No. 23-2146

IN THE UNITED STATES COURT OF APPEALS
FOR THE NINTH CIRCUIT

FOOD & WATER WATCH, CENTER FOR BIOLOGICAL DIVERSITY, CENTER FOR FOOD SAFETY, DAKOTA RURAL ACTION, DODGE COUNTY CONCERNED CITIZENS, ENVIRONMENTAL INTEGRITY PROJECT, HELPING OTHERS MAINTAIN ENVIRONMENTAL STANDARDS, INSTITUTE FOR AGRICULTURE AND TRADE POLICY, IOWA CITIZENS FOR COMMUNITY IMPROVEMENT, KEWAUNEE CITIZENS ADVOCATING RESPONSIBLE ENVIRONMENTAL STEWARDSHIP, LAND STEWARDSHIP PROJECT, MIDWEST ENVIRONMENTAL ADVOCATES, and NORTH CAROLINA ENVIRONMENTAL JUSTICE NETWORK,
Petitioners,
v.
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY,
Respondent.

AMICI CURIAE BRIEF OF KEEVE NACHMAN, Ph.D, SILVIA SECCHI, Ph.D., AND JENNIFER JAY, Ph.D., IN SUPPORT OF PETITIONERS

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AUTHORSHIP AND PREPARATION OF BRIEF

No party's counsel authored this brief in whole or in part; no party, party's counsel, or person other than *amici curiae* contributed money to the brief's preparation or submission.

STATEMENT OF INTEREST OF *AMICI CURIAE*

The *amici* are environmental scientists and scholars with a deep knowledge of concentrated animal feeding operations' (CAFOs') impacts on water quality and public health.

Keeve Nachman, Ph.D. is the Robert S. Lawrence Associate Professor of Environmental Health and Engineering at the Johns Hopkins Bloomberg School of Public Health. He is the Co-Director of the Johns Hopkins Risk Sciences and Public Policy Institute and the Associate Director of the Johns Hopkins Center for a Livable Future (CLF). His research expertise includes risk assessment, environmental epidemiology, toxicology, exposure science, and food systems. Dr. Nachman's research has documented the public health implications of agriculture, in particular industrial food animal production and animal waste management. He has assessed the public health implications of agricultural manure application and nitrate contamination of drinking water, including the risks posed to residents relying on contaminated private wells. He has also characterized increases in disease risk based on proximity to CAFOs. His research of food system issues (including antibiotic misuse and arsenic-based drugs, and state health and environmental agency oversight of and responses to community concerns regarding CAFOs) uses a multidisciplinary approach to characterize public health risks that can be addressed through modifications to production practices, human behaviors, or policy levers. Dr. Nachman holds a B.A., M.H.S., and Ph.D. from the Johns Hopkins University.

Silvia Secchi, Ph.D. is a professor of geographical and sustainability sciences at the University of Iowa. Professor Secchi's area of expertise is natural resource economics and policy, and specifically the environmental issues of industrialized agriculture. Secchi studies CAFOs from a policy standpoint in particular because the lack of regulatory oversight in the United States has created the conditions for CAFOs to proliferate, especially in places where state laws have not been implemented to produce stricter standards than the federal ones. Professor Secchi's research reveals that CAFOs' many environmental problems—from odor and air pollution to water pollution and antibiotic resistance to climate change—are the result of decades of policy that have allowed these facilities to socialize their environmental costs while receiving direct and indirect government subsidies.[1]

[1] *See, e.g.,* Silvia Secchi, *The role of conservation in United States' agricultural policy from the Dust Bowl to today: a critical assessment*, 53 Ambio 3 (Mar. 2024); Silvia Secchi, *What decades of policies aimed at agricultural water pollution can teach us about agricultural climate change mitigation: a US perspective*, Frontiers in Sustainable Food Systems 7 (2023).

Secchi finds that at the federal level, a critical issue has been EPA's poor application of environmental laws, specifically the Clean Water Act and Clean Air Act. Professor Secchi holds a Laurea in Economics from the Università Bocconi in Milan, Italy, a M.S. in Agricultural Economics from the University of Reading in the U.K., and a Ph.D. in Economics from Iowa State University.

Jennifer Ayla Jay, Ph.D. has been a Professor in the Civil and Environmental Engineering Department at the University of California Los Angeles for the last twenty-one years. Her research addresses the fate and transport of chemical and microbial contaminants in the environment, including environmental antibiotic resistance and pathogens. Her laboratory has found: 1) elevated levels of antibiotic resistance in airborne environmental bacteria collected near conventional cattle farms using antibiotics compared to isolates collected near organic cattle farms (Sanchez et al. 2016); 2) higher levels of antibiotic resistance in *Escherichia coli* from conventional commercially-available chicken products compared to organic products (Sanchez et al. 2020); and 3) orders of magnitude higher levels of antibiotic resistance genes in manure-containing garden products compared to native soil (Cira et al. 2021). She also developed expertise in microbial source identification in water when her laboratory was one of five core laboratories to participate in the California state-funded Source Identification Protocol Project, tasked with determining the ideal set of host-associated DNA-based markers to identify the sources of fecal pollution in the environment. Of her 75 peer-reviewed published journal papers, 60 directly address surface and groundwater pollution.

