, promoter DNA hypermethylation, RNA expression etc. are affected by fluoride exposure leading to pain and disability.

<https://www.mdpi.com/1422-0067/22/21/11932/htm>

- Qiao L, Liu X, He Y, Zhang J, Huang H, Bian W, Chilufya MM, Zhao Y, Han J. Progress of Signaling Pathways, Stress Pathways and Epigenetics in the Pathogenesis of Skeletal Fluorosis. *International Journal of Molecular Sciences.* 2021; 22(21):11932.

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DEPRESSION: Animal study finds negative changes in brain structure and behavior with exposure to sodium fluoride (NAF). <https://pubmed.ncbi.nlm.nih.gov/34735150/>

- Zhou G, Hu Y, Wang A, Guo M, Du Y, Gong Y, Ding L, Feng Z, Hou X, Xu K, Yu F, Li Z, Ba Y. Fluoride Stimulates Anxiety- and Depression-like Behaviors Associated with SIK2-CRTC1 Signaling Dysfunction. *J Agric Food Chem.* 2021 Nov 4. PMID: 34735150.

OLD PEOPLE: Chinese study using individual measure of blood fluoride finds those consuming fluoride in water at or above 2 ppm as compared to those in areas with <0.8 ppm are more likely to suffer cognitive decline and dementia. The US EPA certifies that up to 4 ppm is safe.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8656079/>

- Ren C, Zhang P, Yao XY, Li HH, Chen R, Zhang CY, Geng DQ. The cognitive impairment and risk factors of the older people living in high fluorosis areas: DKK1 need attention. *BMC Public Health.* 2021 Dec 9;21(1):2237.

DECEPTION: This historical analysis documents how the ADA suppressed the established science that vitamin D was necessary for healthy teeth and bones in order to promote falsely fluoride which was and is more profitable for their membership. “Public health may well depend on looking at professional societies no different than the way we look at the pharmaceutical industry—conflicted organizations with a power to shape conventional wisdom based on fragile evidence.” <https://www.mdpi.com/2072-6643/13/12/4361/htm#>

- Hujoel PE. How a Nutritional Deficiency Became Treated with Fluoride. *Nutrients.* 2021.

2020

AMERICAN FETAL EXPOSURE: Study on pregnant women in California and Montana find, “Fluoride concentrations in urine, serum, and amniotic fluid from women were positively correlated to public records of community water fluoridation” and that concentration is consistent with findings of Canadian studies that find these concentrations are associated with increased learning disabilities and lower IQ in offspring.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7132865/>

- Abduweli Uyghurturk D, Goin DE, Martinez-Mier EA, Woodruff TJ, DenBesten PK. Maternal and fetal exposures to fluoride during mid-gestation among pregnant women in northern California. *Environ Health.* 2020 Apr 6;19(1):38.

THYROID & IQ: Concentrations of fluoride in drinking water considered optimal and safe in the US result in altered thyroid function and lowered IQ in Chinese children.

<https://www.sciencedirect.com/science/article/pii/S0160412019301370>

- Wang M, Liu L, Li H, et al. Thyroid function, intelligence, and low-moderate fluoride exposure among Chinese school-age children. *Environment International.* Volume 134, January 2020.

BLOOD: Canadian Health Measures Survey (CHMS) collects extensive biomonitoring data used to assess the exposure of Canadians to environmental chemicals finds higher fluoride in urine associated with significantly higher blood lead, urinary lead, etc. Also finds urinary selenium is significantly lower in fluoridated Canadian communities, “this is the first study where biomonitoring data from multiple cycles of CHMS were combined in order to generate robust estimates for subsets of the Canadian population. Such assessments can contribute to a regional-level prioritization of control measures to reduce the exposure of Canadians to chemicals in their environment.”

<https://www.ncbi.nlm.nih.gov/pubmed/31972364?dopt=Abstract>

- Valcke M, Karthikeyan S, Walker M, Gagné M, Copes R, St-Amand A. Regional variations in human chemical exposures in Canada: A case study using biomonitoring data from the Canadian Health Measures Survey for the provinces of Quebec and Ontario. *Int J Hyg Environ Health.* 2020 Jan 20;225:113451.

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OVERDOSED CANADIAN BABIES: MIREC study documents Canadian bottle-fed babies have lower IQ in optimally fluoridated communities while breast fed babies have extremely low F and significantly higher IQ. <https://www.sciencedirect.com/science/article/pii/S0160412019326145>

- Till C, Green R, Flora D, Hornung R, Martinez-Miller EA, Blazer M, Farmus L, Ayotte P, Muckle G, Lanphear B. Fluoride exposure from infant formula and child IQ in a Canadian birth cohort. *Environment International*. 2020.

BIASED NARRATIVES: Canadian researchers comment on “expert” attacks on the high quality studies that contradict the dental CWF narrative, i.e. political suppression of scientific facts.

<https://www.nature.com/articles/s41390-020-0973-8>

- Till, C., Green, R. Controversy: The evolving science of fluoride: when new evidence doesn't conform with existing beliefs. *Pediatr Res* (2020).

BONE HEALTH: Low to moderate fluoride exposure weakens and damages bones in women.

<https://www.sciencedirect.com/science/article/abs/pii/S0147651320308708>

- Minghui Gao et al, Association between low-to-moderate fluoride exposure and bone mineral density in Chinese adults: Non-negligible role of RUNX2 promoter methylation. *Ecotoxicology and Environmental Safety*. Volume 203, 15 October 2020.

BONES: Found an age-specific association between fluoride exposure and altered CALCA methylation in adult women, affecting bone health. <https://pubmed.ncbi.nlm.nih.gov/32283421/>

- Sun R, Zhou G, Liu L, Ren L, Xi Y, Zhu J, Huang H, Li Z, Li Y, Cheng X, Ba Y. Fluoride exposure and CALCA methylation is associated with the bone mineral density of Chinese women. *Chemosphere*. 2020 Aug;253:126616.

SEX HORMONES IN FLUORIDATED US: “The data indicated gender- and age-specific inverse associations of fluoride in plasma and water with sex steroid hormones of total testosterone, estradiol and SHBG in U.S. children and adolescents.”

<https://www.sciencedirect.com/science/article/pii/S0269749119357963>

- Bai, R., Huang, Y., Wang, F., & Guo, J. (2020). Associations of fluoride exposure with sex steroid hormones among U.S. children and adolescents, NHANES 2013–2016. *Environmental Pollution*, 114003

NERVOUS SYSTEM: The enteric nervous system (ENS) is called the second brain and governs the gastrointestinal track. Includes dopamine & serotonin function. Study finds “fluoride exposure during pregnancy and lactation might induce ENS developmental defects.”

<https://link.springer.com/article/10.1007/s12011-020-02249-x>

- Sarwar, S., Quadri, J.A., Kumar, M. et al. Apoptotic and Degenerative Changes in the Enteric Nervous System Following Exposure to Fluoride During Pre- and Post-natal Periods. *Biol Trace Elem Res* (2020).

ENDOCRINE SYSTEM REVIEW: The endocrine system includes the pineal gland, hypothalamus, pituitary gland, thyroid with parathyroid glands, thymus, pancreas (partial endocrine function), adrenal glands, as well as male and female gonads (testes and ovaries) which are adversely effected by exposure to fluoride.

<https://www.sciencedirect.com/science/article/abs/pii/S0045653520317604>

- Marta Skórka-Majewicz et al, Effect of fluoride on endocrine tissues and their secretory functions -- review. *Chemosphere*, Volume 260, December 2020, 127565.

PINEAL GLAND & MELATONIN: Fluoride calcifies the pineal gland and interferes with enzyme function, hormones and sleep patterns. <https://www.mdpi.com/2076-3417/10/8/2885>

- Dariusz Chlubek, Maciej Sikora. Fluoride and Pineal Glad. *Applied Sciences*. 22 April 2020.

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WHO IGNORES KIDNEYS: WHO guidelines of safety below 1.5 ppm fluoride concentration is wrong. “The available guidelines for drinking water are solely based on healthy populations with normal renal function. But, it is evident that once the kidney function is impaired, patients enter a vicious cycle as fluoride gradually accumulates in the body, further damaging the kidney tissue.”
<https://www.sciencedirect.com/science/article/abs/pii/S0045653520313795>

- Shanika Nanayakkara, et al. The Influence of fluoride on chronic kidney disease of uncertain aetiology (CKDu) in Sri Lanka. *Chemosphere*. Volume 257, October 2020, 127186

PEDIATRIC BONE DISEASE: Identifies fluoride concentrations in water above 1.2 ppm as “dangerously high” that can cause pediatric bone disease. Urine measurements of fluoride in those afflicted are below the fluoride concentrations in women living in optimally fluoridated communities per 2017 Canadian study by Green et al.

<https://pubmed.ncbi.nlm.nih.gov/32692054/>

- Nipith Charoenngam, Muhammet B Cevik, Michael F Holick. Diagnosis and management of pediatric metabolic bone diseases associated with skeletal fragility. *Curr Opin Pediatr*. 2020 Aug;32(4):560-573.

EPA ON ENVIRONMENTAL STRESS: EPA authors find that exposure to fluoride has the greatest adverse impact on cognitive ability in children, even more than lead.

<https://www.mdpi.com/1660-4601/17/15/5451/htm>

- Frances M. Nilsen, Jazmin D.C. Ruiz and Nicole S. Tolve. A Meta-Analysis of Stressors from the Total Environment Associated with Children’s General Cognitive Ability. *Int. J. Environ. Res. Public Health* 2020, 17(15), 5451.

SOURCE: Compared MIREC, ELEMENT & PROGRESS data. MIREC & ELEMENT differed from PROGRESS in that “daily food and beverage fluoride intake was not associated with CUF in PROGRESS” but study “found that CUF (child urinary fluoride) levels are comparable among children in Mexico City and fluoridated Canadian communities, despite distinct sources of exposure.” <https://pubmed.ncbi.nlm.nih.gov/33233802/>

- Green, R., Till, C., Cantoral Preciado, A. D. J., Lanphear, B., Angeles Martinez-Mier, E., Ayotte, P., Wright, R. O., Tellez-Rojo, M. M., & Malin, A. J. (2020). Associations between urinary, dietary, and water fluoride concentrations among children in Mexico and Canada. *Toxics*, 8(4), 1-11. [110].

SPERM MOTILITY: Animal study determines mechanisms how fluoride exposure lowers sperm quality and male reproductive function. <https://pubmed.ncbi.nlm.nih.gov/31901658/>

- Liang C, He Y, Liu Y, Gao Y, Han Y, Li X, Zhao Y, Wang J, Zhang J. Fluoride exposure alters the ultra-structure of sperm flagellum via reducing key protein expressions in testis. *Chemosphere*. 2020 May;246:125772.

DENTAL FLUOROSIS & CWF CESSATION: Dental literature review by dentists finds “a significant decrease in the prevalence of fluorosis post cessation or reduction in the concentration of fluoride added to the water supply.”

<https://pubmed.ncbi.nlm.nih.gov/32598322/>

- Nor Azlida Mohd Nor, Kuala Lumpur, Barbara L. Chadwick, Damian JJ. Farnell, Ivor G. Chestnutt. The impact of stopping or reducing the level of fluoride in public water supplies on dental fluorosis: a systematic review. *Reviews on Environmental Health*. 2020.

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2019

SLEEP & PINEAL GLAND: "Chronic low-level fluoride exposure may contribute to changes in sleep cycle regulation and sleep behaviors among older adolescents in the US."

<https://ehjournal.biomedcentral.com/articles/10.1186/s12940-019-0546-7>

- Malin, A.J., Bose, S., Busgang, S.A. et al. Fluoride exposure and sleep patterns among older adolescents in the United States: a cross-sectional study of NHANES 2015–2016. *Environ Health* 18, 106 (2019)

ADHD: Youth in optimally fluoridated Canadian communities are almost 3 times more likely to be diagnosed with ADHD and have significantly higher rates of other learning disabilities as compared to their counterparts in non-fluoridated communities on a dose-response trend line.

<https://www.sciencedirect.com/science/article/pii/S0160412019315971>

- Riddell JK, et al. Association of water fluoride and urinary fluoride concentrations with attention deficit hyperactivity disorder in Canadian youth. *Environment International*. Volume 133, Part B, December 2019.

ASD: Increased exposure to fluoride is associated with higher incidence of ASD in regions with fluoridated water or endemic fluorosis. Based on biological plausibility and incidence, authors hypothesize that increased fluoride exposure is an environmental risk factor for autism.

<https://www.mdpi.com/1660-4601/16/18/3431/htm>

- Strunecka A, Strunecky O. Chronic Fluoride Exposure and the Risk of Autism Spectrum Disorder. *Int. J. Environ. Res. Public Health* 2019, 16(18), 3431.

PRENATAL: Three measurements in high quality NIH sponsored prospective cohort study (MIREC) found significantly lowered IQ in offspring of mostly white, well-educated Canadian women living in 'optimally' fluoridated communities.

<https://jamanetwork.com/journals/jamapediatrics/fullarticle/2748634>

- Green R, Lanphear B, Hornung R, et al. (2019) Association Between Maternal Fluoride Exposure During Pregnancy and IQ Scores in Offspring in Canada. *JAMA Pediatrics*. 2019.

KIDNEY & LIVER: Researchers at Mt. Sinai Medical School find American teens in optimally fluoridated American towns have markers for altered kidney & liver parameters that puts them at higher risk for kidney & liver disease as adults. Notes the primary source of fluoride is water.

<https://www.sciencedirect.com/science/article/pii/S0160412019309274>

- Malin AJ, Lesseur C, Busgang SA, Curtin P, Wright RO, Sanders AP. Fluoride exposure and kidney and liver function among adolescents in the United States: NHANES, 2013–2016. *Environment International*. August 8, 2019.

GUTS: Animal study on microbiome health and immunity documents fluoride causes serious damage to rectal structure and significantly inhibits proliferation of rectal epithelial cells.

<https://www.ncbi.nlm.nih.gov/pubmed/31885060/>

- Wang H., Miao C., Liu J. et al. Fluoride-induced rectal barrier damage and microflora disorder in mice. *Environ Sci Pollut Res* (2019).

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TEETH: An analysis of the dental fluorosis data in three U.S. NHANES reports noted that more than half of American teens have fluoride damaged teeth as the result of too much fluoride consumption during childhood. This results in costly cosmetic dentistry in young adulthood for millions as well as increased decay in the more severely affected.

(20% very mild + 15% mild + 28% moderate + 3% severe = 65% afflicted per 2011-12 data)

<http://fluoridealert.org/wp-content/uploads/neurath.2019-1.pdf>

- Neurath C, Limeback H, Osmunson Bm et al. (2019) Dental Fluorosis Trends in US Oral Health Surveys: 1986 to 2012. JDR Clinical & Translational Research.

ALZHEIMER'S: Even low concentrations of fluoride in drinking water at or below concentrations deemed optimal or safe by the WHO result in a pattern of increased dementia.

<https://www.ncbi.nlm.nih.gov/pubmed/30868981>

- Russ TC, Killin LOJ, Hannah J, Batty GD. Aluminium and fluoride in drinking water in relation to later dementia risk. The British Journal of Psychology. March 2019.

DNA DAMAGE: Mitochondrial dysfunction associated with dental fluorosis observed in Chinese children with fluoride concentrations in water identified as optimal or safe per U.S. authorities. Gender differences to the fluoride induced oxidative stress also noted.

<https://www.sciencedirect.com/science/article/pii/S0160412018326291?via%3Dihub>

- Zhou G, Yang L, Luo C, et al. Low-to-moderate fluoride exposure, relative mitochondrial DNA levels, and dental fluorosis in Chinese children. Environment International. Volume 127, June 2019, Pages 70-77.

DEMENTIA: Describes mechanism by which the effectiveness of the two most popular drugs used to treat Alzheimer's & other neurodegenerative dementia disease is reduced or blocked by fluoride. <https://www.mdpi.com/1660-4601/16/1/10/htm>

- Marta Goschorska, Izabela Gutowska, Irena Baranowska-Bosiacka, Katarzyna Piotrowska, Emilia Metryka, Krzysztof Safranow, Dariusz Chublek. Influence of Acetylcholinesterase Inhibitors Used in Alzheimer's Disease Treatment on the Activity of Antioxidant Enzymes and the Concentration of Glutathione in THP-1 Macrophages under Fluoride-Induced Oxidative Stress. Int. J. Environ. Res. Public Health, 2019, 16(1), 10.

ADULT BRAINS: First long term NaF animal study (10 weeks) using moderate levels of fluoride finds a number of histological changes including in parts of the brain associated with memory and learning. <https://www.sciencedirect.com/science/article/pii/S0045653518317508>

- Pei Jiang, Gongying Li, Xueyuan Zhou, Changshui Wang, Yi Qiao, Dehua Liao, Dongmei Shi. Chronic fluoride exposure induces neuronal apoptosis and impairs neurogenesis and synaptic plasticity: Role of GSK-3 β /b-catenin pathway. Chemosphere. Volume 214, January 2019, Pages 430-435.

DELAYED MALE PUBERTY: This 4th study from the NIH sponsored ELEMENT investigation of the prenatal impact of low-dose prenatal exposure found a significant pattern of delayed puberty for boys associated with maternal fluoride as measured in urine samples. Female data showed non-significant trend towards earlier menarche. More study needed to determine the impact on sexual development. <https://www.ncbi.nlm.nih.gov/pubmed/30922319>

- Liu Y, Téllez-Rojo M, Hu H, et al. Fluoride exposure and pubertal development in children living in Mexico City. Environ Health. 2019 Mar 29;18(1):26.

ANXIETY & DEPRESSION: Both rats and children experience changes in brain chemistry from extended exposure to fluoride which affects mood. Serotonin and the prefrontal cortex are impacted. Studies that only examine short-term exposure are inadequate to detect these changes which are more pronounced in females.

<https://www.sciencedirect.com/science/article/abs/pii/S0031938418309375>

- Lu F, Zhang Y, Trevedi A, et al. (2019) Fluoride related changes in behavioral outcomes may relate to increased serotonin. Physiology & Behavior.

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EYE DISEASE: Fluoride is a poison that has biological impact on consumers in any dose, contributing to the development of cataracts, glaucoma and macular degeneration.

<https://www.mdpi.com/1660-4601/16/5/856>

- Waugh DT. The Contribution of Fluoride to the Pathogenesis of Eye Diseases: Molecular Mechanisms and Implications for Public Health. *Int. J. Environ. Res. Public Health*. 2019, 16(5), 856.

BONES & GENES: This 30 day animal study at 8 mg/L fluoride documents DNA & RNA damage that inhibits gene expression which can be passed on through generations affecting bone development and contributing to weak bones, blood & bone cancers and skeletal fluorosis.

<https://www.sciencedirect.com/science/article/pii/S0147651318311734?via%3Dihub>

- Atule P. Daiwile, Prashant Tarale, Saravanadevi Sivanesan, et al. Role of fluoride induced epigenetic alterations in the development of skeletal fluorosis. *Ecotoxicology and Environmental Safety*. Volume 169, March 2019, Pages 410-417.

BRAIN INJURY: Fluoride interferes with calcium metabolism which impacts brain chemistry and poisons the hippocampus. “The imbalance of calcium metabolism caused by fluorosis may be a pathogenesis of brain injury induced by fluoride.”

<https://www.sciencedirect.com/science/article/pii/S0045653518324007>

- Qiuli Yu, Dandan Shao. Rui Zhang, Wei Ouyang, Zigui Zhang. Effects of drinking water fluorosis on L-type calcium channel of hippocampal neurons in mice. *Chemosphere*. Volume 220, April 2019, Pages 169-175. [Online Ahead of Print]

BRAIN DAMAGE: Prenatal & postnatal animal experiment using 10, 50 and 100 mg/L to simulate human experience documents mitochondrial damage and neuronal death as mechanism that result in learning and memory impairments.

<https://www.ncbi.nlm.nih.gov/pubmed/30659323>

- Zhao, Q., Niu, Q., Chen, J. et al. Roles of mitochondrial fission inhibition in developmental fluoride neurotoxicity: mechanisms of action in vitro and associations with cognition in rats and children. *Arch Toxicol* (2019).

IODINE: Identifies and discusses the biochemical and hormonal impact of fluoride and fluoridation policy on iodine metabolism with consideration of related neurodevelopmental and pathological disorders. <https://www.mdpi.com/1660-4601/16/6/1086>

- Waugh DT. Fluoride Exposure Induces Inhibition of Sodium/Iodide Symporter (NIS) Contributing to Impaired Iodine Absorption and Iodine Deficiency: Molecular Mechanisms of Inhibition and Implications for Public Health. *Int. J. Environ. Res. Public Health* 2019, 16, 1086.

BIOLOGY OF POISON: Deep dive into the biological impact of fluoride that affects metabolism, hormones, immune function, etc. “Moreover, the findings of this study further suggest that there are windows of susceptibility over the life course where chronic F exposure in pregnancy and early infancy may impair Na⁺, K⁺-ATPase activity with both short- and long-term implications for disease and inequalities in health.” <https://www.mdpi.com/1660-4601/16/8/1427>

- Waugh DT. Fluoride Exposure Induces Inhibition of Sodium-and Potassium-Activated Adenosine Triphosphatase (Na⁺, K⁺-ATPase) Enzyme Activity: Molecular Mechanisms and Implications for Public Health. *Int. J. Environ. Res. Public Health* 2019, 16(8), 1427

DOSE RESPONSE: Three month study on adult rats found “fluoride can impair the learning ability of rats, which may be related to the induction of autophagy in rat hippocampal neurons.”

