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Molly C. Dwyer
Clerk of Court

October 07, 2022

No.:	22-70226
Short Title:	Food & Water Watch, Inc., et al. v. USEPA

Dear Petitioners/Counsel

A petition for writ of mandamus and/or prohibition has been received in the Clerk's Office of the United States Court of Appeals for the Ninth Circuit. The U.S. Court of Appeals docket number shown above has been assigned to this case. Always indicate this docket number when corresponding with this office about your case.

If the U.S. Court of Appeals docket fee has not yet been paid, please make immediate arrangements to do so. If you wish to apply for in forma pauperis status, you must file a motion for permission to proceed in forma pauperis with this court.

Pursuant to FRAP Rule 21(b), no answer to a petition for writ of mandamus and/or prohibition may be filed unless ordered by the Court. If such an order is issued, the answer shall be filed by the respondents within the time fixed by the Court.

Pursuant to Circuit Rule 21-2, an application for writ of mandamus and/or prohibition shall not bear the name of the district court judge concerned. Rather, the appropriate district court shall be named as respondent.

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ATTENTION ALL PARTIES AND COUNSEL
PLEASE REVIEW PARTIES AND COUNSEL LISTING

We have opened this appeal/petition based on the information provided to us by the appellant/petitioner and/or the lower court or agency. EVERY attorney and unrepresented litigant receiving this notice MUST immediately review the caption and service list for this case and notify the Court of any corrections.

Failure to ensure that all parties and counsel are accurately listed on our docket, and that counsel are registered and admitted, may result in your inability to participate in and/or receive notice of filings in this case, and may also result in the waiver of claims or defenses.

PARTY LISTING:
Notify the Clerk immediately if you (as an unrepresented litigant) or your client(s) are not properly and accurately listed or identified as a party to the appeal/petition. To report an inaccurate identification of a party (including company names, substitution of government officials appearing only in their official capacity, or spelling errors), or to request that a party who is listed only by their lower court role (such as plaintiff/defendant/movant) be listed as a party to the appeal/petition as an appellee or respondent so that the party can appear in this Court and submit filings, contact the Help Desk at http://www.ca9.uscourts.gov/cmecf/feedback/ or send a letter to the Clerk. If you or your client were identified as a party to the appeal/petition in the notice of appeal/petition for review or representation statement and you believe this is in error, file a motion to dismiss as to those parties.

COUNSEL LISTING:
In addition to reviewing the caption with respect to your client(s) as discussed above, all counsel receiving this notice must also review the electronic notice of docket activity or the service list for the case to ensure that the correct counsel are

listed for your clients. If appellate counsel are not on the service list, they must file a notice of appearance or substitution immediately or contact the Clerk's office.

NOTE that in criminal and habeas corpus appeals, trial counsel WILL remain as counsel of record on appeal until or unless they are relieved or replaced by Court order. *See* Ninth Circuit Rule 4-1.

REGISTRATION AND ADMISSION TO PRACTICE:
Every counsel listed on the docket must be admitted to practice before the Ninth Circuit AND registered for electronic filing in the Ninth Circuit in order to remain or appear on the docket as counsel of record. *See* Ninth Circuit Rules 25-5(a) and 46-1.2. These are two separate and independent requirements and doing one does not satisfy the other. If you are not registered and/or admitted, you MUST, within 7 days from receipt of this notice, register for electronic filing AND apply for admission, or be replaced by substitute counsel or otherwise withdraw from the case.

If you are not registered for electronic filing, you will not receive further notices of filings from the Court in this case, including important scheduling orders and orders requiring a response. Failure to respond to a Court order or otherwise meet an established deadline can result in the dismissal of the appeal/petition for failure to prosecute by the Clerk pursuant to Ninth Circuit Rule 42-1, or other action adverse to your client.

If you will be replaced by substitute counsel, new counsel should file a notice of appearance/substitution (no form or other attachment is required) and should note that they are replacing existing counsel. To withdraw without replacement, you must electronically file a notice or motion to withdraw as counsel from this appeal/petition and include your client's contact information.

To register for electronic filing, and for more information about Ninth Circuit CM/ECF, visit our website at http://www.ca9.uscourts.gov/cmecf/#section-registration.

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NO. _____

IN THE UNITED STATES COURT OF APPEALS
FOR THE NINTH CIRCUIT

FOOD & WATER WATCH, INC., 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 CARES, MIDWEST ENVIRONMENTAL ADVOCATES, NORTH CAROLINA ENVIRONMENTAL JUSTICE NETWORK,

Petitioners,

v.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY,

Respondent.

PETITION FOR A WRIT OF MANDAMUS TO COMPEL UNREASONABLY DELAYED ACTION BY THE ENVIRONMENTAL PROTECTION AGENCY

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INTRODUCTION

Concentrated animal feeding operation (CAFO) pollution devastates waterways across the country, jeopardizing human health and the environment in the process. Congress has expressly directed the United States Environmental Protection Agency (EPA or the Agency) to regulate CAFO pollution under the Clean Water Act. But decades later, EPA's lax regulation of the industry's pollution has failed to protect the nation's waters or the communities that rely on these essential resources. To remedy this failure, in 2017 dozens of groups (Petitioners) petitioned EPA to strengthen its regulatory approach to CAFOs, recommending specific actions the Agency should take to ensure that all discharging facilities are subject to Clean Water Act permits, and that those permits are sufficiently protective of water quality.

It has been well over five years since Petitioners filed the Petition, yet EPA has failed to respond. This delay necessitates a writ of mandamus under the well-known "*TRAC*" factors. EPA's unjustified failure to act exceeds any rule of reason, particularly in light of the Clean Water Act timetables established to continually strengthen oversight of CAFO pollution. Critically, EPA's delay is perpetuating the ongoing harm that unchecked CAFO water pollution inflicts on Petitioners, their members, and communities across the country. Given the magnitude of the health and environmental threats, competing priorities do not justify further delay. Finally, EPA's repeated refusal to regulate CAFO pollution demonstrates it likely will not

act of its own accord. EPA has violated its duty to timely respond to the Petition, and its egregious delay warrants this Court's intervention.

RELIEF SOUGHT

Petitioners Food & Water Watch, Center for Food Safety, Dakota Rural Action, Dodge County Concerned Citizens, the Environmental Integrity Project, Helping Others Maintain Environmental Standards, Institute for Agriculture and Trade Policy, Iowa Citizens for Community Improvement, Kewaunee CARES, Midwest Environmental Advocates, and North Carolina Environmental Justice Network[1] request that this Court issue a writ of mandamus compelling EPA to take a final, reviewable action in response to their March 8, 2017 *Petition to Revise the Clean Water Act Regulations for Concentrated Animal Feeding Operations* by approving or denying it in writing. Petitioners ask the Court to order EPA to respond within 90 days and to retain jurisdiction to ensure a complete response.

ISSUE PRESENTED

Whether EPA's failure to respond to the Petition for more than five years is

[1] Petitioners have contemporaneously filed a Motion for Leave to File Standing Declarations, appending 16 declarations thereto (Exhibits 1–16) that establish Petitioners' standing in this case. *See Nw. Env't Def. Ctr. v. Bonneville Power Admin.*, 117 F.3d 1520, 1527–28 (9th Cir. 1997) (considering affidavits to prove standing because "petitioners had no reason to include facts sufficient to establish standing as a part of the administrative record"). Petitioners also file the Declaration of Emily Miller, attaching documents received from EPA through the Freedom of Information Act.

arbitrary, capricious, and contrary to the Administrative Procedure Act, 5 U.S.C. § 555(b), which requires federal agencies to conclude matters presented to them "within a reasonable time."