Professor Jay's team is particularly interested in addressing community-based environmental research questions in underserved communities and does so through the Center for Environmental Research and Community Engagement, a UCLA Center that she recently founded. Her lab is currently working with several community groups who are protecting neighborhoods from off-site pollution from industrial food animal production. Jay was awarded the Presidential Early Career Award in Science and Engineering, and two engineering school-wide award for excellence in teaching. In addition, she was the Pritzker Fellow for Environmental Sustainability and a Carnegie Fellow for Civic Engagement in Higher Education, and she recently named a Chancellor's Fellow for Community-Engaged Research. Jay earned her B.S., M.S., and Ph.D. in Civil and Environmental Engineering at Massachusetts Institute of Technology.

INTRODUCTION & SUMMARY OF THE ARGUMENT

EPA's current regulatory approach to CAFO water pollution is based on assumptions that are not grounded in science. EPA's foundational assumption—that cropland surrounding CAFOs will absorb the massive amounts of waste generated by these operations and prevent it from entering surface waters—has been incorrect for decades. Since at least the late 1990s, the federal government has known that, in many parts of the country, CAFO waste production exceeds what the surrounding land can use as fertilizer.[2] EPA itself acknowledged that "in many areas, manure is applied in excess of crop needs," and that "appropriate nutrient management practices are not followed for 92 percent of manured acres."[3] This imbalance has only worsened as the number of animals raised in concentrated, industrialized operations that mostly import animal feed has increased, causing a corollary

[2] ER-124 (GAO, Concentrated Animal Feeding Operations, 20 (Sept. 2008) (hereinafter, "GAO") ("The clustering of large operations in certain geographic areas may result in large amounts of manure that cannot be effectively used as fertilizer on adjacent cropland.")). For instance, a 2007 USDA study identified at least 179 counties in which even all the cropland and pastureland in the entire county could not absorb the nutrients in the waste generated by the county's CAFOs. ER-72–73. This figure represents a 22 percent increase in the number of counties unable to assimilate CAFO waste since USDA's 2002 assessment, part of a "steadily increasing" trend since at least 1982. *Id.*

[3] ER-115.

decrease in crop farming adjacent to CAFOs.[4] Thus, EPA is well-aware that land application of CAFO waste is an "insufficient" method of water pollution control.[5]

There is a strong scientific basis for addressing the gaps in EPA's regulation of polluted discharges from CAFOs. First, the problem is unequivocally serious. Pollution from agriculture, including CAFOs, is the leading cause of impaired water

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[4] *Compare* ER-232 to ER-90 (identifying a 16 percent increase in total CAFOs nationwide since 2011); *see also* ER-72–73 (373 percent increase in counties with excess CAFO waste from 1982 to 2011); Zihao Bian, *et al.*, *Production and application of manure nitrogen and phosphorus in the United States since 1860*, 13 Earth Syst. Sci. Data 2, 515–27 (2021); Lawrence B. Cahoon, *et al.*, *Nitrogen and Phosphorus Imports to the Cape Fear and Neuse River Basins to Support Intensive Livestock Production*, 33 Env't Sci. & Tech. 410 (1999) [AR0013625] (order of magnitude increase in nutrient pollution in watershed due to CAFOs); 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) [AR0013636] (finding where industrial swine facility density is high, surface waters have poor sanitary quality); Zach Raff & Andrew Meyer, *CAFOs and Surface Water Quality: Evidence from Wisconsin*, 104 Am, J. Agric. Econ. 161 (2022) [AR0013643] (linking data on CAFO intensity in Wisconsin with water quality measurements across the state to show that water quality decreased as CAFO intensity increased; finding that a marginal increase of one CAFO led to a 1.7 percent increase in phosphorus and 2.7 percent increase in ammonia levels compared to means in surface water in the region).

[5] *See, e.g.*, ER-89 (EPA acknowledging that land application of CAFO waste is an "insufficient" method of water pollution control, "[e]ven if CAFOs were to comply" with nutrient management plans); ER-115 (EPA acknowledging that rates for land application of CAFO waste are "agronomic rather than water quality-based").

quality in our nation's lakes and streams.[6] Pathogens and antibiotic resistant bacteria from CAFO discharges likewise pose a serious risk to human health.

Second, the cause of the problem is also clear. Massive amounts of CAFO pollution enter surface waters because EPA's current regulations allow the vast majority of CAFOs to discharge pollution without permits, and regardless of permit status, EPA's regulations do not address CAFO waste disposal methods that are known to result in discharges to surface water.[7] In particular, EPA's regulations allow for excessive application of waste to fields beyond the land's assimilative capacity, resulting in the horizontal transport of pollution into waterways. EPA's regulations

[6] National Pollutant Discharge Elimination System (NPDES) Regulation and Effluent Limitation Guidelines and Standards for CAFOs, 68 Fed. Reg. 7179, 7237 (Feb. 12, 2003) (codified at 40 C.F.R. pts. 9, 122, 123, 412) (hereinafter, "2003 CAFO Rule").