<https://www.ncbi.nlm.nih.gov/pubmed/31111310>

- Zhang C, Huo S, Fan Y, Gao Y, Yang Y, Sun D. Autophagy May Be Involved in Fluoride-Induced Learning Impairment in Rats. *Biol Trace Elem Res*. 2019 May 20.

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GENETIC SUSCEPTIBILITY: Review of recent scientific literature on biological impact. Same exposure in same population affect individuals differently, suggesting genetic vulnerability.
<https://onlinelibrary.wiley.com/doi/full/10.1111/jcmm.14185>

- Wei, W, Pang, S, Sun, D. The pathogenesis of endemic fluorosis: Research progress in the last 5 years. *J Cell Mol Med.* 2019; 23: 2333– 2342.

MITOCHONDRIA: Prenatal and postnatal exposure to fluoride results in mitochondrial abnormalities, autophagy and apoptosis contributing to neuronal death.

<https://www.ncbi.nlm.nih.gov/pubmed/30659323>

- Zhao, Q., Niu, Q., Chen, J. et al. Roles of mitochondrial fission inhibition in developmental fluoride neurotoxicity: mechanisms of action in vitro and associations with cognition in rats and children. *Arch Toxicol* (2019).

NUTRITION: The f-ion is a poison but the bioavailability of CaF is different than NaF as calcium is the antidote to fluoride poisoning. In addition to being in water and dental products, 20% of pharma and 40% of agrichemicals have a fluoride base. Consequently, people are exposed to excessive amounts of fluoride which contributes to chronic disease.

<https://journals.matheo.si/index.php/ACSi/article/view/4932/2095>

- Stepec D, Ponikvar-Svet M. Fluoride in Human Health & Nutrition. *Acta Chim Slov.* 2019, 66.

SYNERGY, SUSCEPTIBILITY & TSCA: Accurately identifying highly exposed groups and the intrinsic and extrinsic factors that affect susceptibility require adequately assessing the aggregate exposure among vulnerable groups. The 2016 Lautenberg update to the 1976 Toxic Substance Control Act (TSCA) requires performing a challenging and scientifically disciplined risk assessment that mitigates risk, such as calculating the impact of combined fluoride exposure from fluoridated pesticides in food and fluoridated water on young children.

<https://www.ncbi.nlm.nih.gov/labs/pmc/articles/PMC6715167/>

- Koman PD, Singla V, Lam J, Woodruff TJ. Population susceptibility: A vital consideration in chemical risk evaluation under the Lautenberg Toxic Substances Control Act. *PLoS Biol.* 2019 Aug 29;17(8):e3000372.

2018

THYROID: 18% of people drinking 'optimally' fluoridated water in Canadian communities have a heightened risk of low thyroid function because fluoride interferes with iodine metabolism. Many of them will be sub-clinical and not know they are mildly hypothyroid, which nevertheless increases their risk for diabetes, high cholesterol, and other problems. Study excluded those already diagnosed with thyroid disease. (CHMS)

<https://www.sciencedirect.com/science/article/pii/S016041201830833X>

- Ashley J. Malin, Julia Riddell, Hugh McCague, Christine Till. Fluoride exposure and thyroid function among adults living in Canada: Effect modification by iodine status. *Environment International.* Volume 121, Part 1, December 2018, Pages 667-674.

THYROID: Even 0.5 ppm fluoride in water has an adverse impact on thyroid hormones. Water is currently fluoridated to 0.7 ppm, a reduction from up to 1.2 ppm in 2015.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5805681/>

- Z. Kheradpisheh et al. (2018) Impact of Drinking Water Fluoride on Human Thyroid Hormones: A Case-Control Study. *Scientific Reports.* volume 8.

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OVERDOSED BABIES: Over one third of babies (37%) in fluoridated American communities consume amounts of fluoride in excess of the upper limits of fluoride considered safe per government regulations. Even 4% of babies in non-fluoridated communities are overdosed on fluoride due to consumption of products made with fluoridated water. At the very least, this puts these children at high risk for developing dental fluorosis. Dental fluorosis is associated with increased incidence of learning disabilities, broken bones and kidney disease.

<http://jocpd.org/doi/10.17796/1053-4625-43.1.7>

- Claudia X Harriehausen, Fehmida Z Dosani, Brett T Chiquet, Michelle S Barratt, and Ryan L Quock. Fluoride Intake of Infants from Formula. *Journal of Clinical Pediatric Dentistry*. 2018.

GOVERNMENT BIAS: A National Toxicology Program animal experiment studying the impact of fluoride consumption used the wrong rats, the wrong dose, and the wrong study design in order to manufacture a finding of no prenatal or postnatal effect.

<https://www.sciencedirect.com/science/article/pii/S0306987718308600>

- Karen Favazza Spencer, Hardy Limeback. Blood is Thicker Than Water: Flaws in a National Toxicology Program Study. *Medical Hypotheses*. Volume 121. December 2018. Pages 160-163.

PREGNANT WOMEN: Pregnant Canadian women drinking 'optimally' fluoridated water had twice the fluoride exposure per individual testing as compared to pregnant women in non-fluoridated Canadian communities - and consistent with the range in the Mexican women in the ELEMENT cohort whose children had up to 6 points lowered IQ based on prenatal exposure to fluoride (from salt). The Canadian study excluded those with health conditions such as kidney disease as well as considered confounding factors such as tea consumption.

<https://ehp.niehs.nih.gov/doi/pdf/10.1289/EHP3546>

- Christine Till, Rivka Green, John G. Grundy, Richard Hornung, Raichel Neufeld, E. Angeles Martinez-Mier, Pierre Ayotte, Gina Muckle, and Bruce Lanphear. Community Water Fluoridation and Urinary Fluoride Concentrations in a National Sample of Pregnant Women in Canada. *Environmental Health Perspectives*. October 2018.

LEARNING DISABILITIES: Over 200 children were individually tested. Study found attention deficit disorder apparently caused by their prenatal exposure to fluoride specific to dose. This is the 3rd report out of the NIH sponsored 12 year ELEMENT project that has confirmed low dose prenatal exposure to fluoride consistent with exposure in 'optimally' fluoridated communities causes subtle but permanent brain damage for many consumers. Excluded those with history of mental illness or conditions such as diabetes and renal disease.

<https://www.sciencedirect.com/science/article/pii/S0160412018311814>

- Morteza Bashash, Maelle Marchand, Howard Hu, Christine Till, Angeles Martinez-Mier, Brisa N. Sanchez, Niladri Basu, Karen Peterson, Rivka Green, Lourdes Schnaas, Adriana Mercado-García, Mauricio Hernández-Avila, Martha María Téllez-Rojo. Prenatal fluoride exposure and attention deficit hyperactivity disorder (ADHD) symptoms in children at 6–12 years of age in Mexico City. *Environment International*. Volume 121, Part 1, December 2018, Pages 658-666.

ALZHEIMER'S DISEASE: Describes impact of fluoride-induced stress and inflammation in the development of Alzheimer's disease and demonstrates the mechanism for cell death in its worsening over time. <https://www.mdpi.com/1422-0067/19/12/3965>

- Goschorska M, et al. Potential Role of Fluoride in the Etiopathogenesis of Alzheimer's Disease. *Int. J. Mol. Sci.* 2018, 19 (12), 3965.

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CANCER: Researchers who include an IARC scientist find esophageal cancer is 9.4 times more prevalent among those with dental fluorosis in the endemic fluorosis regions of Kenya. Provides biological plausibility that inflammatory fluoride affects microbiome and other biological mechanisms. Recommends more study. <https://www.ncbi.nlm.nih.gov/pubmed/30582155/>

- Menya D, Maina SK, Kibosia C, Kigen N, Oduor M, Some F, Chumba D3, Ayuo P, Middleton DR, Osano O, Abedi-Ardekani B, Schüz J, McCormack V. Dental fluorosis and oral health in the African Esophageal Cancer Corridor: Findings from the Kenya ESCCAPE case-control study and a pan-African perspective. *Int J Cancer*. 2018 Dec 23.

KIDNEYS: Fluoride is a common exposure that is selectively toxic to the kidneys.

<https://www.sciencedirect.com/science/article/pii/S0270929518301827>

- Lash LH. Environmental and Genetic Factors Influencing Kidney Toxicity. *Seminars in Nephrology*. Volume 39, Issue 2, March 2019, Pages 132-140.

IQ & DF: Between 0.5 and 3.9 mg/L, found every 0.1 mg/L increased dental fluorosis by 2.24% and every 0.5 mg/L decreases IQ by 2.67 points. Also found half as many kids with high IQ children with higher F- dose. <https://www.NCBI.nlm.nih.gov/pubmed/29870912>

- Yu X et al. Threshold effects of moderately excessive fluoride exposure on children's health: A potential association between dental fluorosis and loss of excellent intelligence. *Environ Int*. 2018 Jun 2;118:116-124.

WORSE THAN ARSENIC: "In conclusion, F exposure was related to the urinary excretion of early kidney injury biomarkers, supporting the hypothesis of the nephrotoxic role of F exposure."

<https://www.sciencedirect.com/science/article/pii/S0041008X18302382>

- Monica I. Jiménez-Córdova, Mariana Cardenas-Gonzaleza, Guadalupe Aguilar-Madrid, Luz C. Sanchez-Peña, Ángel Barrera-Hernández, Iván A. Domínguez-Guerrero, Carmen González-Horta, Olivier C. Barbier, Luz M. Del Razo. Evaluation of kidney injury biomarkers in an adult Mexican population environmentally exposed to fluoride and low arsenic levels. *Toxicology and Applied Pharmacology*. May 2018.

Brain-derived neurotrophic factor (BDNF): Chinese animal study verifies mechanisms using in vivo and in vitro methodology for cognitive deficits that "suggest that the developmental neurotoxicity of fluoride is associated with the impairment of synaptogenesis, which is caused by ERK1/2-mediated BDNF-TrkB signaling disruption." BDNF is involved with learning, memory, aging and psychiatric disease <https://pubmed.ncbi.nlm.nih.gov/30130557/>

- Chen J, et al. ERK1/2-mediated disruption of BDNF-TrkB signaling causes synaptic impairment contributing to fluoride-induced developmental neurotoxicity. *Toxicology*. 2018 Dec 1;410:222-230.

KIDNEY CASCADE: "Taken together, these findings indicate that there can be some alterations in liver enzyme activities at early stages of fluoride intoxication followed by renal damage." <https://pubmed.ncbi.nlm.nih.gov/29769014/>

- Perera T. et al. Effect of fluoride on major organs with the different time of exposure in rats. *Environmental Health and Preventive Medicine* (2018) 23:17

2017

REVIEW: Concludes that fluoridation schemes whether from water, food or salt programs "pose risks of various diseases in the asthmatic-skeletal, neurological, endocrine and skin systems. Dental and skeletal fluorosis are signs of chronic and excessive ingestion of fluoride."

<https://www.NCBI.nlm.nih.gov/pubmed/28453591>

- Verena Romero, Frances J. Norris, Juvenal A. Ríos, Isel Cortés, Andrea González, Leonardo Gaete, Andrei N. Tchernitchin. The impact of tap water fluoridation on human health. *Rev. méd. Chile* vol.145 no.2 Santiago Feb. 2017.

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DOSE-RESPONSE: Validated that IQs of children are lowered on a dose-response trend line correlated with the amount of fluoride exposure as measured via urine tests of their mothers during pregnancy and individualized IQ tests of offspring. In the range consistent with doses in optimally fluoridated communities, there was up to a 6 point difference in IQ. This NIH sponsored 12 year longitudinal study conducted by researchers at world class American & Canadian universities excluded diabetics as well as those with kidney disease or pregnancy complications and allowed for many confounders.

<https://pubmed.ncbi.nlm.nih.gov/28937959/>

- Morteza Bashash, Deena Thomas, Howard Hu, et al. Prenatal Fluoride Exposure and Cognitive Outcomes in Children at 4 and 6–12 Years of Age in Mexico. *Environ Health Perspect.* Sept 2017. Vol 125, Issue 9.

GENES & BONES: “This study provides evidence that chronic oxidative and inflammatory stress may be associated with the fluoride-induced impediment in osteoblast differentiation and bone development.” <http://link.springer.com/article/10.1007/s12011-016-0756-6>

- Gandhi, D., Naoghare, P.K., Bafana, A. et al. Fluoride-Induced Oxidative and Inflammatory Stress in Osteosarcoma Cells: Does It Affect Bone Development Pathway? *Biol Trace Elem Res* (2017) 175: 103.

PRESCHOOL DIET: Diet of two year olds contain unsafe levels of fluoride.

<http://onlinelibrary.wiley.com/doi/10.1111/cdoe.12283/full>

- Martinez-Mier EA, Spencer KL, Sanders BJ, Jones JE, Soto-Rojas AE, Tomlin AM, Vinson LA, Weddell JA, and Eckert GJ. Fluoride in the diet of 2-years-old children. *Community Dent Oral Epidemiol.* 2017;00:1–7.

APOPTOSIS: “Enamel fluorosis is a developmental disturbance caused by intake of supraoptimal levels of fluoride during early childhood. The enamel defects consist of horizontal thin white lines, opacities (subsurface porosities), discolorations, and pits of various sizes. The molecular mechanism underlying enamel fluorosis is still unknown..... We can hypothesize that fluorosis is due to a combination of direct cytotoxic effects causing cell death, the delayed development of tight junctions, which are necessary to form a sealed barrier between apical and basolateral surfaces, and a direct inhibitory effect of fluoride on vectorial calcium and/or bicarbonate transport.” <https://www.NCBI.nlm.nih.gov/pmc/articles/PMC5770627/>

- Rácz, Róbert et al. “No Change in Bicarbonate Transport but Tight-Junction Formation Is Delayed by Fluoride in a Novel Ameloblast Model.” *Frontiers in Physiology.* 2017; 8: 940.

DNA: Finds that “prolonged fluoride intake at chosen concentrations caused imbalance of the cellular oxidative state, affected DNA and disrupted cellular homeostasis... It is recommended that fluoride supplementation requires a fresh consideration in light of the current study.”

<https://www.NCBI.nlm.nih.gov/pubmed/28089781>

- F.D. Campos-Pereira, L. Lopes-Aguiar, F.L. Renosto, et al. Genotoxic effect and rat hepatocyte death occurred after oxidative stress induction and antioxidant gene downregulation caused by long term fluoride exposure. *Chem Biol Interact.* 2017 Feb 25;264:25-33.

PRENATAL POISON: “F can pass through the cord blood and breast milk and may have deleterious impact on learning and memory of the mouse pups.”

<http://journals.sagepub.com/doi/abs/10.1177/0960327117693067>

- Y Zhang, X Xue, R Niu, J Wang. Maternal fluoride exposure during gestation and lactation decreased learning and memory ability, and glutamate receptor mRNA expressions of mouse pups. *Z Sun, Human & Experimental Toxicology.* February 13, 2017.

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IMMUNITY: Prenatal and early postnatal exposure to fluoride impairs spleen function and development which damages spleen and lifelong immunity.

<https://www.NCBI.nlm.nih.gov/pubmed/28846973/>

- Yanqin Ma, Kankan Zhang, Fengjun Ren, Jundong Wang, Developmental fluoride exposure influenced rat's splenic development and cell cycle via disruption of the ERK signal pathway, In Chemosphere, Volume 187, 2017, Pages 173-180

NEUROINFLAMMATION: Toxic effects of fluoride on the central nervous system and immunity.

<https://link.springer.com/article/10.1007/s10753-017-0556-y>

- Chen R, Zhao LD, Liu H. et al. Fluoride Induces Neuroinflammation and Alters Wnt Signaling Pathway in BV2 Microglial Cells. Inflammation. 2017;40: 1123.

2016

CRITIQUE HHS RECOMMENDATION: Pro-fluoridation team of dental researchers determined that the Department of Health and Human Services reduction of the optimal fluoride concentration to a single 0.7 ppm target is lacking in sound science, i.e. that “policy need to be cognizant of the balancing of risk and protective exposures across the entire population and potentially all ages and to be based on recent data that are purposefully collected, critically analyzed and carefully interpreted... (the recommendation seems) premature in terms of its rationale and its use and interpretation of sometimes dated data.” These authors’ bias is to maintain 1 ppm; nevertheless, their rationale against the HHS document is appropriate. The HHS document is political, not scientific.

<https://www.NCBI.nlm.nih.gov/pubmed/26710669>

- Spencer AJ, Do LG. Caution needed in altering the 'optimum' fluoride concentration in drinking water. Community Dent Oral Epidemiol. 2016 Apr;44(2):101-8.

OSTEOPOROSIS: “Consequently, although the World Health Organization continues to support F schemes for caries prevention despite a lack of scientific proof, the F schemes are not able to improve the crystal quality but rather contribute adversely to affect tooth development and increases the risk of developing postmenopausal osteoporosis.”

<http://dx.doi.org/10.4172/2379-1764.1000170>

- Mitsuo Kakei, Masayoshi Yoshikawa and Hiroyuki Mishima. Fluoride Exposure May Accelerate the Osteoporotic Change in Postmenopausal Women: Animal Model of Fluoride-induced Osteoporosis. Adv Tech Biol Med 2016, 4:1

DIABETES: Fluoridation policy significantly increases incidence of age related type 2 diabetes.

<https://www.NCBI.nlm.nih.gov/pubmed/27740551>

- K. Fluegge. Community water fluoridation predicts increase in age-adjusted incidence and prevalence of diabetes in 22 states from 2005 and 2010. Journal of Water and Health, 2016.

IBD: Crohn’s disease and ulcerative colitis increases after fluoridation begins in multiple countries. <http://www.NCBI.nlm.nih.gov/pubmed/27199224>

- Follin-Arbelet B, Moum B. Fluoride: a risk factor for inflammatory bowel disease? Scand J Gastroenterol. 2016 May 19:1-6.

PROPAGANDA: Assisted by the media, fluoridationists misrepresent historical and scientific fact in order to achieve a political end. <https://www.researchgate.net/publication/305985332>

- Anat Gesser-Edelsburg and Yaffa Shir-Raz. Communicating risk for issues that involve 'uncertainty bias': what can the Israeli case of water fluoridation teach us? Journal of Risk Research. August 2016.

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2015

COCHRANE CWF REVIEW: Estimates that 12% of the children living in fluoridated communities with 0.7 ppm fluoridation have aesthetically objectionable dental fluorosis with a total dental fluorosis effect of 40%. The effects were 47% & 15% for 1 ppm, only a minor impact on incidence of dental fluorosis and consistent with the findings of the 2000 York Review.

http://www.cochrane.org/CD010856/ORAL_water-fluoridation-to-prevent-tooth-decay

- Iheozor-Ejiofor Z, Worthington HV, Walsh T, O'Malley L, Clarkson JE, Macey R, Alam R, Tugwell P, Welch V, Glenny A. Water fluoridation for the prevention of dental caries. Cochrane Database of Systematic Reviews 2015, Issue 6.

THYROID: Diagnoses of low thyroid significantly higher in 'optimally' fluoridated regions.

<https://www.NCBI.nlm.nih.gov/pubmed/25714098>

- S Peckham, D Lowery, S Spencer. Are fluoride levels in drinking water associated with hypothyroidism prevalence in England? A large observational study of GP practice data and fluoride levels in drinking water. J Epidemiol Community Health. 24 February 2015.

ADHD: Researchers found between 67k and 131k more 11 year olds with ADHD in fluoridated regions of the U.S.

<http://www.ehjournal.net/content/pdf/s12940-015-0003-1.pdf>

- A Malin and C Till. Exposure to fluoridated water and attention deficit hyperactivity disorder prevalence. Environmental Health 2015, 14:17

CWF INFLAMMATIONS: Found that "even in small concentrations fluoride changes the amounts and activity of COX-1 and COX-2 enzymes taking part in the initiating and development of inflammatory process."

<http://www.sciencedirect.com/science/article/pii/S0887233315001605>

- I. Gutowska, et al. Fluoride as a factor initiating and potentiating inflammation in THP1 differentiated monocytes/macrophages. Toxicology in Vitro. Volume 29, Issue 7, October 2015, Pages 1661–1668.

NEUROTOXICANT: EPA scientists classify fluoride as a 'gold standard' developmental neurotoxicant with substantial evidence of harm.

<http://www.sciencedirect.com/science/article/pii/S0892036215300362>

- William R. Mundy, Stephanie Padilla, Joseph M. Breier, et al. Expanding the test set: Chemicals with potential to disrupt mammalian brain development. Neurotoxicology and Teratology. Volume 52, Part A, November–December 2015, Pages 25–35.

PROPAGANDIZING: The proponents of fluoridation ignored concerning evidence and did not deliver on their promise of dental benefit then, and now. Neither did they do the expected due diligence re harms. <https://doi.org/10.2105/AJPH.2015.302660>

- Carstairs C. (2015). Debating Water Fluoridation Before Dr. Strangelove. American journal of public health, 105(8), 1559–1569.