STATEMENT OF JURISDICTION

The All Writs Act, 28 U.S.C. § 1651(a), authorizes the courts of appeals to issue "all writs necessary or appropriate in aid of their respective jurisdictions," including writs of mandamus ordering agencies to take final actions in the event of unreasonable delay. *See In re A Cmty. Voice*, 878 F.3d 779, 783 (9th Cir. 2017). In such cases, when a court "would have jurisdiction to review a final rule" then it also has jurisdiction to determine whether an agency's delay with respect to that final action is unreasonable. *Cmty. Voice*, 878 F.3d at 783 (citing *Telecomms. Res. & Action Ctr. v. FCC* (*TRAC)*, 750 F.2d 70, 75 (D.C. Cir. 1984) ("Where a statute commits review of agency action to the Court of Appeals, any suit seeking relief that might affect the Circuit Court's future jurisdiction is subject to the *exclusive* review of the Court of Appeals.")).

In this case, section 509 of the Clean Water Act, 33 U.S.C. § 1369(b)(1), commits review of a final rule on CAFOs to the courts of appeals. Section 509 grants courts of appeals exclusive jurisdiction over any determination EPA makes "in approving or promulgating any effluent limitation" and in "issuing or denying any [National Pollutant Discharge Elimination System (NPDES)] permit." 33 U.S.C. §

1369(b)(1)(E)–(F). These provisions empower appellate courts to review effluent limitations guidelines promulgated by EPA, *see E.I. Du Pont de Nemours & Co. v. Train*, 430 U.S. 112, 136–137 (1977), as well as any "rules that regulate the underlying NPDES permitting procedures." *NRDC v. EPA*, 966 F.2d 1292, 1296–97 (9th Cir. 1992). Here, the Petition requests EPA overhaul its Clean Water Act regulation of CAFOs by revising the rules underlying CAFO permitting procedures and strengthening applicable effluent limitations guidelines. *See* Appendix at APP018. Any final action EPA undertakes in response to the Petition is therefore subject to direct Circuit Court review. *See, e.g., Waterkeeper All., Inc. v. EPA*, 399 F.3d 486, 490 (2d Cir. 2005); *Nat'l Pork Producers Council v. EPA*, 635 F.3d 738, 747 (5th Cir. 2011) (both challenging EPA CAFO rules directly in the Circuit Court).

Venue is appropriate in the Ninth Circuit if any petitioner "transacts business which is directly affected by [the at-issue] action" within the Circuit. 33 U.S.C. § 1369(b)(1). For purposes of section 509 review, an entity "transacts business" where the challenged action will have a "significant effect" on a petitioner's business. *See Tenneco Oil Co. v. EPA*, 592 F.2d 897, 899 (5th Cir. 1979); *Peabody Coal Co. v. EPA*, 522 F.2d 1152, 1153 (8th Cir. 1975). The Ninth Circuit is the appropriate venue here because Petitioners Food & Water Watch and Center for Food Safety maintain offices and conduct significant advocacy work to strengthen regulation of CAFO

water pollution in the Circuit, including in California, Oregon, Washington, Idaho, and Hawaii. Hauter Decl. ¶¶ 12–13; Kimbrell Decl. ¶¶ 7–8.

Accordingly, a writ of mandamus is the only adequate remedy available to Petitioners and this matter is properly before this Court. *See In re Cal. Power Exch. Corp.*, 245 F.3d 1110, 1120 (9th Cir. 2001) (holding mandamus is appropriate where plaintiffs have no other adequate remedy).

FACTUAL AND LEGAL BACKGROUND

I. CAFO Pollution Poses a Serious Threat to Human Health and the Environment

Animal production has changed dramatically over the last several decades, with facilities growing far larger and more geographically concentrated. As a result, industrial-scale CAFOs that house thousands—or even millions—of animals at a time have become the dominant method of livestock production. APP009, 70. And as CAFOs and entire livestock sectors have increasingly concentrated in certain watersheds, so too have the vast quantities of waste these facilities generate. APP010. As of 2003, EPA estimated CAFOs generate approximately 300 million tons of manure every year, more than three times the amount of raw sewage waste generated by the entire United States population. NPDES Permit Regulation and Effluent Limitation Guidelines and Standards for CAFOs, 68 Fed. Reg. 7176, 7176

& 7180 (Feb. 12, 2003). Since then, EPA data show the industry has grown by nearly *40 percent*, with a commensurate increase in waste production.[2]

This industrialization of livestock production has led to widespread water pollution. Agriculture is now the nation's leading contributor to water quality impairments in rivers and lakes, with manure responsible for a significant share of that pollution. APP010–11, 98–99, 101. Twenty-nine states have identified animal feeding operations as contributing to these impairments, and states with high concentrations of CAFOs "experience on average 20 to 30 serious water quality problems per year as a result of manure management problems." APP011, 81.

Decades of research make clear that standard CAFO practices are driving this water pollution crisis. CAFOs store millions of gallons of untreated manure and wastewater in open pits or lagoons, then ultimately dispose of that waste by spreading it onto cropland. NPDES CAFO Reporting Rule, 76 Fed. Reg. 65,431, 65,433–34 (Oct. 21, 2011); 40 C.F.R. § 412.4. Thus, pollution-laden CAFO waste enters surface waters through two major pathways—CAFO production areas and

[2] *See NPDES CAFO Permitting Status Report: National Summary, Endyear 2021*, EPA (July 20, 2022), https://www.epa.gov/system/files/documents/2022-07/CAFO%20Status%20Report%202021.pdf. This publicly-available report on EPA's website is subject to judicial notice. *See, e.g.*, *Daniels-Hall v. Nat'l Educ. Ass'n*, 629 F.3d 992, 998–99 (9th Cir. 2010) (allowing judicial notice of information made publicly available through a government website). Where Petitioners ask this Court take judicial notice, we have provided a hyperlink to the government document at issue.

land application fields.[3] Spills, runoff, leaks, and other discharges may occur from numerous parts of a CAFO production area, such as through leaching or overflowing manure lagoons, feed storage areas, and mortality management areas. APP011. Hundreds of documented overflows and failures of manure storage systems have resulted in massive pollution discharges and toxic stream conditions in numerous states, in addition to discharges from manure lagoons to groundwater that then flows into surface waters. APP011, 78, 103–41; Eayrs Decl. ¶ 15 (describing her local river as a "cesspool of manure runoff"); Duhn Decl. ¶ 19 (discussing the "foul-smelling layer of film" that develops on lake surfaces due to CAFO waste); Masri Decl. ¶ 6 (discussing catastrophic lagoon breaches); Utesch Decl. ¶¶ 6–7, 13 (recounting excessive ground and surface water contamination due to lagoon discharges).

CAFO discharges also occur due to excessive application of waste to cropland or under conditions that lead to runoff, such as on frozen, saturated, or sloped ground, or when crops are not in place to uptake nutrients. APP012. EPA has determined that "in many areas, manure is applied in excess of crop needs," Miller Decl. ¶ 6, Ex. E at 14, and that "appropriate nutrient management practices are not

[3] The CAFO production area is the part of the facility "that includes the animal confinement area, the manure storage area, the raw materials storage area, and the waste containment areas." 40 C.F.R. § 122.23(b)(8) (2012). The CAFO land application area is land under the control of the CAFO operator "to which manure, litter or process wastewater from the production area is or may be applied." *Id.* § 122.23(b)(3).

followed for 92 percent of manured acres." Miller Decl. ¶ 7, Ex. F at 7. CAFO waste production often far surpasses land available for disposal, and this insufficient farmland cannot utilize all the manure nutrients applied. The excess is therefore susceptible to runoff. APP069. Compounding the problem, many manure application fields contain direct conduits to waterways, such as tile lines, ditches, or sinkholes, which carry improperly applied manure directly to surface waters. APP012. Utesch Decl. ¶ 11 (describing use of tile drains resulting in discharges).