[7] *See, e.g.*, ER-90 (less than 30 percent of CAFOs have permits); Revised NPDES Permit Regulation and Effluent Limitations Guidelines for CAFOs in Response to the Waterkeeper Decision, 73 Fed. Reg. 70418, 70469 (Nov. 20, 2008) (hereinafter, "2008 Final CAFO Rule") (EPA recognizing that 75 percent of CAFOs discharge as a result of their "standard operational profiles"); ER-138 (EPA acknowledging that because of its regulations, "many CAFOs . . . discharge without NPDES permits" and requirements for permitted CAFOs fail to effectively limit polluted discharges and are too difficult to enforce).

likewise fail to address leaky waste lagoons. EPA's failure to regulate these known pathways of CAFO pollution leaves affected communities without a backstop.[8]

Third and finally, EPA's response to the petition to fix these regulatory oversights does not reflect a science-based approach. EPA's admission that it did not review the numerous scientific studies submitted with the petition,[9] and the agency's wholesale denial of the petition, including the request for better CAFO monitoring and data gathering requirements, belie EPA's assertion that it needs to study the problem more before deciding whether to act. As discussed below, there is already a robust scientific basis for closing the major loopholes in EPA's CAFO rules. Indeed, most of the studies cited in this brief were submitted with the petition or otherwise part of EPA's record, as noted by the citations to the administrative record and excerpts of record throughout this brief and in the table of contents. All other studies cited herein are also readily available to EPA.

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[8] *See* Jillian P. Fry, *et al.*, *Investigating the role of state permitting and agriculture agencies in addressing public health concerns related to industrial food animal production*, 9 PLOS ONE 2 (2014); Silvia Secchi & Moira McDonald, *The state of water quality strategies in the Mississippi River Basin: Is cooperative federalism working?,* 677 Science of The Total Environment, 241–49 (2019).

[9] Decl. of Wenonah Hauter, ¶¶ 8, 11.

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An agency "must examine the *relevant data* and articulate a *satisfactory explanation* for its action including a '*rational connection between the facts found and the choice made*.'"[10] An agency "cannot avoid its duty to confront" relevant data, including the agency's own prior findings "by blinding itself to them" as EPA has done here.[11]

I. EPA's regulations fail to control CAFO water pollution.

EPA's existing regulations do not prevent CAFOs from polluting surface waters. The scale and severity of the problem require EPA to prioritize overhauling its regulations.

A. CAFOs are a major contributor to surface water quality impairments.

"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."[12] Indeed, for over

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[10] *Humane Soc'y of the United States v. Locke*, 626 F.3d 1040, 1051 (9th Cir. 2010) (quoting *Motor Vehicle Mfrs. Ass'n of U.S., Inc. v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43, 52 (1983), emphasis added by *Locke*).

[11] *Id.*; *see also Morall v. U.S. DEA,* 412 F.3d 165, 178, (D.C. Cir. 2005) ("[The agency's] decision does not withstand review because the agency decisionmaker entirely ignored relevant evidence.")

[12] *Cmty. Ass'n for Restoration of the Env't v. Henry Bosma Dairy*, 305 F.3d 943, 955 (9th Cir. 2002).

twenty years EPA has known that the agriculture sector, including CAFOs, is the leading cause of documented surface water quality "impairments," i.e., water bodies that do not meet water quality criteria.[13] CAFOs discharge massive amounts of nutrient pollution, especially nitrogen and phosphorus.[14] EPA has recognized that

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[13] 2003 CAFO Rule, 68 Fed. Reg. at 7237; *see also* David Osterberg & David Wallinga, *Addressing Externalities from Swine Production to Reduce Public Health & Environmental Impacts*, 94 Am. J. Pub. Health 1703, 1704 (Oct. 2004) (estimating that "[c]urrent farming practices are responsible for 70% of the pollution in the nation's rivers and streams"); GAO at 23, 65–67 (Summarizing "the eight government-sponsored or peer-reviewed studies completed [between 2002 and 2008] that found direct links between water pollutants from animal waste and impacts on human health or the environment.") [AR_13885]; *see also Food & Water Watch v. U.S. EPA*, 20 F.4th 506, 512 (9th Cir. 2021) ("Improper management of CAFO waste has resulted in serious water quality problems in Idaho. . . Watersheds in CAFO-dominated areas have excessive and unsafe levels of E. coli, fecal coliform, and nutrients, as well as low levels of dissolved oxygen, which is essential to healthy aquatic life."); Michael A. Mallin & Matthew R. McIver, *Season Matters When Sampling Streams for Swine CAFO Waste Pollution Impacts*, 16 J. Water & Health 78 (2018) [AR_13638] (finding levels of ammonia, nitrate, and fecal coliform were highest near swine sprayfields, biological oxygen demand levels were very elevated and correlated with other contaminated present in CAFO wastewater); 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) [AR_13638] (finding industrial-scale swine and poultry production leads to chronic surface water pollution hazardous to human health, and current waste management protocols fail to protect freshwater and estuarine ecosystems).