NOT COST EFFECTIVE: Reveals errors in cost-benefit analysis (CBA) used by CDC. Best case scenario after corrections is a \$3 benefit which is more than wiped out by any consideration of dental fluorosis. Fluoridated drinking water results in an economic loss to communities. <http://www.NCBI.nlm.nih.gov/pubmed/25471729>

- Lee Ko & Kathleen M. Thiessen (2015) A critique of recent economic evaluations of community water fluoridation, International Journal of Occupational and Environmental Health, 21:2, 91-120

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Additional items of note:

2017 IAOMT Position Paper: <https://iaomt.org/iaomt-fluoride-position-paper-2/>

2018 Open Letter: <http://www.multibriefs.com/briefs/icim/nutrition.pdf>

2019 Children's Health Defense Statement: <https://childrenshealthdefense.org/news/u-s-water-fluoridation-a-forced-experiment-that-needs-to-end/>

2020 Expert Opinion: <https://www.ehn.org/fluoride-and-childrens-health-2648120286.html>

"...fluoride is presumed to be a cognitive neurodevelopmental hazard to humans..."
- Draft Monograph from National Toxicology Program, "[Systematic Review of Fluoride Exposure and Neurodevelopmental and Cognitive Health Effects](#)" (Sept 6, 2019)

"The cessation of all compulsory water fluoridation schemes should be the goal of all public health agencies, ethical lawmakers, and informed citizens."

- Prof. Rita F. Barnett-Rose, J.D. in "[Compulsory Water Fluoridation](#)" (2014)

DEFINITIONS:

- **Endorsement:** An endorsement is an authoritative statement reflecting a point of view for the purpose of exerting influence. An endorsement is *not* an expert opinion.
 - **Authoritative statement:** An opinion that interprets a rule, law or policy for the purpose of guiding, influencing, or mandating action. Authoritative statements are not inherently trustworthy or reliable, but they are inherently manipulative. "Testimonial propaganda" utilizes authoritative statements in marketing and in politics. The slogan "question authority" was intended to encourage critical thinking in order to combat the blind acceptance of biased authoritative statements that endorse policy and/or sanctioned narratives. (*Logical Fallacies: Appeal to Authority*)
- **Expert Opinion:** An expert opinion is dependent on evidence and the due diligence of someone with substantial study in a field. The Daubert Standard is a legal process that validates the trustworthiness of experts offering opinion in a court of law.

EXAMPLES:

ENDORSEMENT: The April 2015 HHS statement recommending 0.7 ppm fluoride concentration in drinking water for 'safe & effective' prevention of tooth decay promoted the long standing fluoridation policy of the agency.

vs.

EXPERT OPINION: The June 2015 Cochrane report finds no reliable evidence of dental benefit to adults or low income children, but documents substantially higher rates of dental fluorosis, some of which will likely result in costly cosmetic dentistry. The 2019 National Toxicology Program systematic review offered an expert opinion based on the evidence that fluoride is a presumed hazard to human health specific to neurotoxic impact when exposure is pre- or post-natal.

December 14, 2022

Via e-mail to nejac@epa.gov

George QE Ward, Program Manager
National Environmental Justice Advisory Council
1200 Pennsylvania Avenue, NW
Washington, DC 20406

**Re: Comments for the Public Meeting of the National Environmental Justice
Advisory Council, Docket ID EPA-HQ-OA-2022-0053**

Dear Mr. Ward,

We write in response to the National Environmental Justice Advisory Council's request for public comments on addressing harmful air, soil, and water pollution in the United States. We urge the Council to advise the Environmental Protection Agency ("EPA") to address pollution from concentrated animal feeding operations ("CAFOs") by granting a rulemaking petition aimed at increasing oversight of the largest and most-polluting CAFOs, submitted to EPA in October 2022.¹

The Environmental Law and Policy Center ("ELPC") is an environmental legal advocacy organization based in the Midwest. We work in Illinois, Indiana, Iowa, Michigan, Minnesota, North Dakota, Ohio, South Dakota, Wisconsin, and Washington D.C., representing individuals and local grassroots organizations to enact substantive environmental change. Our Clean Water program holds polluters accountable and fights to clean up Midwest water, from the Great Lakes and big river systems to the community watersheds and small-town wells that provide drinking water, wildlife habitat, jobs, and recreational enjoyment for millions.

Unlike waste from other industrial processes, CAFO waste is not treated to remove pollutants. Instead, it is spread, untreated, on crop fields, ostensibly as fertilizer. Liquid waste or slurry—commonly present in the CAFO business model—presents a substantially increased risk of getting into surface and groundwater. In the Midwest, the danger to water quality is heightened due to an extensive network of tile drains, which allows swampy areas to be drained of excessive water in order to facilitate agriculture.² When spread on agricultural land, liquid CAFO waste enters these subsurface tile lines by flowing down through the soil or running off into surface-level intakes known as risers. Tile systems deliver water collected from fields directly into roadside ditches and streams, which ultimately flow into rivers and lakes. Because it is expensive to ship liquid waste over long distances, most CAFOs spread their manure waste on land near their facilities, often selling it or even giving it away to nearby landowners. This results

¹ See *Petition to Adopt a Rebuttable Presumption that Large CAFOs Using Wet Manure Management Systems Actually Discharge Pollutants Under the Clean Water Act* (2022), https://earthjustice.org/sites/default/files/files/cafo_presumptionpetition_withexhibits_oct2022_.pdf.

² See *Tile Drainage 101*, <https://www.agriculture.com/crops/soil-health/tile-drainage-101> (50 million acres of U.S. land are tile-drained); *Understanding the Economics of Tile Drainage*, Iowa State University Extension and Outreach, <https://www.extension.iastate.edu/agdm/wholefarm/html/c2-90.html>.

in over-application of waste onto land that is already over-saturated by nutrients like phosphorus and nitrogen.

In short, CAFOs concentrate more manure and other waste than can be economically applied without polluting the environment, transforming a potentially valuable production input (manure) into a costly waste product. Besides CAFOs, all other industrial polluters are required to treat their waste before discharging it into water. But existing regulations allow CAFOs to externalize these costs by allowing them to spread their waste with limited restrictions, and with no requirement to treat the waste, as noted above. When CAFO waste gets into the water, the cost of that pollution does not go unpaid; it is just passed along to others. Federal farm programs—paid for by taxpayers—further subsidize the CAFO business model, allowing CAFOs to maximize profits while others pay the price.

These externalized costs are borne both by rural communities near CAFOs, as well as by urban communities that can be hundreds of miles away. Over the past 50 years, family farms have been driven out of business and replaced by larger facilities like CAFOs.³ This has had devastating consequences on both individuals and rural communities: a recent study found that suicide rates in agriculture are five times higher than the national average, and even double the rate for military veterans.⁴ People who live downwind of CAFOs are forced to breathe in noxious gases, including ammonia, hydrogen sulfide, methane, and nitrous oxide, as well as carbon dioxide and volatile organic compounds.⁵ Those who live downstream have to deal with the impacts harmful algal blooms (HABs), which are fueled by phosphorus in livestock manure, contaminate surface waters, making them unsafe to drink from or recreate in. HABs also cause dead zones in water bodies, leading to fish kills and other negative environmental impacts.⁶ In a recent example, one CAFO owner in Wisconsin spread so much waste on fields near it that the tributaries around it, which flow into Lake Michigan, were found to have *E. coli* readings hundreds of times higher than the levels that would result in the closure of a public beach.⁷

And groundwater also suffers from CAFO pollution. Wisconsin recently released a report finding that of 301 private wells tested in 2018, 42% were positive for total coliform bacteria and/or nitrate—toxins linked to animal manure—in amounts that exceeded the state and EPA standards.⁸ This has potentially deadly consequences: infants younger than 4 months are at

³ See *How America's Food Giants Swallowed the Family Farms*,

<https://www.theguardian.com/environment/2019/mar/09/american-food-giants-swallow-the-family-farms-iowa>.

⁴ See *Farmer Suicide: The Topic Few Will Discuss*, <https://www.farmprogress.com/outlook/farmer-suicide-topic-few-will-discuss>.

⁵ See *Challenging Indiana's Unjust Right to Farm Laws*, *Hoosier Environmental Council*,

<https://www.hecweb.org/issues/environmental-health-justice/factory-farm-waste-2/hendricks-county-lawsuit/>.

⁶ See *Harmful Algal Blooms Mitigation and Treatment Research*, <https://www.epa.gov/water-research/harmful-algal-blooms-mitigation-and-treatment-research#:~:text=Harmful%20algal%20blooms%20%28HABs%29%20occur%20when%20algal%20%28or,zones%20in%20waterbodies%20and%20have%20significant%20economic%20impacts>.

⁷ See *Kewaunee County dairy farmer, 2 others charged with over-spreading manure, falsifying documents*,

<https://www.jsonline.com/story/news/local/wisconsin/2022/12/05/kewaunee-county-cafo-charged-with-over-spreading-manure/69702165007/>.

⁸ See *Assessing Private Well Contamination in Grant, Iowa, and Lafayette Counties, Wisconsin: The Southwest Wisconsin Groundwater and Geology Study*, https://www.wpr.org/sites/default/files/swigg_report_final.pdf.

particular risk of well water contamination,⁹ including a potentially deadly disease called blue baby syndrome.¹⁰ Nitrate poisoning is also linked to cancer, and cardiovascular and neurological disorders. This reality forces residents to dig deeper wells or drink only bottled water—in either case, a significant inconvenience and additional cost.

Urban communities across the Midwest are also forced to pay for CAFOs' business decisions. HABs in Lake Erie and elsewhere threaten the drinking water of millions of Midwesterners downstream, often impacting the poorest neighborhoods the most. Infamously, in 2014, half a million people in Toledo, OH were notified that their tap water was toxic—containing microcystin, a toxin known to cause diarrhea, vomiting, and liver damage at even small concentrations.¹¹ According to a study by the Alliance for the Great Lakes, the cost of cleaning water contaminated by algae blooms across the state of Ohio amounts to \$10 per resident per year.¹² But in Toledo—which relies on the Maumee Bay of Lake Erie for drinking water—this figure is higher, at \$19 per resident. Because most CAFOs are able to externalize their waste treatment costs, those with the least ability to pay are often those who are forced to pay the price. Water affordability and drinking water contamination crises have become familiar, recurring Midwestern problems, occurring in cities across the region, including Toledo,¹³ Benton Harbor, Flint, and Chicago.¹⁴

EPA and the state environmental agency are not doing enough to prevent pollution from CAFOs. Accordingly, we support the rulemaking petition asking EPA to adopt a rebuttable presumption that Large CAFOs using wet manure management systems—which are a particularly significant source of water pollution—actually discharge water pollution and, thus, must apply for Clean Water Act permits. If granted, the petition would strengthen protections for water quality, increase opportunities for public participation in CAFO permitting, and improve transparency around CAFOs.

For these reasons, we urge the Council to advise EPA to grant the rulemaking petition.

Sincerely,

/s/ Katie Garvey

Katie Garvey

Environmental Law & Policy Center

kgarvey@elpc.org

35 E. Wacker Dr.

Suite 1600

Chicago, IL 60601

⁹ See *Nitrate/Nitrite Toxicity*, Agency for Toxic Substances and Disease Registry (ATDSR), <https://www.atsdr.cdc.gov/csem/nitrate-nitrite/cover-page.html>.

¹⁰ See *Blue Baby Syndrome*, Healthline.com, <https://www.healthline.com/health/blue-baby-syndrome#causes>.

¹¹ See *Lake Erie's Failed Algae Strategy Hurts Poor Communities the Most*, <https://www.circleofblue.org/2022/world/lake-eries-failed-algae-strategy-hurts-poor-communities-the-most/>.

¹² See *New Study: Downstream Water Users Bear Financial Burden of Upstream Pollution*, <https://greatlakes.org/2022/05/new-study-downstream-water-users-bear-financial-burden-of-upstream-pollution/>.

¹³ See *Statement on Toledo Drinking Water Crisis*, <https://theoec.org/statement-on-toledo-drinking-water-crisis/>.

¹⁴ See *Drinking Water, Freshwater Future*, <https://freshwaterfuture.org/drinking-water/>.

The Yonkers Housing Authority (YHA) has worked with community solar through sustainable Westchester. Real estate developer Robert Martin has a property in Yonkers called the Southern Westchester Executive Park where they installed solar panels and through a relationship with sustainable Westchester and Groundwork Hudson Valley, YHA and its tenants are now the recipients of these solar benefits. This is a great model of collective community engagement with affordable housing, not-for-profits and local businesses.

The YHA is also working with The Community Builders (TCB) to build new affordable housing with solar panels at the Ridgeway development in Northwest Yonkers. The development is a six-phase replacement project of 500 of all affordable housing units. Phases 4 and 5 have solar panels. Phase 6 will have solar panels and be built to passive house environmental standards. If you have any questions about these successes or want to use them as models, please contact us.

Lakisha Collins-Bellamy, Esq.

EJ communities in uranium mining districts and on indigenous lands throughout the United States have been burdened with mountains of unlined waste rock and uranium mill tailing materials that pose continuing hazards to their health and safety. Contaminants from unlined waste piles seep into their critical drinking water supplies and infiltrate the soils beneath them.

Even when uranium mine and mill sites are reclaimed, the hazardous, radioactive materials left behind will remain constant sources of pollution, and forever blemish their landscapes and tribal homelands.

EPA must end this blight on our communities.

Overburdened EJ communities must never be subjected to another round of mineral extraction and processing or become de facto permanent waste disposal sites.

L. Watchempino

Full Name (First and Last): Leah Taylor Booher

Name of Organization or Community: Heron Bridge Education

City and State: Portland, Oregon

Brief description about the concern: In response to the larger discussion of data and the role that plays in Environmental Justice and equitable enforcement as a whole I have a question. How can we address the revision of Justice40 Census tract eligibility of those that have been subject to repeated environmental disasters thus resulting in long term effects? For a location, such as in Florida that has had repeated impacts on housing from hurricanes, how can they request to be considered for eligibility for housing or workforce development eligibility?

What do you want the NEJAC to advise EPA to do? : A forum, point of contact, and/or method of contacting/appealing in regards to Justice40 Eligibility. Of course, requiring documentation in the form of local data and documentation of devastating events/data yet to be integrated into national tools. A note of the reason for change in eligibility in Justice40 documentation and data could be included.

Specifics would be important:

Example 1: Several hurricanes in the span of four years resulting in >30% loss in housing and significant loss in workforce Documentation (including but not limited to): Government documents from government agencies documenting disaster, local government documentation on housing, data around pending home rebuilding from local level, EPA EJScreen, Census Data, etc.

Example 2: Historically large earthquake 2 years ago that destroyed a large number of homes, rental units, and commercial industry that has adversely affected housing, electricity, and caused a chemical leak that requires remediation.

Documentation (including but not limited to): Government documents from government agencies documenting disaster existing EPA cleanup, data around pending home rebuilding from local level, EPA EJScreen, Census Data, etc.

Full Name (First and Last): Lena Moffitt

Name of Organization or Community: Evergreen Action

City and State: Washington, DC

Brief description about the concern: We want to encourage EPA in expeditiously, equitably and effectively implementing the incredible level of federal resources directed to the agency by the Inflation Reduction Act, with a clear statutory mandate to reduce pollution and prioritize benefits to impacted communities. This unprecedented federal investment in tackling the climate crisis must simultaneously open the door to a more inclusive and just economy that pays workers a fair wage and helps correct historical harms of longstanding environmental racism.

What do you want the NEJAC to advise EPA to do? First the greenhouse gas reduction fund. The EPA should plan the implementation of the Fund to ensure it achieves both the equity and climate goals of the Inflation Reduction Act, President Biden's Justice40 Initiative, and the EPA's Equity Action Plan. This program can serve as a force multiplier to leverage much greater private and public investment in climate solutions, invest in pollution reduction and economic opportunity for disadvantaged communities, and support and accelerate demonstrated state clean energy leadership. With the \$7 billion Zero Emission Technologies Fund inside the GHGRF, we urge the agency to prioritize support for state-level programs, and also support local and tribal government programs that will deploy clean energy to benefit disadvantaged communities. Such state programs could include, but not be limited to: Community solar and low-income solar programs; Programs incentivizing adoption of other zero-emission technologies, like electric appliances and electric vehicles and charging infrastructure; State energy, infrastructure and affordable housing agencies with plans to deploy zero-emission technologies; State departments of education and school districts that want to get their schools off of polluting fossil fuel technologies; And other state, local and tribal programs providing community education and technical assistance. Second, with the \$20 billion Clean Energy Accelerator, the EPA has the opportunity to build a nation-wide ecosystem of equitable clean energy finance. We are deeply supportive of legislative design that ensures that no less than \$8 billion of this funding should benefit disadvantaged communities. And feel that much more of this \$20 billion can and should be prioritized for investment in these communities. Second, the \$3B Environmental and Climate justice block grant program presents an opportunity to reduce the burden in communities most impacted by pollution and systemic underinvestment, but the program must do more to connect with those communities on program design. Many communities still do not even know of the EJ/CJ block grants and EPA must invest time in educating the public and be intentional about targeting that information to impacted communities. For instance: Applications should be accepted on a rolling basis, with continuous community education. This will allow for ongoing opportunities to apply for funds and will hopefully facilitate a greater amount of funds to be distributed. The rulemaking opportunities around the EJ/CJ block grant should be limited to what is statutorily required so that the money flow is not slowed down by multiple rulemaking opportunities, though there should be an RFI to gather initial community input. For definitions, we want to lift up our colleagues' at WeACT for Environmental Justice's preference for those found in the Environmental Justice for All Act. The agency should prioritize applications that invest in green, low income housing stock, for the myriad benefits these investments can deliver to communities.

Finally, the State climate pollution reduction grants. To maximize the pollution-reducing impact of this program, the EPA should prioritize approval of State Climate Implementation Grant awards for those applications that demonstrate:

- 1) the most significant, additional climate pollution reductions; and
- 2) the highest level of certainty or enforceability that these emissions reductions will be achieved;
- 3) the ability to advance a climate policy agenda with greater ambition than the policy tools that are readily available to the state administration may allow, and/or a particularly innovative strategy for sectoral emissions reductions;
- 4) ability to knit together a comprehensive plan pulling from multiple funding streams to transform a sector;
- 5) the largest benefits for disadvantaged communities.

Finally, we want to stress that the availability of these resources to help states and communities' transition away from polluting sources of energy, particularly in the power sector, should encourage the agency to expedite, not delay, its additional regulatory agenda. Regulations directly limiting pollution are essential to delivering justice in the communities the agency serves - and yet, EPA is falling behind on several key climate change and air quality regulations. While the IRA represents historic progress on the President's climate and pollution goals, analysis shows that it will only cut carbon by 40%, short of Biden's commitment to reduce carbon pollution 50% economy-wide by 2030. To close the remaining emissions gap, the EPA must ratchet up their regulatory ambition. We know that these rules directly impact living, breathing communities, particularly Black, Brown, and Indigenous communities. EPA must elevate its sense of urgency on its air pollution and climate priorities in order to drive down pollution.

10-5-2022

Good afternoon, Piyachat Terrell,

I am following up with you from last week's meeting, but before I get into the details, I want to first thank you for giving me and my colleagues an opportunity to meet with you and your staff. Any meaningful action on PFAS at the federal level is greatly appreciated, as long as it makes **Environmental Justice** its mission to achieve President Bidens- EPA PFAS Action Roadmap. Our community group the Environmental Justice Task Force-Tucson, believes that all people have the human right to the enjoyment of living in a safe, clean, health and sustainable environment.

Around the world today, **since 1970's, low-wealth populations and communities of color across the nation have been and continue to be disproportionately impacted by the inequitable community impacts of "environmental hazards."** The Superfund site in Tucson, has been and continue to disproportionately burden the city's majority-minority south-side. Beginning in the early 1940's through late 1980's, federal contractor Hughes Aircraft Co., (Now known as Raytheon Missiles Co.) with the Tucson Airport Authority, spent nearly a decade disposing of a degreaser containing TCE which then leaked into the groundwater supply underneath the city of Tucson. Thousands of local south-side residents, living in a predominate Mexican, Hispanic-American Barrio, inhaled, drank, bathed, and cooked in that water, resulting in many residents developing cancer and other serious and irreversible adverse health effects. In addition to the still ongoing TCE cleanup, PFAS, has emerged, brought on by the **Arizona Air National Guard, Air Force Plant 44** (Raytheon contractors) use of firefighting foam, showing up in the water wells close to the **Tucson Airport Remediation Project (TARP Superfund Site)** facility. The state and federal government have not been swift enough to act quickly to prevent the spread of PFAS in the water remediation system and averting a repetition of the environmental harms on communities of color.