Nutrients are key pollutants of concern in CAFO waste due to their impacts on aquatic ecosystems and public health. Excess nutrients can generate algal blooms that produce toxins harmful to animals, aquatic life, and humans who come into contact with them, and cause hypoxic "dead zones," such as those that occur annually in the Gulf of Mexico and the Chesapeake Bay. APP013, 76; Gibart Decl. ¶ 20 (describing "dead fish that pile up on the shoreline"); Utesch Decl. ¶ 13 (lamenting the decline of brookie populations "decimated [by] contaminated runoff"). Nitrates from CAFO waste can also contaminate drinking water sources, which can be particularly dangerous for infants at risk of debilitating birth defects and fatal nitrate poisoning. APP081. *See* Gibart Decl. ¶ 19 (recounting severe illness and hospitalization of seven-month-old infant following CAFO nitrate exposure); Utesch Decl. ¶ 9 (same); Gillespie Decl. ¶ 10 (describing doctor instructing children to hold their noses and mouths while bathing in CAFO-contaminated well water);

Espey Decl. ¶ 15 (discussing Iowa's costly nitrate treatment systems to address polluted drinking water sources). Excess nitrates are also associated with miscarriages and increased risk of certain cancers. APP081.

Moreover, CAFO waste contains dangerous pollutants that have no value to crops even under optimal conditions, such as pathogens, antibiotics, artificial growth hormones, heavy metals, and pesticides. 76 Fed. Reg. at 65,433–34. EPA has found that "[m]ore than 150 pathogens found in livestock manure are associated with risks to humans, including the six human pathogens that account for more than 90% of food and waterborne diseases." 68 Fed. Reg. at 7236. These pathogens, including *E. coli*, *Salmonella*, and *Giardia*, can cause severe gastrointestinal illness, skin rashes, bacterial infections, and even death. APP012, 83–84; Gillespie Decl. ¶¶ 8–9 (contracting near fatal blood infection due to exposure); Duhn Decl. ¶ 20 (developing a painful skin rash after kayaking in CAFO-contaminated waters).

Feed additives used to promote animal growth, including medically important antibiotics, heavy metals, and hormones, are excreted in animal waste and can similarly wreak havoc on public health and the environment. EPA has found that 80 to 90 percent of administered antibiotics and heavy metals added to feed end up in animal waste, as do large quantities of natural and synthetic hormones. APP013–14. When disposed of, this waste can cause antibiotic-resistant bacteria to proliferate in waterways and result in hormone-induced damage to endocrine and reproductive

systems of aquatic species and humans. *Id.* *See also* Utesch Decl. ¶ 12 (discussing child who contracted antibiotic-resistant bacterial infection after swimming in CAFO-contaminated waters, requiring partial removal of kneecap).

EPA acknowledges that CAFO pollution disproportionately impacts certain communities.[4] Researchers have found that large CAFOs are disproportionately sited in low-income communities and communities of color, APP014, 143–4, and an EPA analysis identified areas at risk of disproportional impacts from virtually every CAFO livestock sector: the Delmarva Peninsula (broiler chicken operations); the Iowa-Minnesota border, (hog, egg layer, and beef feedlot operations); the Carolina lowlands, (hog, broiler, and turkey operations); and the California central valley, (dairy operations). These regions have both large numbers of CAFOs and large minority and low-income populations. APP014–15, 147. *See also* Masri Decl. ¶¶ 13–14 (explaining the burdens faced by communities near CAFO operations).

II. EPA's Attempts to Regulate CAFO Pollution Under the Clean Water Act Have Proven Ineffective

A. The Clean Water Act and NPDES Permits

"[A] cornerstone of the federal effort to protect the environment," *Waterkeeper All., Inc.*, 399 F.3d at 490, the Clean Water Act prohibits the "discharge

[4] *EPA Legal Tools to Advance Environmental Justice* [hereinafter EPA Environmental Justice Report], EPA 1, 75 (May 2022), https://www.epa.gov/system/files/documents/2022-05/EJ%20Legal%20Tools%20May%202022%20FINAL.pdf#page=88.

of any pollutant" from any "point source" to navigable waters "except in compliance with law." 33 U.S.C. §§ 1311, 1362. The main way to achieve compliance with the Act's discharge prohibition is by obtaining and complying with an NPDES permit, which controls pollution through effluent limitations that restrict discharges of pollutants. 33 U.S.C. §§ 1311(a), 1342.

Permit limitations operate by identifying specific technologies capable of controlling a pollutant and setting numeric or narrative effluent limitations based on that demonstrated capability. In this manner, the Act was designed to ratchet up water quality protections as pollution control technology advances, improving water quality over time through more stringent controls. *Id.* § 1311(b)(2)(A) (requiring the "best available technology economically achievable" for many pollutants); *NRDC v. EPA*, 808 F.3d 556, 563–64 (2d Cir. 2015) ("Congress designed [these standards] to be technology-forcing, meaning it should force agencies and permit applicants to adopt technologies that achieve the greatest reductions in pollution."). These technology-based limitations are typically expressed numerically, but when "numeric effluent limitations are infeasible," a permit may instead require "[b]est management practices (BMPs) to control or abate the discharge of pollutants." 40 C.F.R. § 122.44(k)(3). Best management practices may also function as a point source's primary pollutant control technology and may be required where "reasonably necessary to achieve effluent limits and standards." *Id*. § 122.44(k)(4).

NPDES permits must also require both representative effluent monitoring and reporting of monitoring results. 33 U.S.C. §§ 1318(a), 1342(a)(2); 40 C.F.R. §§ 122.44(i)(1) & (2). Such monitoring conditions are necessary to verify compliance with effluent limitations and to facilitate permit enforcement. *Food & Water Watch v. EPA*, 20 F.4th 506, 515–16 (9th Cir. 2021). Pollutant-specific effluent limits, practices or technologies capable of achieving those limits, and monitoring to establish compliance with those limits, thereby work together to reduce pollution.

B. Regulation of CAFOs Under the Clean Water Act

CAFO pollution discharges are "point source" discharges subject to the Clean Water Act's general prohibition on unpermitted discharges. 33 U.S.C. § 1362(14). Congress' decision to expressly include CAFOs in the definition of point source demonstrates an unambiguous intent to regulate discharges of pollutants from CAFOs through the imposition of progressively more protective pollution standards.

EPA's regulations previously required CAFOs that proposed to discharge due to their design, construction, operation, or maintenance to apply for NPDES permits. Revised NPDES Permit Regulation and Effluent Limitations Guidelines for CAFOs in Response to the Waterkeeper Decision, 73 Fed. Reg. 70,418, 70,423, 70,469 (Nov. 20, 2008). However, following the Fifth Circuit's decision in 2011, *Nat'l Pork Producers Council*, 635 F.3d at 751, EPA removed this provision. NPDES Permit Regulation for CAFOs: Removal of Vacated Elements in Response to 2011 Court

Decision, 77 Fed. Reg. 44,494, 44,494–95 (July 30, 2012). As a result, EPA only requires CAFOs to seek NPDES permit coverage if they admit they discharge.

EPA has established effluent limitations for both CAFO production and land application area discharges. EPA prohibits CAFO production area discharges, aside from wastewater overflows caused by extreme precipitation events. *See* 40 C.F.R. § 412.31(a)(1)(i). EPA also requires CAFOs that land apply waste to "minimiz[e] nitrogen and phosphorus movement to surface waters." 40 C.F.R. § 412.4(c)(1). CAFOs must implement a Nutrient Management Plan that contains "best management practices necessary to meet . . . [these] applicable effluent limitations." *Id*. § 122.42(e)(1).