[14] *See, e.g.*, 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) [AR_13631] (finding industrial animal facilities cause phosphorus and nitrogen to enter the environment, contributing to eutrophication in nutrient-sensitive watersheds).

"[n]utrient pollution is one of America's most widespread, costly and challenging environmental problems."[15]

In recent decades, the magnitude of nutrient pollution from CAFOs has increased because the number of animals raised in CAFOs has grown, while the number of CAFOs has decreased, thereby increasing concentration and manure disposal problems.[16]

B. Pathogens, pharmaceuticals, and hormones from CAFO pollution threaten human health.

CAFO pollution is not limited to nutrients.[17] EPA has long recognized that that "[m]ore than 150 pathogens associated with industrial livestock production are also associated with risks to humans, including the six human pathogens that account for

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[15] U.S. EPA, Nutrient Pollution: The Problem, https://www.epa.gov/nutrientpollution/problem.

[16] *Compare* ER-232 to ER-90; *see also* ER-72–73, ER-13–14.

[17] Proposed NPDES CAFO Reporting Rule, 76 Fed. Reg. 65431, 65433–34 (Oct. 21, 2011) (recognizing CAFO pollution includes pathogens, antibiotics, artificial growth hormones, heavy metals, and pesticides).

more than 90% of food and waterborne diseases."[18] Runoff from CAFO waste application fields is a significant source of these waterborne pathogens.[19]

Pharmaceuticals in CAFO discharges, especially antibiotics, are another major human health concern. Antibiotics have repeatedly been detected in waters surrounding CAFOs.[20] Antibiotics are fed to livestock at sub-therapeutic doses,

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[18] 2003 CAFO Rule, 68 Fed. Reg. at 7236; *see also* JoAnn M. Burkholder & Howard B. Glasgow, *History of Toxic Pfiesteria in North Carolina Estuaries from 1991 to the Present*, 51 BioScience 827 (2001) (noting adverse environmental and health effects caused by *Pfistiera*, a potentially toxic microbe, are linked to water pollution from industrial swine facilities).

[19] ER-288 (JoAnn Burkholder, *et al.*, *Impacts of Waste from Concentrated Animal Feeding Operations on Water Quality*, 115 Env't Health Persps. 308 (2007) [AR_14727] (finding runoff from waste fields and leaky waste lagoons among pathways for CAFO contaminants to reach surface waters, posing human health threat)); Donald W. Meals & David C. Braun, *Demonstration of Methods to Reduce E. coli Runoff from Dairy Manure Application Sites*, 35 J. Envtl. Quality 1088 (2006) [AR_13631] (finding bacterial pathogen levels in runoff from fields receiving liquid dairy manure pose a significant risk of pollution, particularly from fields receiving manure before rainfall); Michael Greger & Gowri Koneswaran, *The Public Health Impacts of Concentrated Animal Feeding Operations on Local Communities*, 33 Family & Cmty. Health 11 (2010) [AR_13635] (finding 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).

[20] *See, e.g.*, Joanne C. Chee-Sanford, *et al.*, *Fate and Transport of Antibiotic Residues and Antibiotic Resistance Genes following Land Application of Manure Waste*, 38 J. Envtl. Quality 1086 (2009) [AR_19745]; Pew Commission on Industrial Farm Animal Production, Putting Meat on the Table: Industrial Farm Animal Production in America, 15–16 (2008) [AR_16373]; GAO at 70, 72 (citing Enzo R. Campagnolo, *et al. Antimicrobial Residues in Animal Waste and Water Resources Proximal to Large-Scale Swine and Poultry Feeding Operations*, 299 The Science

fostering the proliferation of antibiotic resistant bacteria and multidrug resistant bacteria in fecal matter from livestock.[21] These bacteria can migrate to local waterways through land application of waste, leaking lagoons, and airborne dust.[22] For example, a recent paper documented that not only were levels of *Escherichia coli* and a DNA-based swine marker elevated in watersheds containing commercial hog operations compared to nearby watersheds without such facilities, *E. coli* isolated from areas near CAFOs showed more resistance to antibiotics and other

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of the Total Environment 1, 89–95 (2002); 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) [AR_13632] (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); Christiana Thorsten, *et al.*, *Determination of Antibiotic Residues in Manure, Soil, and Surface Waters*, 31 Acta hydrochimica et hydrobiological 1, 36–44 (2003); Yi Luo, *et al.*, *Trends in Antibiotic Resistance Genes Occurrence in the Haihe River, China*, 44 Envtl. Sci. Tech. 7220 (2010).