I was born and raised in the Tucson south-side. As a child I was always sick. Starting in the late 1970's, my three older children were born with birth defects, including, Bone age delay, cleft palate, nasal deformities and low weight. In 2007, my 19-year-old child died of a rare cancer related illness known as Lupus and Kidney Nephrotic Syndrome. In 2008, my younger child was diagnosed with Lupus and Kidney Nephrotic Syndrome as well as my son JOJO in 2009. She is currently in her end stages. In 2013, my little grandbaby boy was born with birth defects including a cleft lip. In 2014, my grandbaby only two years old, was diagnosed with Nephrotic Syndrome. In 2017 my little niece Princess Mia was diagnosed with a rare childhood brain cancer know as D.I.P.G and died at the age of 5. In 2019 my husband was diagnosed with prostate cancer and is currently undergoing cancer treatment and monitoring. He does not have health care so he has to pay out of pocket expenses for his treatment. Additionally, the Tucson area has seen decades old, trends of higher cancer rates. One out of five families live below poverty lines. We cannot afford another drop of PFAS in our water or bodies. Unfortunately, we cannot even afford point of use treatment technologies to reduce any potential PFAS exposures in our water. We can barely afford to keep buying bottled water. Surely, we cannot afford PFAS bio monitoring lab kits. If we had the federal governments resources for PFAS bio monitoring then we would have a much better chance of taking control over our health to reduce potential exposures.

Thank you. The contact person for this letter is Linda Shosie, Owner & Founder, Environmental Justice Task Force. At lindarobles39@gmail.com. (520) 528-6629.

As I said I would I am sending you a copy of our asks, as you requested.

Here are our asks:

1). *Ask the USEPA to take the lead on convening a diverse group of stakeholders to develop a citizen science approach to investigating the health impacts of community-wide exposure to PFAS, with an emphasis on equity and justice.*

This effort will include supporting one or more studies that focus on the cumulative impacts of PFAS and other chemicals on the human body and local ecosystems, with attention to EJ concerns, and with an aim to support PFAS biomonitoring, guidance on PFAS exposure testing, and clinical follow up. This initiative will also be aimed at developing a more robust federal response model for assisting PFAS contaminated communities. Stakeholders will include but not be limited to federal government agencies, frontline EJ and social justice leaders from impacted communities, scientists and health professionals. Funding will also be required to support the work of independent technical assistance from experts who can advise impacted residents with interpreting data and with asking key questions that can shape this research endeavor.

2. *Ask the USEPA to provide funding for public education and awareness of PFAS contamination's impacts on water, air, and human health, and for PFAS reduction technologies.*

This initiative will allow trusted community-based organizations to reach residents of impacted communities with the goal of assisting people to mitigate exposure and reduce PFAS in the local environment and their homes. A key component of this effort will also include funding for point of use treatment technologies and in-home water filtration.

3. *Ask the EPA to assist us with seeking clear guidance from the NIEHS on PFAS biomonitoring, PFAS exposure testing and clinical follow up in underserved, low-wealth, and BIPOC communities.*

Thank you,

Linda Shosie

Hello,

Please find a public comment letter from the California Strategic Growth Council regarding the Nov. 29 - Dec. 1 Public Meeting attached. Thank you for the opportunity to provide written comment. If we can provide any further information, please do not hesitate to reach out.

Lois Kim



December 14, 2022

National Environmental Justice Advisory Council
United States Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Washington, DC 20460
nejac@epa.gov

RE: NEJAC Public Comment on Environmental Justice Block Grants & Funding Programs

Dear National Environmental Justice Advisory Council:

The California Strategic Growth Council (SGC) is writing this letter in support of the United States Environmental Protection Agency's new **Environmental Justice Funding Programs** and specifically the **Environmental and Climate Justice Block Grants** discussed at the NEJAC Public Meeting on November 29 - December 1, 2022. The funding proposed by the US EPA towards Environmental Justice Communities aligns with the mission of the California Strategic Growth Council: *To create healthy, thriving, and resilient communities for all*. SGC is highly supportive of the approach the US EPA is taking to ensure funding will be equitable in its implementation.

The SGC has developed what we see as an investment model for equitable, environmental justice focused community transformation. SGC grant and technical assistance programs, namely the Transformative Climate Communities (TCC) program, can provide a model with valuable insight on ways in which this type of restorative funding plays out in practice and could inform best practices for the US EPA's future efforts. We see the Environmental Justice Block Grants and TCC as being highly aligned.

The TCC Program funds community-led development and infrastructure projects that achieve significant environmental, health, and economic benefits in California's most disadvantaged communities. TCC empowers the communities most impacted by pollution to choose the strategies and projects best suited to achieve their community vision and enact transformational change – all with data-driven milestones and measurable outcomes. This unique, place-based strategy is designed to catalyze collective impact through an array of climate projects in a single neighborhood.

Funding communities to self-determine resource allocation through robust and equitable governance processes ensures context-sensitive solutions that may otherwise be missed through a one-size-fits-all funding approach. TCC's emphasis on community-driven place-based transformation brings a holistic view to achieving climate goals while uplifting environmentally and economically burdened communities. Since 2018, SGC has awarded over \$325 million in TCC implementation and planning grants to 33 communities through a competitive process. The collaborative nature of the TCC projects has already empowered community members to lead meaningful change in their own neighborhoods.



The TCC Program provides a tested and replicable model for public investment – a model that empowers frontline communities to choose their own goals, strategies, and projects to reduce greenhouse gas emissions and local air pollution burdens. The key elements that we believe have led to successful outcomes of the TCC program include the following:

- **Collaborative Governance** – As an inclusive model of decision-making, collaborative governance can reshape the power structures that have led to the historical and ongoing marginalization and exclusion of communities of color and low-income populations. In this way, collaborative governance can restore trust in government institutions and improve the ability of governments to enact policy and provide services that best improve outcomes and quality of life for all residents. A collaborative governance structure is essential for meaningful community engagement and accountability. To be effective while advancing equity, a joint governance structure must include significant and diverse representation, empower community members in the decision-making process, and include robust mechanisms for transparency, oversight, and accountability.
- **Multi-Benefit Projects at a Neighborhood Scale** – TCC empowers communities to design multi-benefit projects creating a variety of positive outcomes for diverse stakeholders. When focused on the neighborhood scale, multi-benefit projects can advance collaboration among stakeholders and facilitate innovative project funding opportunities that directly address community needs. Designing multi-benefit projects also supports the integration of infrastructure and ensures new improvements will meet community needs. TCC projects also must implement robust community engagement, workforce development, and displacement avoidance measures to ensure existing residents and small businesses directly benefit from the investment.
- **Catalytic Funding for Sustained, Equitable Reinvestment** – Leveraging philanthropic and private-sector dollars creates a more significant and longer-lasting impact from our climate investments. Directing leveraged funds to areas most in need ensures projects address rather than exacerbate existing inequities. TCC investments have also catalyzed additional investments to environmental justice communities, spurring on community reinvestment and revitalization beyond the initial grant investment.
- **Capacity Building** – A key element to the success of the TCC model is the focus on technical assistance and capacity building. To support diverse networks of partners within a community to self-determine and implement solutions at scale, it is critical that funders invest in the capacity of those organizations to do so. This ensures more successful and equitable project implementation, and the ability for partners to stay engaged to tackle future challenges, pursue additional funding, and sustain the collective momentum in the long-term.
- **Program Evaluation** – Investing in ongoing program evaluation and feedback loops helps the TCC program to meet internal and external program needs. To address the



CALIFORNIA STRATEGIC GROWTH COUNCIL

needs of internal and external stakeholders, an evaluation plan should support the successful project and program implementation, provide evidence of success, and serve as a model for future evaluation efforts. Evaluations also provide transparency and accountability to the original project goals and community needs, and they provide feedback for the program to adapt and improve in real-time.

With unprecedented funding for community-led environmental justice projects now available at the federal level, the TCC model and new Environmental Justice funding programs could be a powerful force multiplier for disadvantaged communities - by catalyzing local, multi-sector partnerships that leverage private and public funds to sustain community revitalization and equitable development into the future.

Finally, the SGC would like to share an observation on the proposed implementation timeframe. We are impressed by the US EPA's proposed structure for the various Environmental Justice Funding Programs to solve a very hard problem of a 3-year implementation timeframe. In our experience, the implementation funding timeframes are longer than the 3 years provided by the law; the climate resilience projects we fund require 5 to 6 years to develop and implement through a meaningful community process. We understand that this is part of the congressional requirement, but this may be a place to consider strategies for longer implementation timeframes to give communities the space to reach their intended outcomes.

Thank you for the opportunity to provide public comment, and thank you for your leadership in making meaningful progress towards environmental justice.

Sincerely,

A handwritten signature in black ink that reads "Lynn M. von Koch Liebert".

Lynn von-Koch Liebert
Executive Director
California Strategic Growth Council



December 14, 2022

Dr. Na'Taki Osborne Jelks
National Environmental Justice Advisory Council
US Environmental Protection Agency
1200 Pennsylvania Avenue NW
Washington, DC 20004

Dear Dr. Na'Taki Osborne Jelks,

Thank you for this opportunity to provide comments on equitable distribution of resources at EPA and prioritizing resources to address environmental impacts in frontline communities. We are particularly concerned about the impacts of biopesticides and genetically engineered animals on vulnerable communities and have recommendations for NEPA that we will discuss in the comments below.

Friends of the Earth is the U.S. voice of the world's largest network of grassroots environmental organizations, with groups in 74 countries. For more than 45 years, Friends of the Earth, along with our more than four million online supporters and members, has worked at the nexus of environmental protection, economic policy and social justice to fundamentally transform the way our country and the world value people and the environment. It is in this light that Friends of the Earth has been following the development of genetic engineering and pesticides, raising awareness about the environmental and health risks, and the need for more robust government oversight, assessment, and transparency related to genetically engineered (GE) organisms, specifically those involved in the agricultural and conservation sector.

Environmental Justice (EJ) impacts of biopesticides

Biopesticides, which are overseen by EPA's pesticide program, disproportionately impact Black, Indigenous and People of Color (BIPOC) and often low-income communities. Biopesticides include genetically engineered insects and nano-scale gene-silencing RNAi pesticides. Given the recent 2022 Executive Order on Biotechnology and Agriculture, it is important for the EPA to evaluate both the immediate potential risks from biopesticides like GE insects or RNAi pesticides to frontline communities, and to put in place mechanisms to evaluate long-term environmental and health impacts of environmental releases of biopesticides.

In 2022, EPA approved the release of up to 2 billion genetically engineered (GE) mosquitoes in California, which are currently proposed for Tulare County, CA, a majority Spanish speaking and



farmworker community in California's Central Valley. This county is rife with environmental contamination from high rates of pesticide exposure, health problems from air pollution and groundwater contamination.

This proposed project creates an environmental justice problem, by potentially adding to the already grave health and environmental problems. Although the company, Oxitec, claims that no female mosquitoes would survive, Oxitec's own data shows 1-3% would survive, and in the presence of commonly used tetracycline, the biting GE females will survive. GE mosquitoes may inject novel proteins into humans or animals, and Oxitec has yet to show that these novel proteins would have impacts, in particular, increased allergenicity. Additionally, in a previous experiment in Brazil, these mosquitoes were found to mate with wild mosquitoes and create a potentially more pesticide-resistant and more virulent hybrid mosquito. EPA did not adequately evaluate the potential environmental or public health risks for community members who will be exposed to an environmental release.

Testing out a biopesticide that has not been fully evaluated for environmental or health impacts exacerbates an inexcusable environmental justice problem.

EPA needs to consider the multitudes of environmental justice impacts that may result from the release and use of biopesticides. There should be funding for least toxic alternatives to GE insects. There are less risky, proven ways to control mosquito populations, such as with the Wolbachia mosquito, which is a mosquito infected with a bacteria called Wolbachia, which has been shown to make it harder for viruses like dengue to reproduce inside *Aedes aegypti* mosquitoes. Independent and peer reviewed studies have shown the Wolbachia mosquito to be safe for humans and the environment.

Friends of the Earth asks NEJAC to recommend that the EPA:

- Establish an independent committee of independent experts and stakeholders to review the proposal and consider the potential environmental, health and social impacts of the release of GE insects;
- Convene public meetings, specifically for the frontline communities, and solicit public comments;
- Develop specific regulations for genetically engineered insects as biopesticides before considering any application for their release

Gene-silencing pesticides

Similarly concerning are nano-encapsulated genetically engineered pesticides.



Agrichemical corporations such as Bayer, BASF, and Syngenta are using genetic modification techniques to develop pesticides that exploit a cellular process called RNA interference (RNAi), in order to switch off or “silence” genes that are essential for the survival of insects – thus killing them. However, RNAi technology is widely associated with off-target impacts, even within the genomes of target organisms. EPA is considering an EUP for this very risky and new biopesticide with significant public health and environmental dangers, and no appropriate personal protective equipment for exposed people who may inhale this potentially dangerous product.

There are several public health concerns related to inhalation that have not been thoroughly researched. Farmers, farmworkers, production workers and rural communities may be exposed to this biopesticide via the potential spray drift. The risks pertaining to inhalation exposure are completely unknown. Studies indicate that RNAi may remain active in mammals’ bodies and can silence genes. Studies have also shown that these particles can cause an immune reaction in the cells. Key questions around human health impacts must be fully investigated and should not be tested on already vulnerable farmworker populations.

Again, testing out a biopesticide that has not been fully evaluated for environmental or health impacts exacerbates an inexcusable environmental justice problem, and also perpetuates the problems of industrial agriculture which have created ecological and health disasters.

There is no regulatory framework for responsibly assessing gene silencing pesticides, and huge gaps exist in our understanding of their possible impacts. These biopesticides should also fall within the scope of government regulatory oversight of genetic engineering and GMOs, using the most robust level of the Precautionary Principle to protect human health and the environment. Oversight and regulations for interfering RNA applications should include independent, transparent health and environmental assessment, including examination of potential long-term impacts, before being allowed to enter the market or environment, and products of all genetic modification should be traceable, and labeled as GMOs.

GE animals

Lastly, I’d like to add to the concerns we’ve heard from my colleagues about the unjust environmental impacts from confined factory farming.

Genetically engineered animals are being developed by genetic engineering companies for a variety of proposed traits, most of which are to allow animals to withstand harsh conditions within industrial factory farms. Essentially, companies are trying to change the animal instead of fixing the problems associated with factory farming. The issue is that genetically engineered



mammals, poultry and fish may perpetuate the current problems with factory farming, including soil, air and water pollution in environmental justice communities near these operations.

GE animals could pose risks to consumers and the environment. Gene editing may cause abnormal protein production, which could result in new food allergies for people. Research has also shown that GE animals like the super-muscly cow can't utilize low-energy foods like grass as well as non-gene edited cows, and could require increased amounts of high-energy, polluting feed like GE corn and soy. Common gene editing traits, such as hornless cows and disease resistance, will perpetuate the poor animal management, such as crowding, often found in Concentrated Animal Feeding Operations (CAFOs). This will magnify the current ethical, health and welfare concerns for animals housed in CAFOs and could raise concerns for consumer safety.

The continued development and implementation of GE animals may exacerbate existing issues related to factory farming that surrounding communities face.

Friends of the Earth asks NEJAC to recommend that the EPA:

Evaluate the environmental and health impacts from genetically engineered animals using the Precautionary Principle to protect human health of frontline communities and consumers, and the local environment.

Thank you for your consideration of these comments.

Sincerely,
Malaika Elias
Friends of the Earth, Food and Agriculture Campaigner

The Yonkers Housing Authority (YHA) has worked with community solar through sustainable Westchester. Real estate developer Robert Martin has a property in Yonkers called the Southern Westchester Executive Park where they installed solar panels and through a relationship with sustainable Westchester and Groundwork Hudson Valley, YHA and its tenants are now the recipients of these solar benefits. This is a great model of collective community engagement with affordable housing, not-for-profits and local businesses.

The YHA is also working with The Community Builders (TCB) to build new affordable housing with solar panels at the Ridgeway development in Northwest Yonkers. The development is a six-phase replacement project of 500 of all affordable housing units. Phases 4 and 5 have solar panels. Phase 6 will have solar panels and be built to passive house environmental standards. If you have any questions about these successes or want to use them as models, please contact us.

Yonkers, New York is the third largest city in New York State with a population of over 200,000 people. It shares its border with New York City and has the dubious distinction of being the only City in America with a double desegregation order, housing and busing. The median income is \$35,000 and the city is majority minority, Hispanic and African American. It is also a melting pot with approximately 6.5 % Asian and many newly arrived immigrants from all over the world. The Municipal Housing Authority for the City of Yonkers (MHACY) own and or manages over 1700 units and administers over 5000 section 8 vouchers making it the fourth largest housing authority in New York State. MHACY properties spread across approximately 60 acres throughout Yonkers, ranging from high rise to townhomes.

Groundwork Hudson Valley is working with the Municipal Housing Authority for the City of Yonkers to address Climate change/climate resiliency at the City's municipal housing sites. Groundwork Hudson Valley and the MHACY received funds from New York State environmental facilities corporation which was leveraged to get more grant funds from the Bezos Earth Fund and Bank of America for the purpose of addressing climate resiliency at 10 of the MHACY's 17 sites.

Flooding, although not in flood zones, heat island effect and other issues have been documented and studied by Groundworks through grants from NOAA. The heat differential from the east side of Yonkers to the west side is two degrees. Southwest Yonkers has traditionally been the area where indigent families reside and the neighborhoods that are generally hotter. Groundwork was able to lay a heat map over the traditionally redlined areas and document the correlation between heat island effect and redlining. Together Groundwork and MHACY have spoken nationally at housing conferences and parks conferences on the connection between heat, health, and standardized test scores. They have also spoken about white roofs, bioswales, rain gardens and tree canopies to mitigate heat island effect and address Environmental Justice (EJ).

We have been asking anyone who is interested to reach out to us so that we may provide them with a model of what teamwork among community partners can achieve in areas with climate resiliency and EJ. As of now, we have partnered with Mayor Mike Spano, Iona University, workforce development (the green team, comprised of MHACY residents), the business council of Westchester community college and others. We urge any and everyone to please reach out to us.

Marcie Ciuffetelli



December 14, 2022

Paula Flores-Gregg, NEJAC Designated Federal Officer
Environmental Protection Agency
National Environmental Justice Advisory Council
1200 Pennsylvania Avenue, N.W.
Washington, D.C. 20460

Submitted via email to nejac@epa.gov

RE: Public Comments on NEJAC November-December Public Meeting, Docket No. EPA-HQ-OA-2022-0053

Dear Ms. Flores-Gregg:

The Center for Biological Diversity welcomes the opportunity to provide comment on environmental justice considerations the National Environmental Justice Advisory Council (“NEJAC”) should advise the Environmental Protection Agency (“EPA”) to consider, particularly in its evaluation of permits and funding for fossil fuel and false solutions projects and infrastructure. At a fundamental level, the vast majority of—if not *all*—permitting of new fossil fuel and false solutions projects and infrastructure undermine environmental justice and disproportionately harm Black, Brown, Indigenous, and low-income communities, perpetuating the systemic racism and energy violence that is entrenched in our nation’s energy system.

It is well-established that the unequal siting of dirty fossil fuel and related false solutions infrastructure and its resulting pollution has led to disproportionate and serious health harms, particularly to communities of color.¹ For example, Black people in the U.S. have 1.54 times the exposure to particulate matter compared to the overall population, while populations of color have 1.28 times higher burden than the general population.² Further, many new fossil fuel and false solutions infrastructure projects cross or are planned to cross Indigenous lands and waters and harm resources and access that Tribes depend on to exercise rights to fish, hunter, gather, and engage in other subsistence and cultural activities. These projects have proceeded without the federal government’s full consideration of the impacts to these communities, and often without the full, robust public involvement and participation of those disproportionately affected.

Thus, we recommend that NEJAC:

- **prohibit permitting or federal investment in projects known to cause disproportionate environmental impacts, such as carbon capture and storage projects;**

¹ Tim Donaghy & Charlie Jiang, Greenpeace, Gulf Coast Center for Law & Policy, Red, Black & Green Movement, and Movement for Black Lives, *Fossil Fuel Racism* (2021).

² *Id.*

- **at the very least, require robust public involvement and participation in decisions that impact environmental justice communities;**
- **require consideration of the disproportionate impacts various technologies and projects have on environmental justice communities and provide solutions to those adverse impacts;**
- **advise EPA to formally require an evaluation and consideration of environmental justice and cumulative impacts when reviewing any Class VI permit;**
- **oppose the push for states to get primacy over permitting Class VI wells, as this will only speed up permit applications and create an end-run around community input and enviro justice/cumulative impacts considerations;**
- **make clear that in many circumstances, environmental justice impacts should be a disqualifying factor for projects to proceed.**

Below we detail many of the numerous, well-documented adverse impacts of energy projects on environmental justice communities which NEJAC must require EPA to evaluate and take into consideration.

Oil and Gas Development

Low-income communities and communities of color have suffered disproportionately from the adverse health impacts of oil and gas development. In California, of the population living within one mile of oil and gas development and in communities identified as most vulnerable, nearly 92 percent are people of color (69 percent Hispanic/Latino, 10 percent African American, 11 percent Asian, and 2 percent other).³ There are numerous feasible mitigation measures for air pollution from oil and gas production that NEJAC should recommend EPA consider. For example, when permitting or funding oil and gas projects, EPA should “[f]und environmental monitoring located inside communities exposed to pollution, along with funds for compliance enforcement.”⁴ Real-time, continuous fence line and community air monitoring of air pollutants would help mitigate environmental justice impacts by providing sorely needed data on the existing pollution burdens in vulnerable communities.⁵ This data would allow state regulators to better understand the impacts of oil and gas development on communities and, in turn, to better protect environmental justice communities from excessive environmental degradation and extreme health risks. Moreover, empirical evidence from existing monitoring programs shows that monitored facilities are more likely to reduce pollution.