Unlike most industries, EPA has not required permitted CAFOs to monitor their pollution to demonstrate compliance with effluent limitations. *See Food & Water Watch*, 20 F.4th at 518 (finding EPA CAFO permit lacked required discharge monitoring provisions). Moreover, EPA's current rules exempt many land application-related discharges from regulation as "agricultural stormwater," which the Clean Water Act excludes from the definition of a point source. 33 U.S.C. § 1362(14). Under EPA's broad interpretation of this exemption, as long as point source CAFOs apply waste in accordance with Nutrient Management Plans, any land application discharges associated with precipitation are considered nonpoint source pollution exempt from permitting requirements. 40 C.F.R. § 122.23(e).

C. EPA Acknowledges that its CAFO Regulations Do Not Adequately Address Public Health and Environmental Impacts

More than a decade ago, EPA conceded that "despite more than 35 years of regulating CAFOs, reports of water quality impacts from large animal feeding operations persist." 76 Fed. Reg. at 65,433. This regulatory failure can be attributed to two critical flaws in the Agency's CAFO program: (1) the majority of CAFOs discharge, yet evade permit coverage; and (2) even CAFOs that do have NPDES permits are subject to requirements that do not effectively control their discharges.

EPA acknowledges that its CAFO regulations are inadequate. The Agency admits that "[m]any CAFOs are not regulated and continue to discharge without NPDES permits" in violation of the Clean Water Act, because its "regulations contain definitions, thresholds and limitations that make it difficult to compel permit coverage." EPA Environmental Justice Report, *supra* note 4, at 75. The Agency further acknowledges that "while many waters are affected by pollutants from CAFOs, many CAFOs often claim that they do not discharge, and EPA and state permitting agencies lack the resources to regularly inspect these facilities to assess these claims." *Id*.; *see also* Espey Decl. ¶ 8–9. Indeed, although EPA estimates that 75 percent of all CAFOs discharge as a result of their standard operational profiles, only 30 percent of even the largest CAFOs are currently permitted. Miller Decl. ¶ 7, Ex. F, at 10, 12. In other words, more than 9,600 unpermitted Large CAFOs across

the country are illegally discharging pollution with no regulatory oversight.[5] Moreover, this trend of inadequate permit coverage has only worsened under EPA's current rules. Between 2011 and 2021, the estimated number of permitted Large CAFOs decreased by 14.5 percent, while the overall number of Large CAFOs *increased* by 18 percent.[6]

Further, EPA concedes that even when CAFOs are subject to EPA's own pollution standards, those standards fail to effectively "limit the discharge of pollutants under certain circumstances" and do not allow EPA to "enforce requirements even when discharges have been established." EPA Environmental Justice Report, *supra* note 4, at 75. For starters, EPA's CAFO effluent limitations only apply to the largest of operations, 68 Fed. Reg. at 7208, and only focus on nutrients and pathogens, failing to address antibiotics, metals, hormones, and more. 40 C.F.R. § 412.2(j)–(k); 73 Fed. Reg. at 70,463.

The applicable effluent limitations also fall short of effectively regulating even nutrient and pathogen pollution. As EPA is fully aware, there are many

[5] EPA estimates there are approximately 21,237 Large CAFOs, 6,266 of which have NPDES permits. *NPDES CAFO Permitting Status Report*, *supra* note 2. If approximately 75 percent (15,928) of CAFOs discharge, an additional 9,662 unpermitted Large CAFOs should be covered under the NPDES program.

[6] *Compare NPDES CAFO Regulations Implementation Status – National Summary, Endyear 2011*, EPA (Dec. 31, 2011), https://www.epa.gov/sites/default/files/2015-08/documents/npdes_cafo_rule_implementation_status_-_national_summary_endyear_2011_0.pdf *with NPDES CAFO Permitting Status Report*, *supra* note 2.

instances in which CAFOs should be using more protective practices than what the Agency currently requires due to a high risk of runoff. Rather than prohibiting these practices, EPA instead urges states to do so themselves. APP091–93 ("strongly encourag[ing] states to prohibit" numerous high-risk application practices). Yet the Agency knows that many state permitting agencies are themselves prohibited from exceeding EPA's minimum requirements. *See, e.g.*, Iowa Code Section 459.311(2) ("any rules adopted pursuant to this [manure control] subsection shall be no more stringent than requirements under the [Clean Water Act]"); North Carolina Statute Section 150B-19.3 (prohibiting state agencies from adopting "a rule for the protection of the environment or natural resources that imposes a more restrictive standard, limitation, or requirement than those imposed by federal law or rule").

Another known problem is that the Agency's Nutrient Management Plan manure application requirements "are agronomic rather than water-quality based," Miller Decl., Ex. E at 14, meaning they are designed to ensure that farms maximize crop yields, rather than prevent discharges to waterways. EPA incorrectly assumes that this agronomic approach will enable operations to minimize nutrient loss and comply with effluent limitations. APP046–49. But research has demonstrated that "just having a [Nutrient Management Plan] does not reduce excess nutrient application nor does it guarantee improvements in water quality." APP096. Moreover, when CAFOs do over-apply waste to cropland, there are no monitoring

requirements to capture the discharge, *see supra* at Section II.B, and regardless, EPA's current rules allow operators to easily write off discharges as exempt agricultural stormwater. APP027–28. These deficiencies in EPA's approach have resulted in both a largely-unregulated CAFO industry and CAFO permits, where they exist, that fail to adequately protect water quality.

EPA acknowledges that many of the specific recommendations in the Petition would improve its broken CAFO program and better protect impacted communities. The Agency believes it could "improve the effectiveness of the CAFO regulations" by redefining the term CAFO to be more inclusive, limiting the agricultural stormwater exemption, mandating additional best management practices for production and land application areas, and requiring discharge monitoring. EPA Environmental Justice Report, *supra* note 4, at 75. The Petition urges EPA to adopt these measures and more. APP026–31, 35–36, 38–62.

D. EPA has Consistently Refused to Make Necessary Updates to CAFO Regulations Absent Court Intervention

Although CAFOs are major and largely unregulated sources of water pollution, EPA has consistently failed to make any improvements to its CAFO rules unless compelled by legal action. In 2003, only in response to a lawsuit did the Agency issue its first-ever update to its 1970s CAFO regulations. *See Waterkeeper All., Inc.*, 399 F.3d at 494 n.12. In 2011, it took a court-approved settlement agreement to spur an initial effort to gather a basic inventory of the CAFO industry.

NRDC v. EPA, No. 09-60510 Settlement Agreement at 2–4 (May 25, 2010); 76 Fed. Reg. 65,431. *But see* 77 Fed. Reg. 42,679 (withdrawing the proposal rather than finalizing the rule, leaving the Agency without comprehensive CAFO information to this day).[7] This Court recently halted EPA's longtime failure to require CAFO discharge monitoring after environmental petitioners sued the Agency for its illegal practice. *Food & Water Watch*, 20 F.4th 506. And it took yet another lawsuit for EPA to reconsider its reliance on nonexistent CAFO monitoring data to evaluate whether to update its CAFO effluent limitations guidelines. *Food & Water Watch v. EPA*, No. 21-71084, EPA Mot. For Voluntary Remand (9th Cir. Jan 7, 2022) (ECF 19-1). In sum, EPA simply does not act to address CAFOs under the Clean Water Act without significant prodding and court intervention.