[21] 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) [AR0013641] (showing multi-drug resistance in CAFO-impacted sites); Carrie E. Givens, *et al*., *Simultaneous stream assessment of antibiotics, bacteria, antibiotic resistant bacteria, and antibiotic resistant genes in an agricultural region of the United States*, 904 Science of The Total Environment (2023) (finding antibiotic resistant bacteria across numerous Iowa streams).

[22] *See supra*, n. 19–21; Helen M. Sanchez, *et al.*, *Comparison of antibiotic resistance in airborne bacteria near conventional and organic beef production facilities in California, USA*, 227 Water Air and Soil Pollution 8 (2016).

drugs.[23] Others have documented that water collected near CAFOs not only had impaired water quality in terms on phosphorus and turbidity, multidrug resistance among environmental bacteria was elevated.[24]

In addition, CAFOs are sources of antibiotics that pass through the body of the animal unmetabolized, leading to repeated detection of antibiotics in waters surrounding CAFOs.[25] The presence of antibiotics in the environment creates conditions in the downstream environments that promote the proliferation of antibiotic resistant bacteria by the application of selective pressure. Bacteria possessing antibiotic resistance genes have a selective advantage over others when antibiotics are present in the environment. CAFOs thus contribute to the generation

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[23] 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 2:156085 (2022).

[24] West, 217 Water, Air, & Soil Pollution 473; 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) [AR001363] (antibiotic-resistant Staphylococcus aureus, including MSSA, MRSA, and MDRSA, present in surface waters adjacent to swine waste sprayfields in southeastern North Carolina).

[25] *See, e.g.*, Joanne C. Chee-Sanford, 38 J. Envtl. Quality 1086; Yi Luo, 44 Envtl. Sci. Tech. 7220; Pew Commission on Industrial Farm Animal Production at 15–16; GAO at 70, 72; Dongle Cheng, *et al.*, *A critical review on antibiotics and hormones in swine wastewater: Water pollution problems and control approaches*, 387 J. Haz. Materials 121682 (2020) (reviewing the presence of antibiotics and hormones present in swine CAFO wastewater, as 70 to 90 percent of these substances pass through swine unmetabolized).

and proliferation of antibiotic-resistant bacteria, a major public health concern for persons who are exposed.[26]

In addition to disease-causing pathogens and antibiotics, CAFO waste also contains artificial growth hormones, heavy metals, and pesticides,[27] which contribute to human health and environmental risks without offering benefits to crops.

EPA's CAFO effluent limitation guidelines, which only apply to large CAFOs that obtain permits, ignore antibiotics and other pharmaceuticals, drug-resistant

[26] Shane Rogers & John Haines, *Detecting and Mitigating the Environmental Impact of Fecal Pathogens Originating from Confined Animal Feeding Operations: Review*, EPA/600/R-06/021 15 (Sept. 2005) (antibiotic resistance increasing the need for hospitalization and average length of hospital stay).

[27] Proposed NPDES CAFO Reporting Rule, 76 Fed. Reg. at 65433–34; *see also* Danika Hill, *et al.*, *Dairy Manure As a Potential Source of Crop Nutrients and Environmental Contaminants*, 100 J. Env't Sci. 117 (2021) [AR_13642] (reporting dairy manure contains hormones, antibiotics, heavy metals, antibiotic resistance genes, and veterinary drugs); D. Raj Raman *et al.*, *Estrogen Content of Dairy and Swine Wastes*, 38 Env't Sci. & Tech. 3567 (2004) [AR_13632] (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); Heather E. Gall, *et al.*, *Assessing the impacts of anthropogenic and hydro-climatic drivers on estrogen legacies and trajectories*, 87 Advances in Water Resources 19-28 (2016); Alistair B.A. Boxall, *et al.*, *Are Veterinary Medicines Causing Environmental Risks?*, 37 Envtl. Science & Tech. 15, 286A–294A (2003).

bacteria, hormones, heavy metals, and pesticides altogether.[28] The petition's request to address these human health risks is strongly supported by the scientific literature.

II. EPA's regulations do not address the primary means of release of water pollution from CAFOs.

EPA's regulatory scheme for CAFOs neglects the most significant routes by which CAFO waste enters surface waters: land application and leaking lagoons. EPA neglects these major pollution pathways in its threshold regulations that decide which CAFOs must apply for CWA permits and in its regulation of permitted CAFOs.

A. EPA does not meaningfully regulate land application of CAFO waste, which routinely results in nutrients and other pollution entering surface water.

As this Court recognized, with respect to land application of CAFO waste "improper application, rainfall, or irrigation can result in discharges that reach navigable waters."[29] EPA even acknowledges "the runoff from land application of manure at CAFOs is a major route of pollutant discharges from CAFOs."[30] Yet, EPA's CAFO regulations contain broad exemptions that allow for this exact "major route of pollutant discharges from CAFOs" to persist.

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[28] *See* 40 C.F.R. § 412.2(j)–(k); 2008 Final CAFO Rule, 73 Fed. Reg. at 70463.

[29] *Food & Water Watch v. U.S. EPA*, 20 F.4th at 509.

[30] 2003 CAFO Rule, 68 Fed. Reg. at 7196.