Further, pollution from compressed and liquified gas is extremely harmful to human health, and environmental justice communities bear the brunt of this burden. Every stage of the fossil fuel life cycle—extraction, processing, transport, and combustion—generates hazardous

³ Natural Resources Defense Council, *Drilling in California: Who’s at risk?* (Oct. 2014).

⁴ White House Environmental Justice Advisory Council, *Final Recommendations: Justice40, Climate and Economic Justice Screening Tool and Executive Order 12898 Revisions*, at 38, EPA (May 21, 2021), <https://www.epa.gov/environmentaljustice/white-house-environmental-justice-advisory-council-finalrecommendations>.

⁵ EDF, *Filling the Void: The Value of New Technology to Reduce Air Pollution and Improve Information at Oil and Gas Sites in California* (2017), at 27.

and criteria air pollutants, including known cancer-causing chemicals like benzene and formaldehyde; ozone-forming chemicals like nitrogen oxides, volatile organic compounds, and methane; and particulate matter including black carbon and silica dust that can cause lung and heart disease.⁶ Research shows that people exposed to fossil fuel pollution have a higher risk for developing cancer,⁷ increased asthma attacks,⁸ higher hospitalization rates,⁹ more upper respiratory problems and rashes,¹⁰ birth defects,¹¹ premature births and high-risk pregnancies,¹² and low-birthweight babies.¹³ The fine particulate pollution from fossil fuel combustion causes one in five premature deaths worldwide, including 355,000 premature deaths in the U.S. in 2018.¹⁴ Reliance on fossil fuels, including natural gas must be eliminated. **NEJAC should recommend that EPA eliminate investment and reject permit applications for projects that perpetuate these health harms nationwide, but especially in disproportionately affected communities.**

Carbon Capture and Storage (“CCS”)/Carbon Capture, Utilization and Storage (“CCUS”)

Many environmental justice communities oppose false climate solutions like CCS/CCUS due to inevitable leaks and the consequent adverse health impacts. Vocal opponents include the White House Environmental Justice Advisory Council (“WHEJAC”), more than 500 organizations and the 1,500-group Climate Action Network.¹⁵ The Black, Brown and Indigenous

⁶ Diane A. Garcia-Gonzalez et al., *Hazardous Air Pollutants Associated with Upstream Oil and Natural Gas Development: A Critical Synthesis of Current Peer-Reviewed Literature*, 40 ANNUAL REVIEW OF PUBLIC HEALTH 283 (2019), <https://www.annualreviews.org/doi/10.1146/annurevpublhealth-040218-043715>; Jill E. Johnston et al., *Impact of Upstream Oil Extraction and Environmental Public Health: A Review of the Evidence*, 657 SCI. TOTAL ENV'T 187 (2019), <https://pubmed.ncbi.nlm.nih.gov/30537580/>; Concerned Health Professionals of New York & Physicians for Social Responsibility, *Compendium of Scientific, Medical, and Media Findings Demonstrating Risks and Harms of Fracking (Unconventional Gas and Oil Extraction) (7th ed.)* (2020), <http://concernedhealthny.org/compendium/>.

⁷ Lisa M. McKenzie et al., *Ambient Nonmethane Hydrocarbon Levels Along Colorado's Northern Front Range: Acute and Chronic Health Risks*, 52 ENV'T SCI. AND TECH. 4514 (2018), <https://pubs.acs.org/doi/10.1021/acs.est.7b05983>.

⁸ Sara G. Rasmussen, *Association Between Unconventional Natural Gas Development in the Marcellus Shale and Asthma Exacerbations*, 176 JAMA INTERNAL MEDICINE 1334 (2016), <https://jamanetwork.com/journals/jamainternalmedicine/fullarticle/2534153>.

⁹ Thomas Jemielita et al., *Unconventional Gas and Oil Drilling Is Associated with Increased Hospital Utilization Rates*, 10 PLOS ONE 7 (2015), available at: <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0131093>

¹⁰ Peter M. Rabinowitz et al., *Proximity to Natural Gas Wells and Reported Health Status: Results of a Household Survey in Washington County, Pennsylvania*, 123 ENV'T HEALTH PERSP. 21 (2015), <https://pubmed.ncbi.nlm.nih.gov/25204871/>.

¹¹ Lisa M. McKenzie, *Birth Outcomes and Maternal Residential Proximity to Natural Gas Development in Rural Colorado*, 122 ENV'T HEALTH PERSP. 412 (2014), <https://pubmed.ncbi.nlm.nih.gov/24474681/>.

¹² Joan A. Casey, *Unconventional Natural Gas Development and Birth Outcomes in Pennsylvania, USA*, 27 EPIDEMIOLOGY 163 (2016), <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4738074/>.

¹³ Shaina L. Stacy et al., *Perinatal Outcomes and Unconventional Natural Gas Operations in Southwest* (2015), <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0126425>.

¹⁴ Karn Vohra et al., *Global Mortality from Outdoor Fine Particle Pollution Generated by Fossil Fuel Combustion: Results from GEOS-Chem*, 195 ENV'T RESEARCH 110754 (2021), <https://www.sciencedirect.com/science/article/abs/pii/S0013935121000487>.

¹⁵ See White House Env'tl. Justice Advisory Council, *Justice40 Climate and Economic Justice Screening Tool & Executive Order 12898 Revisions: Interim Final Recommendations* (May 13, 2021), [3](https://legacy-</p></div><div data-bbox=)

communities already suffering disproportionate and deadly dangers from the industries are targeted for CCS development, particularly along the U.S. Gulf Coast, and through wetlands and neighborhoods in Louisiana’s petrochemical corridor known as “Cancer Alley,” as well as in the northern plains and California’s Central Valley.

Further, transporting and storing CO₂ involves a massive network of perilous pipelines connected to underground injection sites, which have been known to leak and rupture. Compressed CO₂ is highly hazardous upon release, forming a cold, dense cloud that sinks to the ground and can sicken and asphyxiate humans and animals.¹⁶ Health harms from CO₂ leaks include extreme disorientation, unconsciousness, and seizures. In February 2020, 300 people were evacuated and 45 people hospitalized when a CO₂ pipeline ruptured in rural Yazoo County, Mississippi.¹⁷ Since CO₂ is odorless and colorless, community members were unaware of the harmful leak until it was too late. Dense clouds of CO₂ prevented vehicles from operating, making it hard for people to evacuate and blocking emergency vehicles.

Underground CO₂ storage poses even more risks of leakage, contaminating drinking water and triggering earthquakes.¹⁸ And because toxic chemicals like lye and ammonia are often used to “capture” carbon, megatons of these dangerous chemicals must be produced, transported, handled, and eventually dumped to operate CCS at scale.¹⁹ All of this creates massive hazardous chemical risks for workers and nearby communities.

Further, it is unavoidable that stored CO₂ will escape back into the atmosphere through abandoned oil and gas wells, well failures, earthquakes, and other pathways.²⁰ Even small leakage rates can lead to large releases of CO₂.²¹ Also, CO₂ has unique fracture potential, and releases can result in very violent ruptures with the “unzipping” of a pipeline over long distances.²² Compounding the problem, current U.S. regulations do not require permanent storage of injected CO₂ underground. For CCS to qualify for government subsidies, federal

assets.eenews.net/open_files/assets/2021/05/17/document_ew_01.pdf; Ctr. for Int’l Envtl. Law, *Over 500 Organizations Call on Policymakers to Reject Carbon Capture and Storage as a False Solution* (July 19, 2021) <https://www.ciel.org/organizations-demand-policymakers-reject-carbon-capture-and-storage/>.

¹⁶ See Dan Zegart, *The Gassing of Satartia: A CO₂ Pipeline in Mississippi Ruptured Last Year, Sickening Dozens of People. What does it Forecast for the Massive Proposed Buildout of Pipelines Across the U.S.?*, HUFFINGTON POST (Aug. 26, 2021) available at https://www.huffpost.com/entry/gassing-satartia-mississippi-co2-pipeline_n_60ddea9fe4b0ddef8b0ddc8f.

¹⁷ *Id.*

¹⁸ Stanford Report, *Carbon Capture and Storage Likely to Cause Earthquakes, Say Stanford Researchers*, (Jun. 19, 2012), <https://news.stanford.edu/news/2012/june/carbon-capture-earthquakes-061912.html>.

¹⁹ Physicians for Social Responsibility Los Angeles, *Danger Ahead: The Public Health Disaster That Awaits from Carbon Capture and Sequestration*, (Feb. 10, 2022), <https://www.psr-la.org/danger-ahead-the-public-health-disaster-that-awaits-from-carbon-capture-and-sequestration-ccs/>.

²⁰ Zoback et al., *Earthquake Triggering and Large-Scale Geologic Storage of Carbon Dioxide*, 109 PNAS 10164 (2012), <https://doi.org/10.1073/pnas.1202473109>.

²¹ A. Vinca et al., *Bearing the Cost of Stored Carbon Leakage*, 6 FRONTIERS IN ENERGY RESEARCH (2018), <https://doi.org/10.3389/fenrg.2018.00040>.

²² A.B. Kuprewicz, *Accufacts’ Perspectives on the State of Federal Carbon Dioxide Transmission Pipeline Safety Regulations as it Relates to Carbon Capture, Utilization, and Sequestration within the U.S.*, Pipeline Safety Trust (2022), <https://pstrust.org/wp-content/uploads/2022/03/3-23-22-Final-Accufacts-CO2-Pipeline-Report2.pdf>.

regulations require storage of CO₂ for only 50 years.²³

We recommend that NEJAC adopt the WHEJAC’s strong opposition to this false solution technology, and its assertion that CCS/CCUS will not benefit communities.²⁴ We additionally recommend that NEJAC should go further and require that EPA suspend its investments in and the development of CCS/CCUS projects.

Biomass/Bioenergy

Low-income communities and communities of color suffer from biomass projects, another false climate solution. Bioenergy facilities and wood pellet factories are significant sources of toxic pollutants, harming the vulnerable communities where they are located and worsening environmental injustice. Biomass power plants are among the biggest emitters of particulate matter and NO_x, and a significant source of carbon monoxide, sulfur dioxide, lead, mercury, benzene, formaldehyde, arsenic and other hazardous air pollutants that harm public health.²⁵ Similarly wood pellet production facilities emit high levels of particulate matter and VOC pollutants.²⁶ Fine particulate matter (PM 2.5)—which can get deep into the lungs and even enter the bloodstream—is linked to serious health problems including heart disease, premature death, stroke, and aggravated asthma.²⁷

We support WHEJAC’s contention that biomass incineration will not benefit communities, and recommend that NEJAC adopt this position.²⁸ NEJAC should also advise EPA that biomass is not carbon negative and leads to dangerous air pollution. We also recommend that NEJAC require that EPA acknowledge these risks and make no further federal investment in these hazardous projects.

Transportation and Freight Industries

People of color and low-income residents have also historically borne the brunt of transportation and freight pollution, as they are more likely to live near roads with high volumes

²³ A. Vinca et al., *Bearing the Cost of Stored Carbon Leakage*, 6 FRONTIERS IN ENERGY RESEARCH (2018), <https://doi.org/10.3389/fenrg.2018.00040>.

²⁴ White House Environmental Justice Advisory Council, *Final Recommendations: Justice40, Climate and Economic Justice Screening Tool and Executive Order 12898 Revisions*, at 59, EPA (May 21, 2021), <https://www.epa.gov/environmentaljustice/white-house-environmental-justice-advisory-council-finalrecommendations>.

²⁵ Partnership for Policy Integrity, *Air pollution from Biomass Energy*, (updated Apr. 2011), <https://www.pfpi.net/wp-content/uploads/2011/04/PFPI-air-pollution-and-biomass-April-2011.pdf>.

²⁶ See, e.g., *Dirty Deception: How the Wood Biomass Industry Skirts the Clean Air Act*, <https://www.environmentalintegrity.org/wp-content/uploads/2017/02/Biomass-Report.pdf>.

²⁷ EPA, *Health and Environmental Effects of Particulate Matter*, <https://www.epa.gov/pm-pollution/health-and-environmental-effects-particulate-matter-pm>.

²⁸ White House Environmental Justice Advisory Council, *Final Recommendations: Justice40, Climate and Economic Justice Screening Tool and Executive Order 12898 Revisions*, at 59, EPA (May 21, 2021), <https://www.epa.gov/environmentaljustice/white-house-environmental-justice-advisory-council-finalrecommendations>.

of traffic.²⁹ For roads with the highest volumes of traffic, the non-white population living within 200-300 meters of the road averages 65.3 percent. Children in these communities attend schools within proximity of major roadways, too. In major metropolitan areas, approximately 30 percent of public schools are located within 300 meters of a major roadway and have significantly higher populations of students of color.³⁰ Students of color are therefore exposed to high levels of respiratory risks and other effects of frequent exposure to toxic air pollutants, including, but not limited to, neurobehavioral health problems, DNA damage, autism, and poor academic performance.³¹ The U.S. Center for Disease Control confirms these findings and adds that there is a causal relationship between exposure to traffic-related air pollution and morbidity and mortality.³² People of color and low-income populations share a disproportionate burden of exposure and risk from traffic-related air pollution and the health risks from that exposure.³³

We thus recommend that NEJAC require EPA, to “electrify fleets of school buses and sanitation trucks and other public vehicles” as they are some of the most polluting vehicles.³⁴ Additionally, we recommend that NEJAC support federal and EPA zero emission vehicle initiatives to reduce pollution from combustion engines utilized by the government.

Low-income communities additionally face several challenges in accessing charging infrastructure for electric vehicles (“EV”). First, most EV users rely on the convenience of home charging to fill 80 percent of their charging needs, but because a high share of residents in low-income communities are renters in multi-unit dwellings (“MUD”), many do not have reliable access to EV chargers at their homes.³⁵ Many MUD residents have shared parking spaces or no dedicated parking at all. Further, building owners often do not have an incentive to install charging equipment because they often see little or no return on those investments.³⁶ Second, the proportion of MUD residents in low-income communities often correlates with underlying racial and economic inequities that hinder EV access. For example, the average income of residents of MUDs with three or more units is over \$19,000 lower than the national average.³⁷ And a higher percentage of Black (58 percent) and Latinx households are renters (58 percent and 52 percent,

²⁹ Gregory Rowangould, *A Census of the U.S. Near-Roadway Population: Public Health and Environmental Justice Considerations* (2014), *Transportation Research Part D: Transport and Environment*, 59-60, <https://www.sciencedirect.com/science/article/abs/pii/S1361920913001107>.

³⁰ Kweon et al., *Proximity of Public Schools to Major Highways and Industrial Facilities, and Students’ School Performance and Health Hazards* (2018), at 314-315, <https://journals.sagepub.com/doi/abs/10.1177/0265813516673060>.

³¹ *Id.* at 315-316; 326.

³² Boehmer et al., *Residential Proximity to Major Highways — United States CDC Report* (2013), 62 *MMWR SUPP.* at 46, <https://journals.sagepub.com/doi/abs/10.1177/0265813516673060>.

³³ *Id.*

³⁴ White House Environmental Justice Advisory Council, *Final Recommendations: Justice40, Climate and Economic Justice Screening Tool and Executive Order 12898 Revisions*, at 20, EPA (May 21, 2021), <https://www.epa.gov/environmentaljustice/white-house-environmental-justice-advisory-council-finalrecommendations>.

³⁵ Union of Concerned Scientists, *Fact Sheet: Federal Support for EV Charging: Policies for Rapid, Equitable Investments* (2021) at 4, https://www.ucsusa.org/sites/default/files/2021-03/federal-ev-charging-policy_1.pdf.

³⁶ Sara Baldwin et al., *Energy Innovation, Increasing Electric Vehicle Charging Access at Multi-Unit Dwellings: Workshop Summary Report*, (2020), <https://energyinnovation.org/wp-content/uploads/2020/09/Increasing-Electric-Vehicle-Charging-at-Multi-Unit-Dwellings.pdf>.

³⁷ U.S. Census Bureau, *2019 American Housing Survey*, <https://www.census.gov/programs-surveys/ahs.html>.

respectively), compared with white households (28 percent).³⁸ EV charging access is thus deeply entwined with historical racial and economic barriers faced by low-income and communities of color and **NEJAC must address this by recommending more charging stations in low-income communities, including MUDs that receive federal funding.**

Electricity Sector

There are numerous problems with the U.S. electricity sector, and all these problems disproportionately harm environmental justice communities. Therefore, NEJAC must recommend EPA prioritize the advancement of distributed energy resources (“DER”) initiatives, including addressing some of the major issues with the U.S.’s electricity sector, as outlined below.

First, environmental justice communities are most often served by monopoly electric utilities with long histories of harming these communities, through their polluting facilities, unreliable service, shutoff policies, and climate-harming emissions.³⁹ Second, the burden of the pollution associated with the U.S.’s fossil fuel-dominated energy system falls disproportionately on communities of color and low-income communities. Fossil fuel infrastructure, including oil and gas wells, refineries, fossil fuel power plants, and processing, transmission and storage facilities, is often concentrated in communities of color and low-income communities.⁴⁰ As a result, pollution from these facilities disproportionately impacts Black, Latinx, Indigenous, Asian, and low-income communities.⁴¹ Research shows that people of color, particularly Black Americans, disproportionately live near toxic fracking wells, and that the share of people of color living within three miles (five kilometers) of a coal- or oil-fired power plant is 12 percent larger than the national average.⁴²

³⁸ Drew Desilver, *As National Eviction Ban Expires, A Look at Who Rents and Who Owns in the U.S.*, Pew Research Center (2021), <https://www.pewresearch.org/fact-tank/2021/08/02/as-national-eviction-ban-expires-a-look-at-who-rents-and-who-owns-in-the-u-s/>.

³⁹ Jean Su, *Climate, Environmental, and Energy Justice: Integrating Justice into Electricity System Design and Decision-Making*, Advancing Equity in Utility Regulation, Lawrence Berkeley Nat’l Laboratory (2021), https://eta-publications.lbl.gov/sites/default/files/feur_12_-_advancing_equity_in_utility_regulation.pdf.

⁴⁰ See Robert D. Bullard, et al., *Toxic Wastes and Race at Twenty: 1987-2007*, (Mar. 2007), <http://www.ejnet.org/ej/twart.pdf>; Adrian Wilson et al., *Coal Blooded: Putting Profits Before People*, Nat’l Assoc. for the Advancement of Colored People, Indigenous Environmental Network & Little Village Environmental Justice Organization (2012), <https://naacp.org/resources/coal-blooded-putting-profits-people>; EPA, *EJ Screening Report for the Clean Power Plan*, (Jul. 30, 2015), <https://archive.epa.gov/epa/sites/production/files/2016-04/documents/ejscreencpp.pdf>; Emanuele Massetti et al., *Environmental Quality and the U.S. Power Sector: Air Quality, Water Quality, Land Use and Environmental Justice*, Oak Ridge Nat’l Lab (Jan. 4 2017), <https://info.ornl.gov/sites/publications/files/Pub60561.pdf>; PSE Healthy Energy, *Natural Gas Power Plants In California’s Disadvantaged Communities*, (Apr. 2017), https://www.psehealthyenergy.org/wp-content/uploads/2017/04/CA.EJ_Gas_Plants.pdf.

⁴¹ Jean Su, *Climate, Environmental, and Energy Justice: Integrating Justice into Electricity System Design and Decision-Making*, Advancing Equity in Utility Regulation, Future Electric Utility Regulation, Report No. 12, Chpt. 4 (Lisa Schwartz, ed.) (Nov. 2021).

⁴² Klara Zwickl, *The Demographics of Fracking: A Spatial Analysis for Four U.S. States*, 161 ECOLOGICAL ECON. 202 (Jul. 2019), <https://www.sciencedirect.com/science/article/abs/pii/S092180091830661X>; Emanuele Massetti et al., *Environmental Quality and the U.S. Power Sector: Air Quality, Water Quality, Land Use and Environmental*

Third, the U.S. grid is particularly vulnerable to service disruptions because it depends on long-distance, high-voltage (“HV”) transmission lines carrying electricity from large, centralized generation sources to HV transformers. Because the grid is so centralized, damage at a small number of points can cause power outages for large numbers of residents. Particularly during extreme weather events, lack of electricity can be a matter of life and death. Lack of access to air conditioning during heat waves or heat during winter storms, or the inability to run medical equipment or refrigerate medication can be life-threatening, and elderly, young, disabled, and low-income residents are the most vulnerable to these impacts.

Fourth, historically, investments in energy infrastructure have adopted a market-driven, trickle-down approach that favors investor-owned electric utilities as well as wealthy, white communities. Facially neutral policies and rate structures are felt inequitably by households of color. Black and Latinx families on average bear quadruple the energy burdens of white families, with some Black households in the South bearing energy burdens as much as 40 percent of their total income.⁴³ These same households are also more likely to live in older and poorer quality housing stock that is less energy-efficient and more costly to cool and heat.⁴⁴ These inequities are a product of systemic racist policies, like racial residential segregation, that seek to exclusively concentrate welfare, prosperity, and political capital within wealthy and white communities.