III. EPA Has Failed to Respond for More Than Five Years to Petitioners' Petition for Rulemaking

On March 8, 2017, thirty-two public interest organizations petitioned EPA to revise its inadequate Clean Water Act regulations for CAFOs. APP002–62. The Petition not only laid out the well-known water quality and human health impacts of the CAFO industry, but also highlighted the regulatory inadequacies that allow excessive and unregulated CAFO pollution to persist. APP009–18. The Petition

[7] EPA has opted to collect state data rather than conducting its own CAFO inventory, despite its own finding that state data are "inconsistent and inaccurate and do not provide EPA with the reliable data it needs to identify and inspect permitted CAFOs nationwide." 76 Fed. Reg. at 65,435.

raised numerous legal and factual arguments in support of accomplishing two overarching goals: (1) ensuring that all discharging CAFOs obtain NPDES permits—including by narrowing EPA's interpretation of agricultural stormwater and establishing a presumption that certain CAFOs discharge; and (2) strengthening NPDES permits to ensure adequate protection of water quality. APP018–62.

More than five years have passed since the Petition filing, and Petitioners have received no response. Yet it appears EPA has been prepared to respond for nearly half that time. According to EPA records obtained through Freedom of Information Act (FOIA) requests, in July 2018 EPA began creating and circulating Petition briefing documents containing the Agency's analysis of the Petition requests. Miller Decl. ¶ 8, Ex. G. By 2019, EPA was already fully aware of its significant delay and became concerned about the possibility of Petitioners filing this action. Miller Decl. ¶ 9, Ex. H at 1 ("I keep waiting for the notice of intent to sue us from FWW et. al. since it has now been more than two years since they filed the petition."). The Agency's consideration came to a head in 2020, when records show that EPA was preparing its formal response to the Petition. Miller Decl. ¶ 10, Ex. I at 2. However, EPA then opted not to publish its answer, even though it was clearly poised to do so. Miller Decl. ¶ 11, Ex. J. Following this postponement, FOIA records show that EPA staff was "beginning to like the FWW petition more and more." Miller Decl. ¶ 13, Ex. K at 1. But EPA's delay—and CAFO pollution—continue.

ARGUMENT

I. Petitioners Have Standing to Pursue a Writ of Mandamus Compelling EPA to Act

An organization has standing if "its members would otherwise have standing to sue in their own right, the interests at stake are germane to the organization's purpose, and neither the claim asserted nor the relief requested requires the participation of individual members in the lawsuit." *Friends of the Earth, Inc. v. Laidlaw Env't Servs., Inc. (TOC)*, 528 U.S. 167, 181 (2000). Ensuring that EPA responds to the Petition, and in turn addresses the CAFO pollution crisis threatening waterways and communities across the country, is clearly germane to Petitioners' purposes as organizations focused on water protection and/or environmental justice. Alschuler Decl. ¶¶ 4–6; D. Eayrs Decl. ¶¶ 4–7; Espey Decl. ¶¶ 4–8; Gibart Decl. ¶¶ 4–7, 10; Hauter Decl. ¶¶ 4–8, 12–13; James Decl. ¶¶ 4–6, 11–12; Kimbrell Decl. ¶¶ 4–9, 11; Lilliston Decl. ¶¶ 3–5, 7–8; Masri Decl. ¶¶ 4–7; Russ Decl. ¶¶ 4–7, 12; Utesch Decl. ¶¶ 4–7. Indeed, Petitioners have dedicated significant time and resources to addressing unregulated and underregulated CAFO water pollution, working to improve state CAFO NPDES programs, and holding EPA accountable to its Clean Water Act obligations. *Id.* Moreover, individual members' participation is not required for, nor would it aid, the proper resolution of this case. *See W. Watersheds Project v. Kraayenbrink*, 632 F.3d 472, 485 (9th Cir. 2011).

Petitioners' members also have standing to sue in their own right for their procedural injuries. Ordinarily, individuals have standing when they suffer an "injury in fact" that is fairly traceable to the challenged conduct and capable of redress by a favorable decision from the court. *NRDC v. Jewell*, 749 F.3d 776, 782 (9th Cir. 2014). However, a "person who has been accorded a procedural right to protect his concrete interests can assert that right without meeting all the normal standards for redressability and immediacy." *Lujan v. Defs. of Wildlife*, 504 U.S. 555, 572 n.7 (1992). That is, Petitioners' members need only show that following the procedure in question "could protect their interest." *Salmon Spawning & Recovery All. v. Gutierrez*, 545 F.3d 1220, 1228 (9th Cir. 2008).

Petitioners' members satisfy this test because EPA violated an Administrative Procedure Act requirement, 5 U.S.C. § 555(b), that is clearly intended to protect citizens' interests by ensuring agencies are not allowed to ignore concerns raised by the public. Petitioners' members have concrete interests "by virtue of their geographic proximity and use of" waterways affected by CAFO pollution. *Citizens for Better Forestry v. USDA*, 341 F.3d 961, 971 (9th Cir. 2003); *see also* Duhn Decl. ¶¶ 2, 9, 19–22; S. Eayrs Decl. ¶¶ 5–7; Gillespie Decl. ¶¶ 7–9; Kimbirauskas Decl. ¶¶ 11–18; Mendoza Decl. ¶¶ 6, 14, 16; Utesch Decl. ¶¶ 12–16. Based on concerns about pollution from both permitted and unpermitted CAFOs in the waters they live near and extensively use, as well as documented water quality degradation from

pollutants associated with CAFOs, they have curtailed their use of specific waterbodies, limited their recreational activities within certain waterways, and enjoyed those activities less. Duhn Decl. ¶¶ 12, 19–22; S. Eayrs Decl. ¶¶ 14–15; Gillespie Decl. ¶ 12; Kimbirauskas Decl. ¶¶ 11, 15–18; Mendoza Decl. ¶¶ 14, 16; Utesch Decl. ¶¶ 12–16.

Finally, continued delay is reasonably likely to threaten Petitioners' members' interests. As discussed above, EPA's inadequate CAFO program has led to severe water pollution across the nation and in the specific waterways Petitioners' members use and enjoy. Duhn Decl. ¶¶ 24–26; S. Eayrs Decl. ¶¶ 16–17; Gillespie Decl. ¶¶ 13–14; Kimbirauskas Decl. ¶¶ 19–21, 12; Mendoza Decl. ¶¶ 17–18, 12; Utesch Decl. ¶¶ 16–18; *see also W. Watersheds Project*, 632 F.3d at 485–86 (finding standing for procedural injury where group established "geographical nexus" between members' interests and agency action). Because EPA's response to the Petition "could protect" these members' interests by revising the CAFO rules, or at least enabling Petitioners to challenge an unlawful Petition denial, Petitioners have standing to pursue a writ of mandamus here.

II. EPA's Delay is Sufficiently Egregious to Warrant this Court's Intervention

For more than five years, EPA has shirked its duty under the Administrative Procedure Act by failing to respond to the Petition urging it to strengthen its inadequate CAFO regulations. EPA's egregious delay has prejudiced Petitioners,

their members, and the public at large by forestalling much-needed regulatory action to combat the significant and growing public health and environmental harms caused by CAFO water pollution. Accordingly, Petitioners are entitled to a writ of mandamus compelling EPA to respond. *In re NRDC*, 956 F.3d 1134, 1138 (9th Cir. 2020) (explaining that mandamus is warranted "when an agency's delay is egregious") (internal quotations omitted).

This Court has adopted the D.C. Circuit's six-factor test to evaluate claims of unreasonable delay, established in *Telecommunications Research & Action Center v. FCC (TRAC)*. 750 F.2d at 80. *See, e.g.*, *NRDC*, 956 F.3d at 1138–39 (applying the *TRAC* test). Under this test, courts consider: (1) whether the delay comports with the "rule of reason"; (2) whether Congress has indicated a timeframe it considers appropriate for the action at issue; (3) the extent to which delay could harm human health and welfare; (4) the effect expediting would have on competing agency priorities; (5) the nature and scope of interests prejudiced by delay; and (6) that agency impropriety is not required for an unreasonable delay finding. *TRAC*, 750 F.2d at 80.