Under EPA's "agricultural stormwater exemption" the agency does not require a permit for "stormwater discharges from CAFO fields if the CAFO has land applied manure, litter, or process wastewater in accordance with site-specific nutrient management practices," nor does it consider such discharges to be permit violations.[31] This is inherently problematic because over-application of manure is a common and even recommended nutrient management practice.[32]

Scientific literature shows that waste from CAFOs contributes substantially to nutrient pollution when spread on fields, and waste is often applied to fields at

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[31] *Food & Water Watch*, 20 F.4th at 510, 512. In contrast, this Court has ruled "fields where manure is stored" are part of the CAFO and are "point sources" and runoff from them is subject to Clean Water Act regulation. *Cmty. Ass'n for Restoration of the Env't v. Henry Bosma Dairy*, 305 F.3d at 955–56 (noting this interpretation "serves the purpose of the CWA to control the disposal of pollutants in order to restore and maintain the waters of the United States").

[32] ER-184–85 (collecting scientific evidence that applying CAFO waste to land at recommended rates results in excess nutrients that endanger water quality); ER-275 (Robin Shepard, *Nutrient Management Planning: Is it the Answer to Better Management?*, 60 J. Soil & Water Conserv. 171, 176 (2005) [AR_15901]); Andrew Sharpley, *Agricultural Phosphorous, Water Quality, and Poultry Production: Are They Compatible?,* 78 Poultry Sci. 660, 668 (1999) [AR_15887]; *see also* Sarah A. Porter & David E. James, *Using a Spatially Explicit Approach to Assess the Contribution of Livestock Manure to Minnesota's Agricultural Nitrogen Budget*, 10 Agronomy 4, 480 (2020); Matthew T. Streeter, *et al.*, *Effects of cattle manure and soil parent material on shallow groundwater quality*, 6 Agrosys. Geoscis. & Env't 3:e20380 (2023).

higher nitrogen and phosphorus rates than commercial fertilizer.[33] As a result, 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.[34] Stormwater runoff from waste application fields also carries significant loads of disease causing pathogens, especially fields that have received manure before rain events.[35]

[33] 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) [AR0013642].

[34] 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) [AR_13633]; *see also* L.M. Risse, *et al.*, Land Application of Manure for Beneficial Reuse, National Center for Manure and Animal Waste Management White Papers, 17 (2001) [AR_16048] (noting concentrations of phosphorus can be "quite high" when "runoff occurs within a few weeks of manure application").

[35] ER-288 (Burkholder, 115 Env't Health Persps. 308 [AR_14727] (waste application field runoff contaminates surface waters, posing human health threat); Meals, 35 J. Env't Quality 1088 (finding bacterial pathogen levels in runoff from fields receiving liquid dairy manure pose a significant risk of pollution, particularly from fields receiving manure before rainfall); Greger & Koneswaran, 33 Family & Cmty. Health 11 (linking runoff from land application fields with outbreaks of harmful pathogens).

EPA's regulatory assumption that "irrigation-produced runoff of pollutants will never occur" as long as waste is applied at "agronomic rates" is flawed for the same reason.[36]

In truth, irrigation and rainfall both convey the excessive CAFO waste from the fields into nearby waterways. Indeed, EPA itself estimated that up to 75 percent of CAFOs do in fact discharge as a result of their "standard operational profiles."[37] Yet only a tiny, diminishing fraction of CAFOs have discharge permits.[38]

Basic environmental science shows the faults in EPA's current regulatory presumptions, including the agricultural stormwater exemption. Waste application rates are most often based on the optimal amount of nitrogen for plant growth.[39] However, because of the ratio of nitrogen to phosphorus in manure, this "invariably

[36] *Food & Water Watch v. U.S. EPA*, 20 F.4th at 518 (finding "little in the record to support" EPA's assumption).

[37] *Supra,* n. 7.

[38] *Id.*; *see also* 2003 CAFO Rule, 68 Fed. Reg. at 7180; U.S. EPA, NPDES CAFO Regulations Implementation Status Reports https://www.epa.gov/npdes/npdes-cafo-regulations-implementation-status-reports (showing decline in number of CAFOs with permits).

[39] University of Georgia Cooperative Extension, Small Farm Nutrient Management Primer: For Un-permitted Animal Feeding Operations 4-6 (Jan. 2006) [AR_23208]; Risse, *Land Application of Manure for Beneficial Reuse* at ii, 17.

means [phosphorus] is over-applied."[40] For example, researchers analyzing recommended application rates for Coastal bermudagrass, a crop commonly grown on CAFO waste application fields, found that "[n]itrogen application at the