Finally, the energy insecurity that stems from these burdens can result in cycles of poverty and social disruption. Accumulating arrearages can make it difficult to obtain loans, insurance, and employment.⁴⁵ Electricity shutoffs can render homes uninhabitable and lead to evictions or unhoused conditions, which in turn can increase the risk of family separation, and even lead to incarceration as unhoused individuals are increasingly criminalized.⁴⁶ Prioritizing equitably deployed DERs, like distributed solar, energy efficiency, demand response, and building electrification can help to redress many of these issues. Overall, DERs can achieve several environmental and community benefits, including clean energy job creation; improvements to public health including decreased air and groundwater pollution; lower costs

Justice, Oak Ridge Nat’l Lab (Jan. 4 2017), <https://info.ornl.gov/sites/publications/files/Pub60561.pdf>; Emanuele Massetti et al., *Environmental Quality and the U.S. Power Sector: Air Quality, Water Quality, Land Use and Environmental Justice*, Oak Ridge Nat’l Lab (Jan. 4, 2017), <https://info.ornl.gov/sites/publications/files/Pub60561.pdf>.

⁴³ Shuchen Cong et al., *Unveiling Hidden Energy Poverty Using the Energy Equity Gap*, 13 NATURE COMM. 2456 (May 4, 2022), <https://www.nature.com/articles/s41467-022-30146-5>.

⁴⁴ Jamal Lewis et al., *Energy Efficiency as Energy Justice: Addressing Racial Inequities Through Investments in People and Places*, 13 ENERGY EFFICIENCY 419, (2020), <https://doi.org/10.1007%2Fs12053-019-09820-z>; Eva Lyubich, *The Race Gap in Residential Energy Expenditures*, Energy Inst. at Haas (June 2020), <https://haas.berkeley.edu/wp-content/uploads/WP306.pdf>; Brad Plumer & Nadja Popovich, *How Decades of Racist Housing Policy Left Neighborhoods Sweltering*, N.Y. TIMES, (Aug. 24, 2020), <https://www.nytimes.com/interactive/2020/08/24/climate/racism-redlining-cities-global-warming.html>.

⁴⁵ Jamal Lewis et al., *Energy Efficiency as Energy Justice: Addressing Racial Inequities Through Investments in People and Places*, 13 ENERGY EFFICIENCY 419, (2020), <https://doi.org/10.1007%2Fs12053-019-09820-z>.

⁴⁶ Jean Su, *Climate, Environmental, and Energy Justice: Integrating Justice into Electricity System Design and Decision-Making*, Advancing Equity in Utility Regulation, Future Electric Utility Regulation, Report No. 12, Chpt. 4 (Lisa Schwartz, ed.) (Nov. 2021); see H.R. 1364, 117th Cong. (2022), <https://www.congress.gov/bill/117th-congress/house-resolution/1364>.

for electricity; and provide resilient backup power in emergencies.⁴⁷

NEJAC must recommend that disadvantaged, energy poor communities are first in line to benefit from investments into renewable and resilient energy technology and infrastructure. Also, NEJAC must recommend that EPA prioritize funding that incorporates strategies to equitably deploy building energy efficiency, demand response, and electrification measures in environmental justice communities.

Climate Change

Climate change is a threat to our entire population, but historically socially and economically disadvantaged communities face the greatest risks because of where they live, their health, income, language barriers, and limited access to resources. These more vulnerable communities are largely communities of color, immigrants, low-income communities and people for whom English is not their native language. Climate change poses particularly severe threats to such environmental justice communities, who are on the frontlines of the climate emergency, and disproportionately bear the burden of utilities' and other corporations' failure to sufficiently account for and address climate change-related risks.⁴⁸ NEJAC should recommend that EPA make addressing the climate crisis and the urgent need to equitably transition away from fossil fuels a priority.

Environmental justice communities are particularly vulnerable to the effects and impacts of climate change, such as heat, extreme weather events, poor air quality, other pollution, and poor sanitation. For example, warming temperatures and more intense and frequent heat waves disproportionately affect disadvantaged environmental justice communities. While higher temperatures generally lead to more deaths and illness, hospital and emergency room visits, and birth defects, and extreme heat can cause heat cramps, heat stroke, heat exhaustion, hyperthermia, and dehydration, disproportionate health impacts already felt by environmental

⁴⁷ Jean Su, *Climate, Environmental, and Energy Justice: Integrating Justice into Electricity System Design and Decision-Making*, in *Advancing Equity in Utility Regulation*, Lawrence Berkeley National Laboratory (2021), https://eta-publications.lbl.gov/sites/default/files/feur_12_-_advancing_equity_in_utility_regulation.pdf; Sherry Stout et al., Nat'l Renewable Energy Laboratory, *Distributed Energy Planning for Climate Resilience* (2018), <https://www.nrel.gov/docs/fy18osti/71310.pdf>; *How Distributed Energy Resources Can Improve Resilience in Public Buildings: Three Case Studies and a Step-by-Step Guide*, Department of Energy (2019), <https://www.energy.gov/sites/prod/files/2019/09/f66/distributed-energy-resilience-public-buildings.pdf>.

⁴⁷ Bailey Damiani, *Small-Scale Solar Installations Create 10-Times More Jobs per Megawatt than Utility-Scale Solar*, *Freeing Energy* (Sept. 8, 2021); The Solar Foundation, *National Solar Jobs Census*, <https://www.thesolarfoundation.org/national/>; U.S. Bureau of Labor Statistics, *Occupational Outlook Handbook: Solar Photovoltaic Installers*, <https://www.bls.gov/ooh/construction-and-extraction/solar-photovoltaicinstallers.htm#tab-6>; Bailey Damiani, *Small-Scale Solar Installations Create 10-Times More Jobs per Megawatt than Utility-Scale Solar*, *Freeing Energy* (Sept. 8, 2021); The Solar Foundation, *National Solar Jobs Census*, <https://www.thesolarfoundation.org/national/>; U.S. Bureau of Labor Statistics, *Occupational Outlook Handbook: Solar Photovoltaic Installers*, <https://www.bls.gov/ooh/construction-and-extraction/solar-photovoltaicinstallers.htm#tab-6>.

⁴⁸ See, e.g., Carina J. Gronlund, *Racial and Socioeconomic Disparities in Heat-Related Health Effects and Their Mechanisms: A Review*, 1 *CURR. EPIDEMIOL. REP.* 165 (2014), <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4264980/>; R. Dean Hardy, Richard A. Milligan & Nik Heynen, *Injustice of Colorblind Adaptation Planning for Sea-Level Rise*, 87 *GEOFORUM*, 62 (2017), <https://www.sciencedirect.com/science/article/pii/S0016718517302944>; Nat'l Assoc. for the Advancement of Colored People, *Environmental and Climate Justice*, <https://www.naacp.org/issues/environmental-justice/>.

justice communities are exacerbated by extreme heat events. Many disadvantaged communities have higher rates of health conditions such as heart disease, diabetes, asthma, and chronic obstructive pulmonary disease, which are exacerbated by heat stress. Heat stress can also worsen heart disease and diabetes, and warming temperatures result in more pollen and smog, which can worsen asthma and chronic obstructive pulmonary disease. Furthermore, disadvantaged environmental justice communities often lack access to good medical care and health insurance. Further exacerbating extreme heat events, low-income areas in cities have been found to be five to 12 degrees hotter than higher income neighborhoods because they have fewer trees and parks, and more asphalt that retains heat.

The increase in frequency and intensity of extreme weather events also disproportionately affects environmental justice communities. These communities may be particularly at risk because of their locations with lower-quality housing and old infrastructure that is more vulnerable to power outages, water issues and damage during extreme weather events. Environmental justice communities, particularly communities of color, are also less likely to receive adequate resources to protect against disasters or prompt emergency responses and aid. The additional stress and anxiety that accompanies the impacts of extreme weather also exacerbates mental health problems among such communities.

Climate change can also worsen air quality, already degraded in many environmental justice communities because of fossil fuel burning. Extreme heat events cause air to remain stagnant and prevent pollution from moving away or dissipating, leading to the creation of smog. Similarly, wildfires fueled by heat waves and drought produce toxic smoke which can linger in such communities exacerbating existing health impacts. Additionally, more people of color live in places that are polluted with toxic waste, which is no coincidence. Project developers often site landfills, chemical plants, bus terminals and other dirty businesses like fossil fuel projects in communities of color and environmental justice communities.

Fundamentally, the link between climate change and environmental justice is a product of racism in the U.S. For example, redlining practices created communities of historical neglect and racism, what are now environmental justice communities. **NEJAC must require EPA to acknowledge and consider the history of injustice faced by these disadvantaged and disproportionately affected communities, which are now the environmental justice communities continually being sacrificed for fossil fuel development.**

Conclusion

We appreciate the opportunity to submit these comments and look forward to NEJAC's continued efforts on these important matters. Please do not hesitate to reach out to us if there is any additional information we can provide at this time.

Respectfully submitted,

/s/ Maggie Coulter

Margaret A. Coulter

mcoulter@biologicaldiversity.org

Senior Attorney, Climate Law Institute

Center for Biological Diversity

1411 K Street N.W., Suite 1300

Washington, D.C. 20005

Full Name (First and Last): María

Name of Organization or Community: Cassell

City and State: San José Ca

Type of Comment: Written Comment Only

Brief description about the concern: Lead contamination coming from the single piston airplanes flying over our homes as a result pilots flying in and out of Reid Hillview Airport.

What do you want the NEJAC to advise EPA to do? : I would like the EPA to find an endangerment finding at this airport and to help this community get an early closure of this nuisance airport.

The Yonkers Housing Authority (YHA) has worked with community solar through sustainable Westchester. Real estate developer Robert Martin has a property in Yonkers called the Southern Westchester Executive Park where they installed solar panels and through a relationship with sustainable Westchester and Groundwork Hudson Valley, YHA and its tenants are now the recipients of these solar benefits. This is a great model of collective community engagement with affordable housing, not-for-profits and local businesses. The YHA is also working with The Community Builders (TCB) to build new affordable housing with solar panels at the Ridgeway development in Northwest Yonkers. The development is a six-phase replacement project of 500 of all affordable housing units. Phases 4 and 5 have solar panels. Phase 6 will have solar panels and be built to passive house environmental standards. If you have any questions about these successes or want to use them as models, please contact us.

Regards, Mary Lyras

Yonkers, New York is the third largest city in New York State with a population of over 200,000 people. It shares its border with New York City and has the dubious distinction of being the only City in America with a double desegregation order, housing and busing. The median income is \$35,000 and the city is majority minority, Hispanic and African American. It is also a melting pot with approximately 6.5 % Asian and many newly arrived immigrants from all over the world. The Municipal Housing Authority for the City of Yonkers (MHACY) own and or manages over 1700 units and administers over 5000 section 8 vouchers making it the fourth largest housing authority in New York State. MHACY properties spread across approximately 60 acres throughout Yonkers, ranging from high rise to townhomes.

Groundwork Hudson Valley is working with the Municipal Housing Authority for the City of Yonkers to address Climate change/climate resiliency at the City's municipal housing sites. Groundwork Hudson Valley and the MHACY received funds from New York State environmental facilities corporation which was leveraged to get more grant funds from the Bezos Earth Fund and Bank of America for the purpose of addressing climate resiliency at 10 of the MHACY's 17 sites.

Flooding, although not in flood zones, heat island effect and other issues have been documented and studied by Groundworks through grants from NOAA. The heat differential from the east side of Yonkers to the west side is two degrees. Southwest Yonkers has traditionally been the area where indigent families reside and the neighborhoods that are generally hotter. Groundwork was able to lay a heat map over the traditionally redlined areas and document the correlation between heat island effect and redlining. Together Groundwork and MHACY have spoken nationally at housing conferences and parks conferences on the connection between heat, health, and standardized test scores. They have also spoken about white roofs, bioswales, rain gardens and tree canopies to mitigate heat island effect and address Environmental Justice (EJ).

We have been asking anyone who is interested to reach out to us so that we may provide them with a model of what teamwork among community partners can achieve in areas with climate resiliency and EJ. As of now, we have partnered with Mayor Mike Spano, Iona University, workforce development (the green team, comprised of MHACY residents), the business council of Westchester community college and others. We urge any and everyone to please reach out to us.

Mary Lyras

Full Name (First and Last): Patrick Bosold

Name of Organization or Community: Jefferson County Farmers and Neighbors

City and State: Fairfield, IA

Brief description about the concern: Confined Animal Feeding Operations (CAFOs) have turned Iowa's rural landscape into the world's largest open-air toilet. I will email a Weblog post and a graphic image, both created by Dr. Christopher Jones of the University of Iowa's IIHR-Hydroscience & Engineering Laboratory, to support this claim.

What do you want the NEJAC to advise EPA to do? Regulate each and every CAFO, regardless of size, as a specific source of air and water pollution. These are industrial operations with a toxic waste stream, and they should be regulated as such.

Dear NEJAC team,

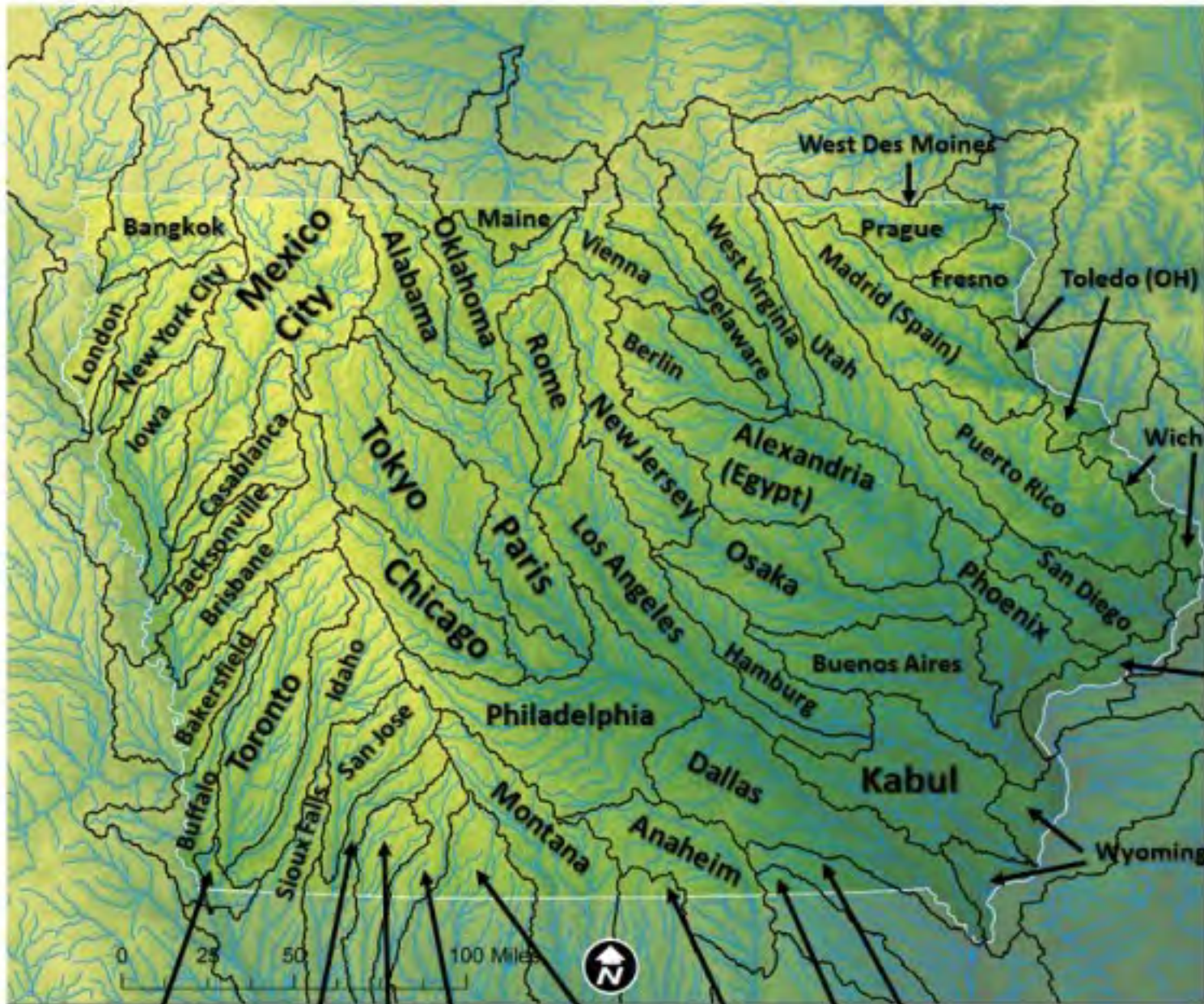
This is a public comment for your public meeting being held from November 29 through December 1, 2022. I also submitted these comments today using your online comment submission form.

Confined Animal Feeding Operations (CAFOs) have turned Iowa's rural landscape into the world's largest open-air toilet. I am attaching a Weblog post and a graphic image, both created by Dr. Christopher Jones of the University of Iowa's IIHR-Hydroscience & Engineering Laboratory, to support this claim.

The EPA needs to regulate each and every CAFO, regardless of size, as a specific source of air and water pollution. These are industrial operations with a toxic waste stream, and they should be regulated as such.

Sincerely,

Patrick Bosold



Urbandale New Orleans Colorado Springs Fort Worth Albuquerque Anaheim St. Louis Cedar Rapids

Minneapolis

Wichita

Toledo (OH)

West Des Moines

Prague

Fresno

Madrid (Spain)

Utah

West Virginia

Delaware

Vienna

Maine

Oklahoma

Alabama

Mexico City

Bangkok

London

New York City

Iowa

Casablanca

Jacksonville

Brisbane

Bakersfield

Toronto

Buffalo

Idaho

San Jose

Tokyo

Chicago

Philadelphia

Montana

Anaheim

Dallas

Kabul

Wichita

Wyoming

San Diego

Phoenix

Buenos Aires

Hamburg

Osaka

Alexandria (Egypt)

New Jersey

Berlin

Rome



These hogs are getting ready for market as they grow inside this Iowa swine finishing barn.

Iowa has around 3 million people, a total that has not changed much over the last 80-90 years. People are large animals, and as such our bodies produce a lot of waste. That being said, we produce much less waste than the animals that we eat. Take hogs, for example. A feeder pig is about the same size as a human being, but it excretes 3 times as much nitrogen (N), 5 times as much phosphorus (P), and 3.5 times as much solid matter (TS-total solids) (1). Some of this is because of the pig's diet and some it is because modern hogs grow really, really fast (these things relate to each other, obviously). A pig weighs about 3 pounds at birth and about 250 pounds at slaughter a mere 6 months later, so it is gaining more than one pound per day. By comparison, a human infant gains a pound about every 20 days. There's a reason we use the word "hog" metaphorically and pejoratively because they consume anything and everything in sight virtually non-stop, which is one reason why they make for a good food animal.

Everybody knows Iowa has a lot of livestock. If you're like me, maybe you have heard from time to time that our state has enough animals to effectively be as populous as California, using one common example. As you will soon see, it's bigger than that. Much bigger.

Exactly how many of each species that we have at any one time is a difficult thing to quantify for reasons I will not get into here. I'm going to present some watershed-by-watershed numbers for the following analysis and I do not claim that they are exact, but I have consulted with a couple of experts and I am confident they are in the ball park. Anyway, statewide, we have around 20-24 million hogs; 250,000 dairy cattle; 1.8 million beef cattle, 80 million laying chickens, and 4.7 million turkeys. I did not consider sheep, goats, horses, broiler chickens, deer or Canada geese.

When I apply the N, P and TS values of the waste from these animals, what would be the equivalent-sized human population that would generate such waste is staggering:

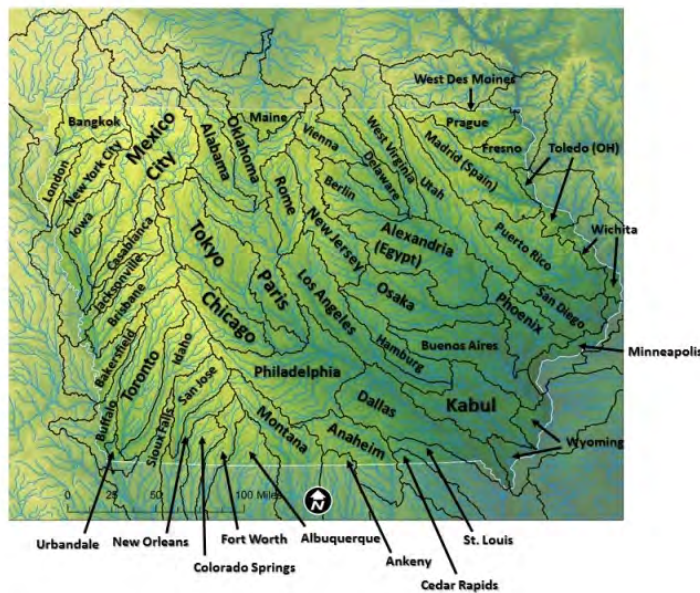
- Iowa hogs: equivalent to 83.7 million people
- Dairy cattle: 8.6 million people
- Beef cattle: 25 million people
- Laying chickens: 15 million people
- Turkeys: 900,000 people

In total, these five species generate the waste equivalent to that produced by about 134 million people, which would place Iowa as the 10th most populous country in the world, right below Russia and right above Mexico. (Caveat: obviously Russia and Mexico have their own livestock that I am not counting.) And in terms of population density in the context of N, P and TS waste, Iowa would come close to the country of Bangladesh.