Here, the *TRAC* factors weigh in favor of granting mandamus relief. EPA's five-year delay is unreasonable, especially in light of the Clean Water Act's clear mandate to regulate CAFO pollution according to relevant statutory timelines for strengthening pollution standards. Moreover, EPA acknowledges that CAFOs and

the dangerous wastes they produce pose a serious threat to human health, thereby prejudicing the frontline communities in which these operations are disproportionately sited, and whom the Agency claims to prioritize.

A. EPA Has a Clear Duty to Respond to the Petition

The Administrative Procedure Act requires an agency to "conclude a matter presented to it" "within a reasonable time." 5 U.S.C. § 555(b); *Cmty. Voice*, 878 F.3d at 784. This includes administrative petitions that are "requests for discretionary action." *In re Am. Rivers & Idaho Rivers United*, 372 F.3d 413, 418 (D.C. Cir. 2004). Thus, EPA must make a "final ruling" on the Petition—a "formal action to grant or deny it"—that is subject to judicial review, *In re Pesticide Action Network N. Am.*, 798 F.3d 809, 813 (9th Cir. 2015), and it must do so "within a reasonable time." 5 U.S.C. § 555(b).

B. *TRAC* Factors One & Two: EPA's Five-Year Delay Defies the Rule of Reason and Relevant Clean Water Act Timetables

EPA's failure to answer the CAFO Petition plainly violates the rule of reason. The first *TRAC* factor—whether the agency's delay is reasonable—is the "most important factor in the analysis," *Cmty. Voice*, 878 F.3d at 786, and along with factor two, requires inquiry into "whether the agency's response time complies with an existing specified schedule and whether it is governed by an identifiable rationale." *Ctr. for Sci. in the Pub. Interest v. FDA*, 74 F. Supp. 3d 295, 300 (D.D.C. 2014).

Although there is no rigid timetable for answering petitions, the Ninth Circuit has repeatedly concluded that "a reasonable time for agency actions is typically counted in weeks or months, not years." *NRDC*, 956 F.3d at 1139; *Cmty. Voice*, 878 F.3d at 787. Indeed, this Court has routinely held years-long delays to be unreasonable. *See, e.g.*, *NRDC*, 956 F.3d at 1136 (three years); *Cmty. Voice*, 878 F.3d at 787 (eight years); *Pesticide Action Network*, 798 F.3d at 811 (eight years). This Court has also looked to "the more developed law of the District of Columbia," which has found a six-year delay is "nothing less than egregious," *NRDC*, 956 F.3d at 1139 (quoting *Am. Rivers & Idaho Rivers United*, 372 F.3d at 419), and that a "five year delay smacks of unreasonableness on its face." *Fund for Animals v. Norton*, 294 F. Supp. 2d 92, 113 (D.D.C. 2003).

Here, EPA's more than five-year delay has stretched the "rule of reason" beyond its limits. The Agency has provided no justification for its delay, nor has it provided Petitioners a concrete timeline for its response. Furthermore, FOIA documents show that EPA has been seemingly prepared to answer the Petition for at least two years, yet has failed to do so. Miller Decl. ¶¶ 10–11, Ex. I–J. Without *any* identifiable rationale governing its continued failure to act, this delay "smacks of unreasonableness on its face." *Fund for Animals*, 294 F. Supp. 2d at 113.

EPA's delay is especially egregious given the Clean Water Act's clear mandate to regulate CAFO pollution with NPDES permits, and the relevant statutory

timetables that Congress provided for the review and revision of NPDES regulations. *See, e.g.*, 33 U.S.C. §§ 1314(b) (requiring EPA to review effluent limitations guidelines for each industry sector, including CAFOs, "at least annually" and revise, if appropriate), 1314(m) (requiring EPA to publish a plan every two years that "establish[es] a schedule for the annual review and revision of promulgated effluent guidelines"), 1342(b)(1)(B) (requiring permitting agencies to establish fixed terms for NPDES permits not to exceed five years). The Petition seeks changes to the same regulations and permits that EPA is already mandated to review and revise on a shorter timeline than its delay to date. This Court has found similar delays unreasonable in the context of far less specific Congressional mandates. *See*, *e.g.*, *Cmty. Voice*, 878 F.3d at 787 ("eliminate [lead poisoning] expeditiously"). EPA's more than five-year delay has therefore extended beyond any rule of reason.

C. *TRAC* Factors Three & Five: EPA's Delay Is Unreasonable Given the Health and Welfare Concerns Prejudiced by the Delay

Because CAFO pollution poses a clear threat to human health but remains largely unregulated, the third and fifth *TRAC* factors—impacts to human health and welfare, and the interests prejudiced by the delay—weigh heavily in favor of Petitioners. "When the public health may be at stake, the agency must move expeditiously to consider and resolve the issues before it." *Pub. Citizen Health Res. Grp. v. Comm'r, FDA*, 740 F.2d 21, 34 (D.C. Cir. 1985). The Ninth Circuit has consistently granted mandamus relief where EPA has delayed action raising human

health concerns—especially children's health—and has itself acknowledged the unmitigated public health risk. *See, e.g.*, *Cmty. Voice*, 878 F.3d at 787 (finding EPA unreasonably delayed updating lead-based paint standards for eight years given the "clear threat to human welfare" and EPA's own acknowledgment that lead poisoning was a significant health threat to children and "the current standards are insufficient"); *NRDC*, 956 F.3d at 1136 (ordering EPA to respond to a petition to end the use of a dangerous pesticide in household pet products after three years of delay where EPA acknowledged the widespread and serious risk it posed to the neurodevelopmental health of children).

Here, EPA has likewise acknowledged the indisputable human health risks attributable to CAFO discharges. Inadequately regulated CAFO pollution presents a serious health risk to neighboring and downstream communities whose drinking water and recreational waterways are contaminated with nitrates, pathogens, and other dangerous pollutants. *See supra* Section I. This is particularly the case for infants who are at risk of birth defects and nitrate poisoning when exposed to contaminated drinking water. APP081; Gibart Decl. ¶ 19 (infant nitrate poisoning incident). But older children and adults also face substantial, even life-threatening health risks. APP081, 84; Gillespie Decl. ¶¶ 8–9 (near-fatal blood infection); Utesch Decl. ¶ 12 (frequent infections and gastrointestinal diseases in community); Duhn Decl. ¶ 20 (severe skin rash). Just as in *NRDC* and *Cmty. Voice*, EPA has

acknowledged these widespread CAFO health risks, as well as the heightened threat to infants. *Supra* at Section I.

Moreover, the Agency has conceded that its CAFO regulations fail to remedy the problem. EPA plainly admits that after decades of its current regulatory approach, thousands of CAFOs are discharging without NPDES permits, Miller Decl. ¶ 7, Ex. F at 5, 10, 12, and CAFO pollution continues to devastate waterways. 76 Fed. Reg. at 65,433. So much so, in fact, that CAFOs are one of the leading known sources of water pollution across the country. APP010–11. Because health risks associated with CAFO discharges are a serious, undisputed concern raised by the Petition, and "EPA itself has acknowledged . . . that the current standards are insufficient," EPA's delay in responding to the Petition is patently unreasonable, and seriously prejudices those communities that suffer constant exposure to this unmitigated threat. *NRDC*, 956 F.3d at 1141–2.

D. *TRAC* Factor Four: EPA's Delay Is Unreasonable Because No Competing Priorities Justify its Delay

Where, as here, EPA has offered "no acceptable justification for the considerable human health interests prejudiced by the delay," courts have given little weight to the Agency's competing regulatory priorities—the fourth *TRAC* factor—— even when such priorities also impact human health. *See, e.g.*, *NRDC*, 956 F.3d at 1141. As such, "[e]ven assuming that EPA has numerous competing priorities under

the fourth factor" the clear balance of the *TRAC* factors nevertheless favors issuance of a writ. *Id.* at 1142 (quoting *Cmty. Voice*, 878 F.3d at 787).