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[40] University of Kentucky Research Foundation, Demonstration of Enhanced Technologies for Land Application of Animal Nutrient Sources in Sensitive Watersheds: Final Progress Report 2 (2008) [AR_15773]; *see also* U.S. EPA, *Transport and Fate of Nutrients and Indicator Microorganisms at a Dairy Lagoon Water Application Site: An Assessment of Nutrient Management Plans* at 8 [AR_18829] ("NMPs that are designed to meet the nitrogen requirement for crops may result in the over-application of phosphorous."); Risse, *Land Application of Manure for Beneficial Reuse* at ii (explaining the "special problem" of excess phosphorus); Environmental Integrity Project, Manure Overload on Maryland's Eastern Shore 8 (Dec. 8, 2014) [AR_19550] (finding 75 percent of phosphorous from poultry operations on Maryland's Eastern Shore was applied in excess of crop needs); 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) [AR0013629] (finding manure application increased dissolved reactive phosphorus concentrations in spring runoff by two to five times); 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) (finding levels of dissolved reactive phosphorus in runoff increased with increasing manure application rates); Mallin, 16 J. Water & Health 78 (finding seasonal waste application on fields aligns with seasonal differences in adjacent stream water quality for nitrogen, fecal bacteria); 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) [AR_13643] (finding phosphorus often exceeded surface water standards, increased with proximity to dairy operations, and increased with newly permitted CAFOs; phosphorus loads downstream from CAFOs increased by 91 percent following CAFO expansions); Andrew Meyer, *et al.*, *Remotely sensed imagery reveals animal feeding operations increase downstream dissolved reactive phosphorus*, J. Amer. Water Resources Ass'n (Nov. 22, 2023) https://doi.org/10.1111/1752-1688.13177 (finding average additional CAFO increased downstream dissolved reactive phosphorus 10 to 15 percent).

recommended rate . . . resulted in [phosphorus] application at nearly three times the recommended rate."[41] Studies likewise show excessive nitrogen releases to ground and surface water when waste is applied at agronomic rates for phosphorus.[42]

Thus, both nitrogen and phosphorus are very often applied in excess,[43] and rainfall and irrigation deliver these excess nutrients into drainage ditches and surrounding waterways.[44] Accordingly, *amici* cannot identify any basis for EPA to

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[41] Robert 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) [AR0013591].

[42] Streeter, 6 Agrosys. Geoscis. & Env't 3 (explaining "if cattle manure (and any other nutrient input) is applied at agronomic rates for [phosphorus] while not accounting for the manure [nitrogen] in the total input budget for that nutrient, the potential to degrade groundwater resources with NO3-N is high."); *cf.* Colleen N. Brown, *et al.*, *Tracing Nutrient Pollution from Industrialized Animal Production in a Large Coastal Watershed*, 192 Env't Monitoring Assessment 515 (2020) [AR0013642] (detecting CAFO-derived nutrients many kilometers downstream from CAFOs; samples taken during months when waste application occurs have maximum nitrate concentrations, attributed to waste effluent).

[43] *See, e.g.* Claudia Copeland, *Animal Waste and Hazardous Substances: Current Laws and Legislative Issues*, CRS Report RL33691 1 (Nov. 8, 2011) [AR_19617] (In 1997, USDA estimated that 66,000 operations had nitrogen in excess of the "assimilative capacity of the soil," while 89,000 operations had a similar excess in phosphorous.)

[44] *Id.*; *see generally* ER-184; ER-288 (Burkholder, 115 Env't Health Persps. 308 (surveying literature that found high concentrations of nitrogen in surface waters adjacent to sprayfields where animal waste was applied at recommended rates)); GAO at 65–66, 68, 70–72 (literature survey); *see also* Christopher S. Jones, *et al.*,

maintain regulations that equate agronomic rates with a minimal risk of polluted runoff, much less with Clean Water Act compliance.

EPA itself appears to acknowledge that its reasoning is not supported by data or science. For example, EPA recognized that agronomic-based manure application rates are different from water quality-based rates or standards that would prevent nutrient-laden discharges from fields.[45] And, as another EPA-reviewed white paper acknowledged, "few studies have documented the effectiveness of nutrient management plans and some studies suggest it is difficult for farmers to reduce environmental impacts even with well developed plans. . . Even under ideal conditions, there is still a significant risk of [manure] losses to the environment."[46]

EPA's regulations also allow CAFO waste to be applied to fields that cannot take up any "fertilizer," such fields without crops and frozen, saturated, and snow-

Livestock manure driving stream nitrate, 48 Ambio 1143–53 (2018); Zihao Bian, 13 Earth Syst. Sci. Data 2, 515–27.

[45] ER-115; ER-89.

[46] Risse, *Land Application of Manure for Beneficial Reuse* at iii; *see also id.* at 17 ("Even under ideal conditions, with a well planned system, there is still a significant risk of losses to the environment. Agricultural systems leak and elimination of non-point source impacts is practically impossible.")

covered ground.[47] Crops cannot effectively take up nutrients when the ground is frozen.[48] CAFO waste that is applied to frozen ground is destined for drainage channels and waterways.[49] Here again, EPA appears to acknowledge these practices fail to protect water quality but declined the petition's request to regulate them.[50]

In sum, scientific literature showing polluted discharges from CAFOs waste fields does not square with the agricultural stormwater exemption. Studies show that CAFOs waste runs off of fields carrying significant quantities of nutrients, pathogens, and other pollutants, despite being applied at recommended agronomic rates.