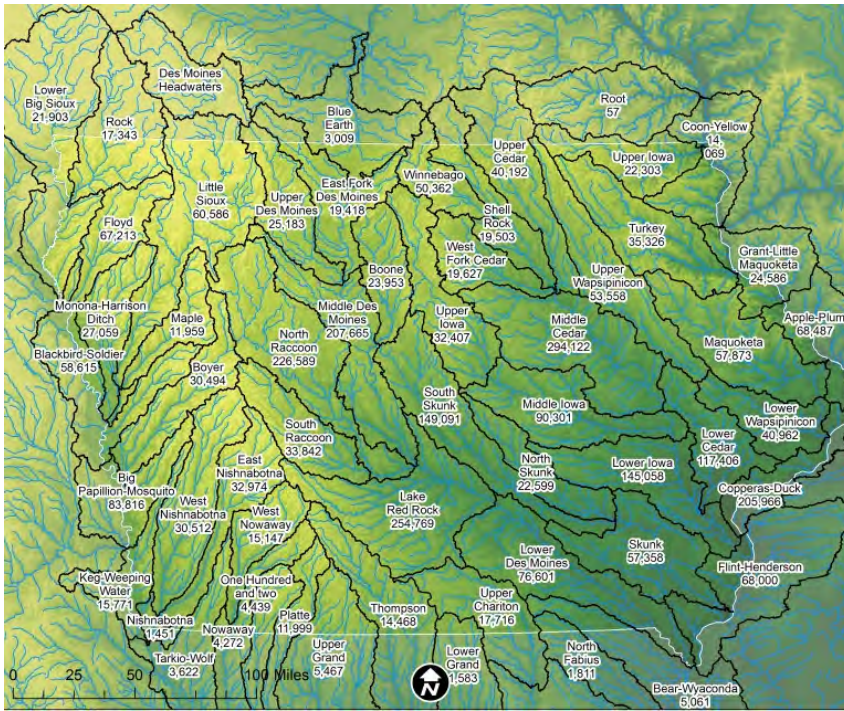
Managing the waste from these animals is possibly our state's most challenging environmental problem. Of course we have a lot of cropland to apply this waste, but the time windows in which farmers have to do this in without damaging the crops with equipment are usually not large. Wet, cold and hot weather can all limit application. As a result, there are only a precious few weeks in a year when this Mt. Everest of waste can be applied to corn and soybean fields. And there can be no doubt that the sheer amount, and the logistical complications of hauling and handling it, have consequences for water quality (2). Watersheds with the highest density of livestock frequently have some of the highest stream nitrate concentrations (North Raccoon, Floyd, and Rock River watersheds, for example).

My colleague Dan Gilles, a Water Resources Engineer at the Iowa Flood Center, was able to derive the human population for all of Iowa's HUC8 watersheds. Dan has been a great collaborator to work with and most days he could run circles around me. Anyway, our most populated watershed, the Middle Cedar, has 294,000 people. Even in that watershed, the human-equivalent livestock population (3.6 million) dwarfs that of actual people. I added the human population to this human-equivalent livestock population for each of Iowa's HUC8 watersheds and this is illustrated below by relating it to a city or state that has a similar human population. I realize that most people will not know the population of many of these places, and the table that follows will help with that.

To finish up, I present this illustration not to make any value judgments on the livestock industry. Clearly it is an important part of our economy. I think we can and should, however, objectively and dispassionately ask ourselves how much we can accommodate while still being able to achieve our desired environmental outcomes. Denmark and the Netherlands both have livestock densities on the scale of Iowa. As a result, both of these countries have in the past suffered environmental consequences similar to our own, but, both country's governments have intervened in more forceful ways than ours. I'm not saying this is good, bad, or in between, it's just true. I think even industry advocates would say there is not much that limits further expansion in Iowa, except perhaps available land in certain areas of the state to apply the waste. Is it reasonable to think about what's possible when trying to reconcile our desired environmental outcomes with the economic and regulatory considerations the industry wants? If we are going to be honest with ourselves, then I think the answer to that question is yes.



This map shows the human waste equivalent of the people, hogs, laying chickens, turkeys, and dairy and beef cattle the city or state that relates to it with its human population only. Reflected is an average of N, P and TS waste. Only the population of the city proper is reflected, not the overall metropolitan metro area.



Iowa HUC8 Watersheds and the number of Iowans that live in them.

watershed	Human equivalents in Livestock	Humans	total	Comparable Place
Raccoon North	9,080,446	226,589	9,307,035	Tokyo
Little Sioux	8,852,978	60,586	8,913,564	Mexico City
Big Sioux Lower	8,835,575	21,903	8,857,478	London
Iowa Upper	8,385,401	32,407	8,417,808	New Jersey
Floyd	8,283,702	67,213	8,350,915	New York City
rock	8,254,927	17,343	8,272,270	Bangkok
DM Upper	4,843,697	25,183	4,868,880	Alabama
Boone	4,655,979	23,953	4,679,932	Rome
Cedar Middle	3,562,152	294,122	3,856,274	Alexandria
DM East Fork	3,827,907	19,418	3,847,325	Oklahoma
Skunk South	3,625,608	148,091	3,774,699	Los Angeles
turkey	3,729,426	35,326	3,764,752	Madrid
Cedar West Fork	3,561,875	19,627	3,581,502	Berlin
Maple	3,455,468	11,959	3,467,427	Casablanca
skunk	3,274,769	57,358	3,329,127	Kabul
Wapsi Upper	3,235,679	53,558	3,289,237	Utah
Maquoketa	3,133,159	57,873	3,191,032	Puerto Rico
M-H Ditch	2,991,408	27,059	3,018,467	Iowa
Iowa Lower	2,856,729	76,601	2,933,330	Buenos Aires
Raccoon South	2,641,366	33,842	2,675,208	Chicago
Iowa Middle	2,547,364	90,301	2,637,665	Osaka
Nish West	2,571,037	30,512	2,601,549	Toronto
Boyer	2,440,086	30,494	2,470,580	Brisbane
DM Middle	1,938,789	207,665	2,146,454	Paris
Skunk North	1,769,798	22,599	1,792,397	Hamburg
Winnebago	1,712,470	50,362	1,762,832	Vienna
Cedar Upper	1,695,450	40,192	1,735,642	West Virginia
Nish East	1,698,437	32,974	1,731,411	Idaho
Lake Red Rock	1,255,675	254,769	1,510,444	Philadelphia
cedar lower	1,301,585	117,406	1,418,991	Phoenix
Wapsi Lower	1,257,082	40,962	1,298,044	San Diego
DM Lower	1,109,387	76,601	1,185,988	Dallas
Blue Earth	1,171,036	3,009	1,174,045	Maine
Upper Iowa	1,107,874	32,407	1,140,281	Rhode Island
thompson	1,029,796	14,468	1,044,264	Montana
shell rock	959,356	19,503	978,859	Delaware
Nodaway West	929,422	15,147	944,569	San Jose
Blackbird-Soldier	766,055	58,615	824,670	Jacksonville
Platte	740,549	11,999	752,548	Forth Worth
Grand Upper	538,941	5,467	544,408	Albuquerque
Flint Henderson	439,902	68,000	507,902	Wyoming
Coon-Yellow	485,899	14,069	499,968	Fresno
One hundred two	406,861	4,439	411,300	Colorado Springs
Copperas-Duck	184,377	205,966	390,343	Minneapolis
Apple Plum	304,135	68,487	372,622	Wichita
Big Papillion	269,924	83,816	353,740	Bakersfield
Nodaway	338,716	4,272	342,988	New Orleans
Chariton	313,481	17,716	331,197	Anaheim
Bear-Wyaconda	309,860	5,061	314,921	St. Louis
Grant-Little Maq	264,153	24,586	288,739	Toledo
Keg-Weeping Water	246,614	15,771	262,385	Buffalo
tarkio wolf	173,921	3,622	177,543	Sioux Falls
north fabius	121,634	1,811	123,445	Cedar Rapids
root	58,731	57	58,788	West Des Moines
Grand Lower	48,774	1,583	50,357	Ankeny
Nishabotna	44,551	1,451	46,002	Urbandale

Data table used to derive the maps above.

In case, I cannot attend the meeting through of very consummated in time for zoom meeting that we don't have the same time here in the Philippines, If, I cannot send you reply message, I don't know, I can attend now for zoom meeting, I wait for this meeting but despite on issue if, I am losing my time with you, I lost you also.

My Name is Philip Henry C. Kortekaas, 31 years old, Who live in xxx xth.Avenue.,Sta.Ana.,Purok X.,Barangay XX-C.,Davao City, Philippines as Criminology License Passer for PRC or Professional Regulatory Commission here in Davao City. Hope next time please let the meeting to so early.

This is my Letter Proposal:

To the Presidency of US government and US government itself. Important on our everyone presentation hope notwithstanding should we become good evaluate to our relation to prevent and stop every crisis facing every day we have. Like at the virus of coronavirus and environmental disorder.

The Way we help our Environment; We must Act too it's; Precise and correctiveness; Aiding the "Hazards" Always of global warming, sun rays, Sun Heat and Water Sea Toxic Change.

You and We must can invent the Device and Equipment Things to STOP and PREVENT the "Earthquake" "should be ware need to be 100% present effective without barriers. On Preventing, Minimizing and Mitigate the Criminality, Terrorism, Organize and Transnational Crime and Insurgency for "Ghost Recon: Future Soldiers and Weapon" and "Call of Duty: Infinite Warfare" that should 100% present effective without barriers.

For This Evidentiary Presentation with You: <https://youtu.be/VhVx3jBXRSY>

My Request:

Please help me give me 0.04% present accreditation and credential from US president and US government to its executive power of office to my PRC or Professional Regulatory Commission "Criminology License" in Ecoland Drive, Phase 2, Inside the Phoenix Gasoline Station and Beside Indonesian Embassy and also to my Philippine Department of Interior and Local Government Service at Davao City without barriers to my Davao City Local Government Office successful without barriers.

Philip Henry C. Kortekaas

Full Name (First and Last): Ramon Perez

Name of Organization or Community: Lake Erie Advocates

City and State: Toledo

Brief description about the concern: CAFOs AKA FACTORY FARMS: "On August 2, 2014, residents of Toledo, Ohio awoke to the urgent warnings not to drink or use their tap water. Half a million people were unable to drink their water, cook with it, or brush their teeth for three days"...and incalculable panic was mounting in the air. The cause? Currently there are over 200 CAFOs in Ohio, including 60 in the Western Lake Erie watershed. As the number of factory farms increased, the WLE watershed began suffering massive toxic algal blooms each summer fueled by Phosphorus in animal feces and urine.

billions of gallons of feces and manure from 25 million confined animals, cows, chickens, hogs, are dumped in Toledo, Ohio's area watershed every year. That's as much phosphorus as the combined human population of Ohio, Indiana, Chicago, and Atlanta. You can't mitigate that with filter strips and cover crops.

To this date - December 15, 2022 there has been no change in the cause and effect except higher utility bills and little to no recreational, fishing, swimming use of the Western Lake Water Shed.

What do you want the NEJAC to advise EPA to do? :

Sisters/Brothers not really sure what real power you have besides recommendations...and I truly feel you because as a member of Lake Erie Advocates here in Toledo, Ohio we have almost come to the conclusion the only way to really get at the core of saving this living organism...just like you and me, is to declare h2Ohio a scam favoring the Ohio Department of Agriculture illegally issuing CAFO permits, maybe the federal EPA under this adm. can finally order all CAFOs in Ohio illegal, no more permits issued, declared as hazardous to Lake Erie, US/Oh-EPA with recognized Ohio environmental groups to include real-time input, not recommendations for environmental clean-up standards, and start the process of eliminating factory farms and invest in real, innovative agriculture farming that also revitalizes our land, water, air...just like my indigenous ancestors did before greed took over this once healthy region.

feel free to contact me and Lake Erie Advocates website... and a big thank you/ gracias! to Maritza and Mariana with Green Latinos for getting me to you all...cuidance!

To whom it may concern:

Yonkers, New York is the third largest city in New York State with a population of over 200,000 people. It shares its border with New York City and has the dubious distinction of being the only City in America with a double desegregation order, housing and busing. The median income is \$35,000 and the city is majority minority, Hispanic and African American. It is also a melting pot with approximately 6.5 % Asian and many newly arrived immigrants from all over the world. The Municipal Housing Authority for the City of Yonkers (MHACY) own and or manages over 1700 units and administers over 5000 section 8 vouchers making it the fourth largest housing authority in New York State. MHACY properties spread across approximately 60 acres throughout Yonkers, ranging from high rise to townhomes.

Groundwork Hudson Valley is working with the Municipal Housing Authority for the City of Yonkers to address Climate change/climate resiliency at the City's municipal housing sites. Groundwork Hudson Valley and the MHACY received funds from New York State environmental facilities corporation which was leveraged to get more grant funds from the Bezos Earth Fund and Bank of America for the purpose of addressing climate resiliency at 10 of the MHACY's 17 sites.

Flooding, although not in flood zones, heat island effect and other issues have been documented and studied by Groundworks through grants from NOAA. The heat differential from the east side of Yonkers to the west side is two degrees. Southwest Yonkers has traditionally been the area where indigent families reside and the neighborhoods that are generally hotter. Groundwork was able to lay a heat map over the traditionally redlined areas and document the correlation between heat island effect and redlining. Together Groundwork and MHACY have spoken nationally at housing conferences and parks conferences on the connection between heat, health, and standardized test scores. They have also spoken about white roofs, bioswales, rain gardens and tree canopies to mitigate heat island effect and address Environmental Justice (EJ).

We have been asking anyone who is interested to reach out to us so that we may provide them with a model of what teamwork among community partners can achieve in areas with climate resiliency and EJ. As of now, we have partnered with Mayor Mike Spano, Iona University, workforce development (the green team, comprised of MHACY residents), the business council of Westchester community college and others. We urge any and everyone to please reach out to us.

Sade N. Glover

Full Name (First and Last): Skye Wheeler

Name of Organization or Community: Human Rights Watch

City and State: Washington DC

Brief description about the concern: Dear NEJAC members, Many thanks for the opportunity to submit comment on the way in which environmental justice and equity are incorporated into finance and investments at the Environmental Protection Agency (EPA). I wanted to draw your attention to a letter that a group of 29 organizations working towards better maternal health, reproductive justice and environmental justice in the US recently sent to Administrator Regan asking him to create at least one high-level reproductive justice position within the new Office of Environmental Justice and External Civil Rights (OEJECR) in the EPA, including a position senior enough to allow coordination with other parts of government managing environmental justice funds and other resources. I also wanted to make sure that the requests in the letter were also reiterated to this important body through this public comment process. As you know, important indicators of maternal and newborn health like maternal mortality, as well as serious illnesses during pregnancy, and preterm birth, are higher in the US than most industrialized nations, are in many cases rising, and are unjustly higher for women of color than white women.

We are increasingly concerned about the impact of climate change and other mounting harms from environmental degradation on the health of pregnant people and newborn babies. These negative impacts, which reflect specific biological as well as socioeconomic vulnerabilities of pregnancy, are inequitably distributed. Such impacts compound and interact with poverty, racism, and other forms of marginalization, and can have life-long ramifications that in turn reinforces inequality and corrodes future community resilience, including to disasters arising from the climate crisis.

Known impacts arising from air pollution, extreme weather driven by the climate crisis, fossil fuels (including extraction, refinement, and use), low quality housing, toxins from soil and water and other environmental factors include preterm birth, low birth weight, still birth, and higher rates of some maternal diseases. Without action, environmental injustices will continue to worsen the US maternal health crisis, deepening unjust inequities in rates of maternal morbidity and mortality and adverse birth outcomes, with worse rates for Black, Indigenous, and other women and birthing people of color

We ask that you recommend the EPA take the following steps to address these concerns:

- Create at least one high-level reproductive justice position within the OEJECR, including a position senior enough to allow coordination with other parts of government managing environmental justice funds and other resources. We envisage this person contributing scientific and policy understanding of sexual and reproductive health vulnerabilities to climate change, toxics, and other environmental health problems. The position holder should also have a deep understanding of the maternal and newborn crisis in the US and how pregnant people and newborns in some communities are especially vulnerable to environmental health harms because of systemic racism or other forms of marginalization.

- Announce an explicit commitment to reproductive justice for the OEJECR at the next possible opportunity, and that you create agency webpages dedicated to the intersection of environmental justice and reproductive justice in the US.
- Direct resources, including those aimed at addressing environmental injustice, to reproductive justice and environmental health and sexual and reproductive health and rights and support local health practitioners including community health clinics, public health departments and public health workers and community health workers such as doulas.
- Include reproductive justice language, evidence from studies showing environmental health harms to maternal, newborn, adolescent, fertility and other sexual and reproductive health and rights, and studies showing disparate impacts on historically marginalized communities as you develop work plans for the OEJECR.

Many thanks and best wishes for the end of the year holidays and thank you for your important work.

What do you want the NEJAC to advise EPA to do? : We ask that the NEJAC recommend the EPA take the following steps:

- Create at least one high-level reproductive justice position within the OEJECR, including a position senior enough to allow coordination with other parts of government managing environmental justice funds and other resources. We envisage this person contributing scientific and policy understanding of sexual and reproductive health vulnerabilities to climate change, toxics, and other environmental health problems. The position holder should also have a deep understanding of the maternal and newborn crisis in the US and how pregnant people and newborns in some communities are especially vulnerable to environmental health harms because of systemic racism or other forms of marginalization.
- Announce an explicit commitment to reproductive justice for the OEJECR at the next possible opportunity, and that you create agency webpages dedicated to the intersection of environmental justice and reproductive justice in the US.
- Direct resources, including those aimed at addressing environmental injustice, to reproductive justice and environmental health and sexual and reproductive health and rights and support local health practitioners including community health clinics, public health departments and public health workers and community health workers such as doulas.

- Include reproductive justice language, evidence from studies showing environmental health harms to maternal, newborn, adolescent, fertility and other sexual and reproductive health and rights, and studies showing disparate impacts on historically marginalized communities as you develop work plans for the OEJECR.

Many thanks and best wishes for the end of the year holidays and thank you for your important work.

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**In memoriam*

HUMAN RIGHTS WATCH

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Office of Administrator Michael Regan
Environmental Protection Agency

November 28, 2022

Dear Administrator Regan,

Congratulations on the launch of the Office of Environmental Justice and External Civil Rights (OEJECR). We share your excitement about all the important work this new part of the Environmental Protection Agency (EPA) will do to protect unjustly marginalized populations from the harms of environmental degradation.

We are a group of varied organizations working to end environmental injustice and/or the maternal health crisis in the US. As you know, important indicators of maternal and newborn health like maternal mortality, as well as serious illnesses during pregnancy, and preterm birth, are higher in the US than most industrialized nations, are in many cases rising, and are unjustly higher for women of color than white women.

We have been increasingly concerned about the impact of climate change and other mounting harms from environmental degradation on the health of pregnant people and newborn babies. These negative impacts, which reflect specific biological as well as socioeconomic vulnerabilities of pregnancy, are inequitably distributed. Such impacts compound and interact with poverty, racism, and other forms of marginalization, and can have life-long ramifications that in turn reinforces inequality and corrodes future community resilience, including to disasters arising from the climate crisis.

Known impacts arising from air pollution, extreme weather driven by the climate crisis, fossil fuels (including extraction, refinement, and use), low quality housing, toxins from soil and water and other environmental factors include preterm birth, low birth weight, still birth, and higher rates of some maternal diseases. Please see below for some examples of relevant studies. Without action, environmental injustices will continue to worsen the US maternal health crisis, deepening unjust inequities in rates of maternal morbidity and mortality and adverse birth outcomes, with worse rates for Black, Indigenous, and other women and birthing people of color

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We ask that you take the following steps to address these concerns:

- Create at least one high-level reproductive justice position within the OEJECR, including a position senior enough to allow coordination with other parts of government managing environmental justice funds and other resources. We envisage this person contributing scientific and policy understanding of sexual and reproductive health vulnerabilities to climate change, toxics, and other environmental health problems. The position holder should also have a deep understanding of the maternal and newborn crisis in the US and how pregnant people and newborns in some communities are especially vulnerable to environmental health harms because of systemic racism or other forms of marginalization.
- Announce an explicit commitment to reproductive justice for the OEJECR at the next possible opportunity, and that you create agency webpages dedicated to the intersection of environmental justice and reproductive justice in the US.
- We ask that the EPA directs resources, including those aimed at addressing environmental injustice, to reproductive justice and environmental health and sexual and reproductive health and rights and support local health practitioners including community health clinics, public health departments and public health workers and community health workers such as doulas.
- We also hope that you will include reproductive justice language, evidence from studies showing environmental health harms to maternal, newborn, adolescent, fertility and other sexual and reproductive health and rights, and studies showing disparate impacts on historically marginalized communities as you develop work plans for the OEJECR.

Our sincere thanks for your consideration. We would be delighted to speak further on this with you or your colleagues.