This conclusion is especially warranted here because FOIA records demonstrate that EPA has already dedicated significant time to answering the Petition. As explained above, EPA has completed a thorough analysis of the Petition's merits and appears poised to act on it. Thus, the Petition is a priority that has already outcompeted many others for agency time. Further, EPA has repeatedly counted the issues raised by the Petition amongst its top priorities. For fourteen years, it ranked "preventing animal waste from contaminating surface and ground water" as a national priority. Miller Decl. ¶¶ 6, 13, Ex. F at 3, Ex. L at 2–3.

EPA is also subject to an environmental justice Executive Order mandating the Agency prioritize clean water access and polluter accountability in disproportionately-impacted communities "where the Federal Government has failed to meet that commitment in the past," which undoubtedly includes communities plagued by CAFO pollution. Exec. Order No. 13,990, 86 Fed. Reg. 7037 (Jan. 20, 2021). Because answering the Petition would advance these priorities, EPA's delay in doing so is unreasonable.

E. *TRAC* Factor Six: EPA's History of Resisting Needed Action on CAFOs Absent Court Intervention Further Warrants Mandamus

Finally, EPA's long practice of refusing to regulate CAFOs without legal action underscores the need for the Court's intervention in this case. While the Court

need not find any impropriety in the Agency's delay to find it unreasonable, *TRAC*, 750 F.2d at 80, any such impropriety can further demonstrate the need for mandamus. In *NRDC*, this Court found EPA's delay in answering a petition "all the more glaring" when it has "taken the action of [petitioner] or a court to prompt any movement by the EPA." *NRDC*, 956 F.3d at 1139–40. This petition for writ of mandamus is far from the only time that legal action has been necessary to force EPA to fulfill its statutory obligations under the Clean Water Act for CAFOs. *See supra* at Section II.D. Against a decades-long backdrop of the Agency refusing to regulate the CAFO industry as the Clean Water Act requires, only relenting when compelled by litigation, EPA's five-year delay in answering the Petition is "all the more glaring," further warranting the Court's intervention.

CONCLUSION

For the foregoing reasons, Petitioners urge the Court to grant a writ of mandamus compelling EPA to answer the Petition within 90 days, and retain jurisdiction to ensure EPA's response is complete.

Dated this 7th day of October 2022.

Respectfully submitted,

s/ Emily Miller
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Food & Water Watch

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Counsel for Petitioners

CERTIFICATE OF COMPLIANCE

I hereby certify that this petition for writ of mandamus complies with the length limitations of Fed. R. App. P. 21(d) and Ninth Circuit Rule 21-2(c), because, excluding the parts listed by Fed. R. App. P. 21(a)(2)(C) and 32(f), it does not exceed 30 pages or 7,800 words.

Dated this 7th day of October, 2022.

s/ Emily Miller
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CERTIFICATE OF SERVICE

I hereby certify that I electronically filed the foregoing with the Clerk of the Court for the United States Court of Appeals for the Ninth Circuit by using the appellate CM/ECF system on October 7, 2022. I certify that this is an original petition or other original proceeding and therefore I cannot directly serve it via the Appellate Electronic Filing system.

Dated this 7th day of October, 2022.

s/ Emily Miller
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STATEMENT OF RELATED CASES

The undersigned counsel of record for Petitioners is aware of no pending related cases.

Dated this 7th day of October, 2022.

s/ Emily Miller
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RULE 26.1 DISCLOSURE STATEMENT

Pursuant to Fed. R. App. P. 26.1, Food & Water Watch, Center for Food Safety, Dakota Rural Action, Dodge County Concerned Citizens, the Environmental Integrity Project, Helping Others Maintain Environmental Standards, Institute for Agriculture and Trade Policy, Iowa Citizens for Community Improvement, Kewaunee CARES, Midwest Environmental Advocates, and North Carolina Environmental Justice Network hereby disclose that they are nonprofit organizations, and as such, have no parent corporations or publicly held corporation owning 10% or more of their stock.

Dated this 7th day of October, 2022.

s/ Emily Miller
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APPENDIX

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In re Food & Water Watch et. al. v. EPA

Exhibit 1

Petition to Revise the Clean Water Act Regulations for Concentrated Animal Feeding Operations

BEFORE THE UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY

FOOD & WATER WATCH, ARKANSAS RIGHTS KOALITION, ASSATEAGUE COASTAL TRUST (MARYLAND), ASSOCIATION OF IRRITATED RESIDENTS (CALIFORNIA), BUFFALO RIVER WATERSHED ALLIANCE (ARKANSAS), CENTER FOR BIOLOGICAL DIVERSITY, CENTER FOR FOOD SAFETY, CONCERNED CITIZENS AGAINST INDUSTRIAL CAFOS (MARYLAND), DAKOTA RURAL ACTION (SOUTH DAKOTA), DALLAS COUNTY FARMERS AND NEIGHBORS (IOWA), DES MOINES WATER WORKS (IOWA), DODGE COUNTY CONCERNED CITIZENS (MINNESOTA), DON'T WASTE ARIZONA, THE ENVIRONMENTAL INTEGRITY PROJECT, GRAND RIVERKEEPER (OKLAHOMA), HELPING OTHERS MAINTAIN ENVIRONMENTAL STANDARDS (ILLINOIS), ILLINOIS CITIZENS FOR CLEAN AIR & WATER, INSTITUTE FOR AGRICULTURE AND TRADE POLICY, INTERFAITH WORKER JUSTICE (NEW MEXICO), IOWA CITIZENS FOR COMMUNITY IMPROVEMENT, JEFFERSON COUNTY FARMERS & NEIGHBORS (IOWA), JOHNS HOPKINS CENTER FOR A LIVABLE FUTURE, KEWAUNEE CITIZENS ADVOCATING RESPONSIBLE ENVIRONMENTAL STEWARDSHIP (WISCONSIN), LAND STEWARDSHIP PROJECT (MINNESOTA), MIDWEST ENVIRONMENTAL ADVOCATES (WISCONSIN), MISSOURI RURAL CRISIS CENTER, MOMS ACROSS AMERICA EASTERN SHORE CHAPTER (MARYLAND), MONTGOMERY TOWNSHIP FRIENDS OF FAMILY FARMS (PENNSYLVANIA), NORTH CAROLINA ENVIRONMENTAL JUSTICE NETWORK, OZARK RIVER STEWARDS (ARKANSAS), PATUXENT RIVERKEEPER (MARYLAND), POWESHIEK COMMUNITY ACTION TO RESTORE ENVIRONMENTAL STEWARDSHIP (IOWA), PRESERVE OUR SHORE ACCOMACK COUNTY (VIRGINIA), AND RIO VALLE CONCERNED CITIZENS (NEW MEXICO),

Petitioners,

v.

SCOTT PRUITT, ADMINISTRATOR,
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY,

Respondent.

PETITION TO REVISE THE CLEAN WATER ACT REGULATIONS FOR CONCENTRATED ANIMAL FEEDING OPERATIONS

TABLE OF CONTENTS

I. INTRODUCTION

The goal of the Clean Water Act (CWA or Act) is to eliminate the discharge of pollutants into waterways.[1] As one way of making progress toward that goal, the Act generally instructs the Environmental Protection Agency (EPA) to regulate polluters by identifying, and requiring the use of, state-of-the-art pollution-control technology for each industry. EPA has made significant strides in meeting its CWA mandate to regulate point source pollution from most industrial and municipal sources. However, the Agency has made very little progress in its efforts to regulate pollution from concentrated animal feeding operations (CAFOs). As a result, the agricultural sector, including CAFOs, remains largely unregulated and is now the nation's leading source of water quality impairments.[2] The Agency's current CAFO regulations are plainly not up to the task of protecting our waterways from industrial livestock operations.