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[47] *See* ER-209 (U.S. EPA, NPDES Permit Writers' Manual for CAFOs, EPA 833-F-2-001, 6-16 (Feb. 2012) [AR_15752] (strongly encouraging states to prohibit application to frozen ground but declining to establish federal prohibition)).

[48] International Joint Commission, A Balanced Diet for Lake Erie: Reducing Phosphorous Loadings and Harmful Algal Blooms 75 (2014) [AR_22014]; Ontario Ministry of Agriculture, Food, and Rural Affairs, Winter Application of Manure and Other Agricultural Source Material, OMAFRA Fact Sheet 10-073 (Sept. 2010) [AR_17096].

[49] *See* ER-185 [AR_13592-94] (collecting literature detailing the problems of winter application of CAFO waste); International Joint Commission, A Balanced Diet for Lake Erie at 9 [AR_22014]; Iowa State Univ. Extension and Outreach, Using Manure Nutrients for Crop Production 6 (May 2016) [AR_21923].

[50] *See* ER-209 (EPA Permit Writers' Manual at 6-16); ER-230.

B. EPA ignores that CAFO waste lagoons leak even when they meet design standards.

This Court also recently recognized that EPA's failure to properly regulate CAFO waste lagoons allows for significant surface water pollution. The Court explained:

> Even assuming the lagoons were constructed pursuant to Natural Resource Conservation Service standards, these standards specifically allow for permeability and, thus, the lagoons are designed to leak. . . . Depending on the character of the soil surrounding the lagoon, animal waste leaked from lagoons can reach groundwater that can, in turn, reach navigable waters. . . The record before the EPA showed that leaky containment structures—especially lagoons—are sources of groundwater pollution and that groundwater flow is the primary contributor of nitrate to surface water from agriculture.[51]

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[51] *Food & Water Watch v. U.S. EPA*, 20 F.4th at 509, 517 (internal punctuation omitted; quoting *Cmty. Ass'n for Restoration of the Env't, Inc. v. Cow Palace, LLC*, 80 F. Supp. 3d 1180, 1223 (E.D. Wash. 2015)). While the Court's 2021 decision focused on Idaho CAFOs, leaky lagoons are common across the nation. *See, e.g., Cow Palace, LLC*, 80 F. Supp. 3d at 1223; Walt W. McNab Jr., *et al.*, *Assessing the Impact of Animal Waste Lagoon Seepage on the Geochemistry of an Underlying Shallow Aquifer*, 41 Envt. Sci. Tech. 753–58 (2007) (Research from over 15 years ago documenting transport of pollutants through the subsurface from dairy lagoons); 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) [AR_13634] (indicating that contamination of waterways with swine waste may be more extensive than previously thought); Sinan Sousan, *et al.*, *High-frequency assessment of air and water quality at a concentration animal feeding operation during wastewater application to spray fields*, 288 Envt'l Pollution 117801 (2021) (seepage from swine CAFO manure sprayfield had dissolved inorganic nitrogen levels that were 25 times higher than the values observed upstream).

EPA's regulations improperly ignore the need for a permit for such discharges.[52] Yet, EPA denied the petition's request to address this regulatory omission without so much as reviewing the published literature on this pollution pathway.[53] As with EPA's failure to address the land application pollution pathway, EPA's refusal to address leaky CAFO waste lagoons appears to be the result of the agency impermissibly "blinding itself" to the relevant data.[54]

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[52] *See Cty. of Maui v. Haw. Wildlife Fund*, 140 S. Ct. 1462, 1468 (2020) (holding that CWA permits are required where discharges via groundwater are the "functional equivalent of a direct discharge"); *Olympic Forest Coal. v. Coast Seafoods Co.*, 884 F.3d 901, 908 (9th Cir. 2018) ("It makes practical sense that a CAFO is itself a point source. A CAFO can discharge pollutants through pipes, ditches, channels, or similar conduits; but it often discharges pollutants directly, without using any such conduit. For example, a CAFO for land-based animals such as a cattle feeding lot can discharge pollutants from a manure storage 'lagoon' into navigable waters through direct seepage into the earth . . .")

[53] ER-230; Decl. of Wenonah Hauter, ¶¶ 8, 11.

[54] *Humane Soc'y of the United States v. Locke*, 626 F.3d at 1051.

CONCLUSION

Available science shows that common CAFO waste storage and disposal methods allowed under EPA's current rules, including the agricultural stormwater exemption, fail to prevent discharges and protect water quality. EPA understandably may need to conduct additional analyses to finalize specific aspects of new CAFO regulations. However, given the robust evidence of the existing pollution problem and the reasons for it, no additional information is needed to conclude that current regulations are inadequate and stronger ones are needed.

Respectfully submitted this 4th day of March 2024.

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CERTIFICATE OF COMPLIANCE

9th Cir. Case Number(s) 23-2146

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