Yours sincerely,

A Better Balance
Air Alliance Houston
Alliance of Nurses for Health Environments
Birthmark Doulas
Black Millennials for Flint
Center for Biological Diversity
Center for Reproductive Rights
EverThrive Illinois
Every Woman Connecticut
Florida Clinicians for Climate Action
Human Rights Watch
Medical Students for a Sustainable Future
Metro Mommy
Moms Clean Air Force

National Association of Nurse Practitioners in Women's Health
National Birth Equity Collaborative
National Lawyers Guild of Lewis & Clark Law School
National Resources Defense Council
New Voices for Reproductive Justice
Nurses for Reproductive Health
Nurturely
Raising Illinois
Start Early
The Connecticut Maternal and Child Health Coalition
The Connecticut Reproductive Justice Alliance
University of California, San Francisco's Program on Reproductive Health and the Environment
Women's Fund Miami Dade
Women's Voices for the Earth

Annex

Examples of Relevant Studies

[A] Studies describing important links between environmental and maternal and/or birth health outcomes:

Burris, Heather H., Scott A. Lorch, Haresh Kirpalani, DeWayne M. Pursley, Michal A. Elovitz, and Jane E. Clougherty. "Racial disparities in preterm birth in USA: a biosensor of physical and social environmental exposures." *Archives of Disease in Childhood* 104, no. 10 (2019): 931-935.

Robinson, Oliver, and Martine Vrijheid. "The Pregnancy Exposome." *Current Environmental Health Reports* 2, no. 2 (2015): 204-213.

[B] Studies indicating links between air pollution and adverse birth outcomes:

Basu, Rupa, Maria Harris, Lillian Sie, Brian Malig, Rachel Broadwin, and Rochelle Green. "Effects of fine particulate matter and its constituents on low birth weight among full-term infants in California." *Environmental Research* 128 (2014): 42-51.

Bekkar, Bruce, Susan Pacheco, Rupa Basu, and Nathaniel DeNicola. "Association of air pollution and heat exposure with preterm birth, low birth weight, and stillbirth in the US: a systematic review." *JAMA Network Open* 3, no. 6 (2020): e208243-e208243, doi: 10.1001/jamanetworkopen.2020.8243.

Chen, Gongbo, Yuming Guo, Michael J. Abramson, Gail Williams, and Shanshan Li. "Exposure to low concentrations of air pollutants and adverse birth outcomes in Brisbane, Australia, 2003–2013." *Science of the Total Environment* 622 (2018): 721-726, doi: 10.1016/j.scitotenv.2017.12.050.

DeFranco, Emily, William Moravec, Fan Xu, Eric Hall, Monir Hossain, Erin N. Haynes, Louis Muglia, and Aimin Chen. "Exposure to airborne particulate matter during pregnancy is associated with preterm birth: a population-based cohort study." *Environmental Health* 15, no. 1 (2016): 1-8, doi: 10.1186/s12940-016-0094-3.

Ebisu, Keita, Brian Malig, Sina Hasheminassab, Constantinos Sioutas, and Rupa Basu. "Cause-specific stillbirth and exposure to chemical constituents and sources of fine particulate matter." *Environmental Research* 160 (2018): 358-364.

Ghosh, Rakesh, Kate Causey, Katrin Burkart, Sarah Wozniak, Aaron Cohen, and Michael Brauer. "Correction: Ambient and household PM_{2.5} pollution and adverse perinatal outcomes: A meta-regression and analysis of attributable global burden for 204 countries and territories." *PLoS Medicine* 18, no. 11 (2021): e1003852, DOI: 10.1371/journal.pmed.1003952.

Dugandzic, Rose, Linda Dodds, David Stieb, and Marc Smith-Doiron. "The association between low level exposures to ambient air pollution and term low birth weight: a

retrospective cohort study.” *Environmental Health* 5, no. 1 (2006): 1-8, doi: 10.1186/1476-069X-5-3.

Ha, Sandie, Hui Hu, Dikea Roussos-Ross, Kan Haidong, Jeffrey Roth, and Xiaohui Xu. “The effects of air pollution on adverse birth outcomes.” *Environmental Research* 134 (2014): 198-204.

Hansen, Craig, Anne Neller, Gail Williams, and Rod Simpson. “Low levels of ambient air pollution during pregnancy and fetal growth among term neonates in Brisbane, Australia.” *Environmental Research* 103, no. 3 (2007): 383-389, doi: 10.1016/j.envres.2006.06.010.

Hao, Hua, Howard H. Chang, Heather A. Holmes, James A. Mulholland, Mitch Klein, Lyndsey A. Darrow, and Matthew J. Strickland. “Air pollution and preterm birth in the US state of Georgia (2002–2006): associations with concentrations of 11 ambient air pollutants estimated by combining Community Multiscale Air Quality Model (CMAQ) simulations with stationary monitor measurements.” *Environmental Health Perspectives* 124, no. 6 (2016): 875-880, doi: 10.1289/ehp.1409651.

Koman, Patricia D., Kelly A. Hogan, Natalie Sampson, Rebecca Mandell, Chris M. Coombe, Myra M. Tetteh, Yolanda R. Hill - Ashford et al. “Examining Joint Effects of Air Pollution Exposure and Social Determinants of Health in Defining “At - Risk” Populations Under the Clean Air Act: Susceptibility of Pregnant Women to Hypertensive Disorders of Pregnancy.” *World Medical & Health Policy* 10, no. 1 (2018): 7-54.

Lamichhane, Dirga Kumar, Jong-Han Leem, Ji-Young Lee, and Hwan-Cheol Kim. “A meta-analysis of exposure to particulate matter and adverse birth outcomes.” *Environmental Health and Toxicology* 30 (2015).

Lavigne, Eric, Abdool S. Yasseen III, David M. Stieb, Perry Hystad, Aaron Van Donkelaar, Randall V. Martin, Jeffrey R. Brook et al. “Ambient air pollution and adverse birth outcomes: differences by maternal comorbidities.” *Environmental Research* 148 (2016): 457-466.

Li, Xiangyu, Shuqiong Huang, Anqi Jiao, Xuhao Yang, Junfeng Yun, Yuxin Wang, Xiaowei Xue et al. “Association between ambient fine particulate matter and preterm birth or term low birth weight: an updated systematic review and meta-analysis.” *Environmental Pollution* 227 (2017): 596-605, doi: 10.1016/j.envpol.2017.03.055.

Malley, Christopher S., Johan CI Kuylentierna, Harry W. Vallack, Daven K. Henze, Hannah Blencowe, and Mike R. Ashmore. “Preterm birth associated with maternal fine particulate matter exposure: a global, regional and national assessment.” *Environment International* 101 (2017): 173-182.

Melody, Shannon M., Jane Ford, Karen Wills, Alison Venn, and Fay H. Johnston. “Maternal exposure to short-to medium-term outdoor air pollution and obstetric and neonatal outcomes: A systematic review.” *Environmental Pollution* 244 (2019): 915-925, doi: 10.1186/s12940-016-0094-3.

Mendola, Pauline, Carrie Nobles, Andrew Williams, Seth Sherman, Jenna Kanner, Indulaxmi Seeni, and Katherine Grantz. "Air pollution and preterm birth: do air pollution changes over time influence risk in consecutive pregnancies among low-risk women?" *International Journal of Environmental Research and Public Health* 16, no. 18 (2019): 3365.

Sarovar, Varada, Brian J. Malig, and Rupa Basu. "A case-crossover study of short-term air pollution exposure and the risk of stillbirth in California, 1999–2009." *Environmental Research* 191 (2020): 110103.

Stieb, David M., Li Chen, Maysoon Eshoul, and Stan Judek. "Ambient air pollution, birth weight and preterm birth: a systematic review and meta-analysis." *Environmental Research* 117 (2012): 100-111, doi: 10.1016/j.envres.2012.05.007.

Trasande, Leonardo, Patrick Malecha, and Teresa M. Attina. "Particulate matter exposure and preterm birth: estimates of US attributable burden and economic costs." *Environmental Health Perspectives* 124, no. 12 (2016): 1913-1918, DOI: 10.1289/ehp.1510810.

Vinikoor-Imler, Lisa C., J. Allen Davis, Robert E. Meyer, Lynne C. Messer, and Thomas J. Luben. "Associations between prenatal exposure to air pollution, small for gestational age, and term low birthweight in a state-wide birth cohort." *Environmental Research* 132 (2014): 132-139.

[C] Studies indicating links between climate change and adverse birth outcomes:

Ha, Sandie. "The Changing Climate and Pregnancy Health." *Current Environmental Health Reports* (2022): 1-13, doi: 10.1007/s40572-022-00345-9.

Giudice, Linda C., Erlidia F. Llamas - Clark, Nathaniel DeNicola, Santosh Pandipati, Marya G. Zlatnik, Ditas Cristina D. Decena, Tracey J. Woodruff, Jeanne A. Conry, and FIGO Committee on Climate Change and Toxic Environmental Exposures. "Climate change, women's health, and the role of obstetricians and gynecologists in leadership." *International Journal of Gynecology & Obstetrics* 155, no. 3 (2021): 345-356, doi: 10.1002/ijgo.13958.

IPCC, 2022: Summary for Policymakers [H.-O. Pörtner, D.C. Roberts, E.S. Poloczanska, K. Mintenbeck, M. Tignor, A. Alegría, M. Craig, S. Langsdorf, S. Lösckhe, V. Möller, A. Okem (eds.)]. In: *Climate Change 2022: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* [H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Lösckhe, V. Möller, A. Okem, B. Rama (eds.)]. Cambridge University Press. In Press.

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Roos, Nathalie, Sari Kovats, Shakoor Hajat, Veronique Filippi, Matthew Chersich, Stanley Luchters, Fiona Scorgie et al. "Maternal and newborn health risks of climate change: A call for awareness and global action." *Acta obstetrica et gynecologica Scandinavica* 100, no. 4 (2021): 566-570, doi: 10.1111/aogs.14124.

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Watts, Nick, Markus Amann, Nigel Arnell, Sonja Ayeb-Karlsson, Kristine Belesova, Maxwell Boykoff, Peter Byass et al. "The 2019 report of The Lancet Countdown on health and climate change: ensuring that the health of a child born today is not defined by a changing climate." *The Lancet* 394, no. 10211 (2019): 1836-1878, doi: 10.1016/S0140-6736(19)32596-6.

Zlatnik, Marya. "Climate Change and Pregnancy: Risks, Mitigation and Adaptation." Forthcoming.

Additional various useful papers and commentaries can be found in this special edition of *Paediatric and Perinatal Epidemiology: Climate Change and Reproductive, Perinatal, and Paediatric Health: Paediatric and Perinatal Epidemiology: Vol 36, No 1*

a. Exposure to extreme heat:

Bekkar, Bruce, Susan Pacheco, Rupa Basu, and Nathaniel DeNicola. "Association of air pollution and heat exposure with preterm birth, low birth weight, and stillbirth in the US: a systematic review." *JAMA Network Open* 3, no. 6 (2020): e208243-e208243, doi: 10.1001/jamanetworkopen.2020.8243.

Carolan-Olah, Mary, and Dorota Frankowska. "High environmental temperature and preterm birth: a review of the evidence." *Midwifery* 30, no. 1 (2014): 50-59, doi: 10.1016/j.midw.2013.01.011.

Chersich, Matthew Francis, Minh Duc Pham, Ashtyn Areal, Marjan Mosalam Haghghi, Albert Manyuchi, Callum P. Swift, Bianca Wernecke et al. "Associations between high temperatures in pregnancy and risk of preterm birth, low birth weight, and stillbirths: systematic review and meta-analysis." *BMJ* 371 (2020), doi: 10.1136/bmj.m3811.

Konkel, Lindsey. "Taking the heat: potential fetal health effects of hot temperatures." *Environmental Health Perspectives* 127, no. 10 (2019): 102002, doi: 10.1289/EHP6221.

Kuehn, Leeann, and Sabrina McCormick. "Heat exposure and maternal health in the face of climate change." *International Journal of Environmental Research and Public Health* 14, no. 8 (2017): 853, doi: 10.3390/ijerph14080853.

Zhang, Yunquan, Chuanhua Yu, and Lu Wang. "Temperature exposure during pregnancy and birth outcomes: an updated systematic review of epidemiological evidence." *Environmental Pollution* 225 (2017): 700-712, doi: 10.1016/j.envpol.2017.02.066.

b. Exposure to wildfire:

Abdo, Mona, Isabella Ward, Katelyn O'Dell, Bonne Ford, Jeffrey R. Pierce, Emily V. Fischer, and James L. Crooks. "Impact of wildfire smoke on adverse pregnancy outcomes in Colorado, 2007–2015." *International Journal of Environmental Research and Public Health* 16, no. 19 (2019): 3720, doi: 10.3390/ijerph16193720.

Amjad, Sana, Dagmara Chojecki, Alvaro Osornio-Vargas, and Maria B. Ospina. "Wildfire exposure during pregnancy and the risk of adverse birth outcomes: A systematic review." *Environment International* 156 (2021): 106644, doi: 10.1016/j.envint.2021.106644.

Heft-Neal, Sam, Anne Driscoll, Wei Yang, Gary Shaw, and Marshall Burke. "Associations between wildfire smoke exposure during pregnancy and risk of preterm birth in California." *Environmental Research* 203 (2022): 111872, doi: 10.1016/j.envres.2021.111872.

Holstius, David M., Colleen E. Reid, Bill M. Jesdale, and Rachel Morello-Frosch. "Birth weight following pregnancy during the 2003 Southern California wildfires." *Environmental Health Perspectives* 120, no. 9 (2012): 1340-1345, doi: 10.1289/ehp.1104515.

Jones, Benjamin A., and Shana McDermott. "Infant health outcomes in mega-fire affected communities." *Applied Economics Letters* (2021): 1-11, doi: 10.1080/13504851.2021.1927959.

Park, Bo Young, Ian Boles, Samira Monavvari, Shivani Patel, Arriel Alvarez, Mie Phan, Maria Perez, and Ruofan Yao. "The association between wildfire exposure in pregnancy and foetal gastroschisis: A population - based cohort study." *Paediatric and Perinatal Epidemiology* 36, no. 1 (2022): 45-53, doi: 10.1111/ppe.12823.

Requia, Weeberb J., Stefania Papatheodorou, Petros Koutrakis, Rajarshi Mukherjee, and Henrique L. Roig. "Increased preterm birth following maternal wildfire smoke exposure in Brazil." *International Journal of Hygiene and Environmental Health* 240 (2022): 113901, doi: 10.1016/j.ijheh.2021.113901.

[D] Studies indicating links between fossil fuel extraction and adverse birth outcomes:

Cushing, Lara J., Kate Vavra-Musser, Khang Chau, Meredith Franklin, and Jill E. Johnston. "Flaring from unconventional oil and gas development and birth outcomes in the Eagle Ford Shale in South Texas." *Environmental Health Perspectives* 128, no. 7 (2020): 077003, doi: 10.1289/EHP6394.

Gonzalez, David JX, Allison R. Sherris, Wei Yang, David K. Stevenson, Amy M. Padula, Michael Baiocchi, Marshall Burke, Mark R. Cullen, and Gary M. Shaw. "Oil and gas production and spontaneous preterm birth in the San Joaquin Valley, CA: a case-control study." *Environmental Epidemiology* 4, no. 4 (2020), doi: 10.1097/EE9.000000000000099.

Nicole, Wendee. "On Wells and Wellness: Oil and Gas Flaring as a Potential Risk Factor for Preterm Birth." *Environmental Health Perspectives* 128, no. 11 (2020): 114004, doi: 10.1289/EHP7952.

Willis, Mary D., Elaine L. Hill, Andrew Boslett, Molly L. Kile, Susan E. Carozza, and Perry Hystad. "Associations between residential proximity to oil and gas drilling and term birth weight and small-for-gestational-age infants in Texas: a difference-in-differences analysis." *Environmental Health Perspectives* 129, no. 7 (2021): 077002, doi: 10.1289/EHP7678.

A large number of studies on fracking and pregnancy outcomes are included in:

Concerned Health Professionals of New York, & Physicians for Social Responsibility. (2020, December). *Compendium of scientific, medical, and media findings demonstrating risks and harms of fracking (unconventional gas and oil extraction) (7th ed.)*: <http://concernedhealthny.org/compendium/>

[E] Studies indicating links between environmental contaminants and adverse birth outcomes:

Ferguson, Kelly K., Marie S. O'Neill, and John D. Meeker. "Environmental contaminant exposures and preterm birth: a comprehensive review." *Journal of Toxicology and Environmental Health, Part B* 16, no. 2 (2013): 69-113, doi: 10.1080/10937404.2013.775048

Ferguson, Kelly K., Thomas F. McElrath, and John D. Meeker. "Environmental phthalate exposure and preterm birth." *JAMA Pediatrics* 168, no. 1 (2014): 61-67, doi: 10.1001/jamapediatrics.2013.3699.

Porpora, Maria Grazia, Ilaria Piacenti, Sara Scaramuzzino, Luisa Masciullo, Francesco Rech, and Pierluigi Benedetti Panici. "Environmental contaminants exposure and preterm birth: a systematic review." *Toxics* 7, no. 1 (2019): 11, doi: 10.3390/toxics7010011.

Yonkers, New York is the third largest city in New York State with a population of over 200,000 people. It shares its border with New York City and has the dubious distinction of being the only City in America with a double desegregation order, housing and busing. The median income is \$35,000 and the city is majority minority, Hispanic and African American. It is also a melting pot with approximately 6.5 % Asian and many newly arrived immigrants from all over the world. The Municipal Housing Authority for the City of Yonkers (MHACY) own and or manages over 1700 units and administers over 5000 section 8 vouchers making it the fourth largest housing authority in New York State. MHACY properties spread across approximately 60 acres throughout Yonkers, ranging from high rise to townhomes.

Groundwork Hudson Valley is working with the Municipal Housing Authority for the City of Yonkers to address Climate change/climate resiliency at the City's municipal housing sites. Groundwork Hudson Valley and the MHACY received funds from New York State environmental facilities corporation which was leveraged to get more grant funds from the Bezos Earth Fund and Bank of America for the purpose of addressing climate resiliency at 10 of the MHACY's 17 sites.

Flooding, although not in flood zones, heat island effect and other issues have been documented and studied by Groundworks through grants from NOAA. The heat differential from the east side of Yonkers to the west side is two degrees. Southwest Yonkers has traditionally been the area where indigent families reside and the neighborhoods that are generally hotter. Groundwork was able to lay a heat map over the traditionally redlined areas and document the correlation between heat island effect and redlining. Together Groundwork and MHACY have spoken nationally at housing conferences and parks conferences on the connection between heat, health, and standardized test scores. They have also spoken about white roofs, bioswales, rain gardens and tree canopies to mitigate heat island effect and address Environmental Justice (EJ).

We have been asking anyone who is interested to reach out to us so that we may provide them with a model of what teamwork among community partners can achieve in areas with climate resiliency and EJ. As of now, we have partnered with Mayor Mike Spano, Iona University, workforce development (the green team, comprised of MHACY residents), the business council of Westchester community college and others. We urge any and everyone to please reach out to us.

Susan Belluccio

The Yonkers Housing Authority (YHA) has worked with community solar through sustainable Westchester. Real estate developer Robert Martin has a property in Yonkers called the Southern Westchester Executive Park where they installed solar panels and through a relationship with sustainable Westchester and Groundwork Hudson Valley, YHA and its tenants are now the recipients of these solar benefits. This is a great model of collective community engagement with affordable housing, not-for-profits and local businesses.

The YHA is also working with The Community Builders (TCB) to build new affordable housing with solar panels at the Ridgeway development in Northwest Yonkers. The development is a six-phase replacement project of 500 of all affordable housing units. Phases 4 and 5 have solar panels. Phase 6 will have solar panels and be built to passive house environmental standards

If you have any questions about these successes or want to use them as models, please contact us.

Wilson Kimball

Yonkers, New York is the third largest city in New York with a population of over 200,000. It shares a border with New York City and has the dubious distinction of being the only City in America with a double desegregation order, housing and busing. The median income is \$35,000 and the city is majority minority, Hispanic and Africa-American. It is also a melting pot with nearly 5% Asian and many newly arrived immigrants from all over the world.

Groundwork Hudson Valley is working with the Yonkers Housing Authority to address Climate change/climate resiliency at the City's municipal housing sites. YHA owns and operates over 1700 units and administers 5000+ section 8 vouchers making it the fourth largest housing authority in New York State. Groundwork HV and the YHA received monies from New York State environmental facilities corporation which it then leveraged to get more grant monies from the Bezos Earth Fund and Bank of America to addressing climate resiliency at 10 of the 17 sites. YHA properties make up a total of 60 acres across Yonkers. They range from high rise to townhouse. Flooding, although not in flood zones, heath island effect and other issues have been documented and studied by Groundworks through grants from NOAA. The heat differential from the east side of Yonkers to the west side is two degrees. Southwest Yonkers has traditionally been the poorer, hotter neighborhoods and Groundwork was able to lay a heat map over the traditionally redlined areas and document the correlation between heat island effect and redlining. Together Groundwork and YHA have been speaking nationally at housing conferences and parks conferences on the connection between heat, health, and standardized test scores. They have also spoken about white roofs, bioswales, rain gardens and tree canopy as ways to mitigate heat island effect and address EJ. We have been asking anyone who is interested to reach out to us so. That we could provide a model of what teamwork among community partners can achieve in the area of climate resiliency and EJ as we are working with Mayor Spano, Iona University, workforce development (the green team is made up of YHA residents), the business council of Westchester, Westchester Community College and others. Please reach out to us.

Wilson Kimball

President & CEO Yonkers Housing Authority