EPA has attempted to improve its CAFO regulatory scheme over the past fifteen years, but has been largely unsuccessful, in part due to adverse judicial decisions, and in part due to the Agency's failure to craft strong regulations. Court challenges to EPA's rules are responsible for some of EPA's setbacks; the *Waterkeeper Alliance* and *National Pork Producers Council* decisions limited the universe of CAFOs required to obtain CWA permits under EPA's current regulatory approach. Yet the core elements of CAFO permits established in EPA's 2003 CAFO rule are also inadequate, and are still in effect. The current regulations fail to require water monitoring, do not prohibit practices known to harm water quality, generally ignore numerous pollutants of concern, place critical decisions about waste management in the hands of state agencies, and exempt most chronic CAFO discharges from permit requirements through an unreasonably broad reading of the agricultural stormwater exemption.[3] In short, the existing regulations are far too weak, and do not apply to enough of the industry, to protect water quality.

EPA must take further action to fulfill its CWA obligations, and the Agency's 2003 and 2008 rulemaking attempts do not in any way lessen this duty. EPA maintains clear authority to strengthen its approach to CAFO regulation in numerous ways, and has amassed a large volume of new information about CAFO pollution since it put forth the 2001 proposal that largely shaped the current regulations. This petition lays out a regulatory course of action for EPA to better use its authority to control CAFO pollution and further the objectives of the Act.

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[1] 33 U.S.C. § 1251(a)(1).

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

[3] *Id.* § 122.23(e). This exemption excludes "agricultural stormwater discharge" from the definition of "point source" though the former term is not defined in the Act. 42 U.S.C. § 1362(14).

Food & Water Watch, Arkansas Rights Koalition, Assateague Coastal Trust (Maryland), Association of Irritated Residents (California), Buffalo River Watershed Alliance (Arkansas), Center for Biological Diversity, Center for Food Safety, Concerned Citizens Against Industrial CAFOs (Maryland), Dakota Rural Action (South Dakota), Dallas County Farmers and Neighbors (Iowa), Des Moines Water Works (Iowa), Dodge County Concerned Citizens (Minnesota), Don't Waste Arizona, the Environmental Integrity Project, Grand Riverkeeper (Oklahoma), Helping Others Maintain Environmental Standards (Illinois), Illinois Citizens for Clean Air & Water, Institute for Agriculture and Trade Policy, Interfaith Worker Justice (New Mexico), Iowa Citizens for Community Improvement, Jefferson County Farmers & Neighbors (Iowa), Johns Hopkins Center for a Livable Future, Kewaunee Citizens Advocating Responsible Environmental Stewardship (Wisconsin), Land Stewardship Project (Minnesota), Midwest Environmental Advocates (Wisconsin), Missouri Rural Crisis Center, Moms Across America Eastern Shore Chapter (Maryland), Montgomery Township Friends of Family Farms (Pennsylvania), North Carolina Environmental Justice Network, Ozark River Stewards (Arkansas), Patuxent Riverkeeper (Maryland), Poweshiek Community Action to Restore Environmental Stewardship (Iowa), Preserve Our Shore Accomack County (Virginia), and Rio Valle Concerned Citizens (New Mexico) (collectively, Petitioners) hereby petition EPA to promulgate new CAFO regulations pursuant to the Administrative Procedure Act (APA), 5 U.S.C. § 551 et seq., and the CWA, 33 U.S.C. § 1251 et seq. The Petitioners collectively represent millions of citizens from across the United States, including many individuals adversely impacted by CAFO water pollution in their communities.

A. LEGAL BACKGROUND

a. Citizens' Right to Petition and EPA's Duty to Respond

The citizen right to petition the government originates in the First Amendment,[4] and is codified and applied to federal agency regulations through the APA's requirement that "[e]ach agency shall give an interested person the right to petition for the issuance, amendment, or repeal of a rule."[5] The APA also imposes an affirmative obligation on EPA to timely respond to this petition, by requiring that "[w]ith due regard for the convenience and necessity of the parties or their representatives and within a reasonable time, each agency shall proceed to conclude a matter presented to it."[6] In the event EPA seeks to deny the petition in whole or in part, it must provide "[p]rompt notice" to the petitioners.[7]

The APA further grants a right of judicial review to "[a] person suffering legal wrong

[4] U.S. Const. amend. I ("Congress shall make no law . . . abridging . . . the right of the people . . . to petition the Government for a redress of grievances").
[5] 5 U.S.C. § 553(e).
[6] *Id.* § 555(b).
[7] *Id.* § 555(e).

because of agency action, or adversely affected or aggrieved by agency action,"[8] which is defined to include the "failure to act."[9] In the event EPA fails to timely respond or improperly denies the petition in whole or part, courts "shall compel agency action unlawfully withheld or unreasonably delayed,"[10] and "hold unlawful and set aside agency action, findings, and conclusions found to be arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law."[11]

b. EPA's Duty to Regulate CAFOs under the Clean Water Act

The CWA's objective is to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters" by eliminating discharges of pollutants into navigable waters.[12] The National Pollutant Discharge Elimination System (NPDES) permitting program is the primary pollution control mechanism available to EPA and the states to regulate point source discharges."[13] When Congress specifically included "concentrated animal feeding operations" in the CWA's definition of "point source,"[14] it demonstrated unambiguous intent to control and continuously reduce discharges of pollution from the CAFO industry through the NPDES program. Developing and implementing effective CAFO NPDES regulations is therefore one of EPA's clearest CWA obligations.

These regulations must ensure that the entire universe of discharging CAFOs is required to obtain NPDES permits, and that those permits will impose adequate conditions to track and restrict the industry's pollution. The CWA requires EPA to meet certain criteria when establishing the permit requirements for a discharging industry. EPA imposes NPDES permit requirements through the development of national Effluent Limitation Guidelines (ELGs) for industrial source categories. ELGs establish the pollution control levels that industries and facilities must achieve for various types of pollutants, and must be based on several technology-based standards for different categories of pollutants.

Existing facilities are subject to: best available technology economically achievable (BAT) for priority and nonconventional pollutants, which include nitrogen, phosphorus, metals, and pharmaceuticals; best conventional pollutant control technology (BCT) for conventional pollutants, which include fecal coliform, biochemical oxygen demand, pH, oil and grease, and total suspended solids; and best practicable control technology currently available (BPT) for all

[8] *Id.* § 702.
[9] *Id.* § 551(13).
[10] *Id.* § 706(1).
[11] *Id.* § 706(2)(A).
[12] 33 U.S.C. § 1251(a).
[13] *Id.* § 1342.
[14] *Id.* § 1362(14).

pollutants. New sources are subject to more stringent new source performance standards (NSPS) for all pollutants, based on the best available demonstrated control technology (BADT).[15]

EPA must consider various criteria when deriving each standard. BAT must take into account, *inter alia*, facility age, cost of achieving pollution reduction, and non-water quality environmental impacts. BCT must also take these factors into account, but in addition to the requirements that technologies be both available and economically achievable, EPA must consider the reasonableness of the relationship between a technology's cost and the pollution reductions achieved.[16] New source performance standards must "reflect[] the greatest degree of effluent reduction which the Administrator determines to be achievable . . . including, where practicable, a standard permitting no discharge of pollutants."[17]

Such technology-based effluent limitations (TBELs) afford the *minimum* level of water quality protection required by the CWA,[18] and permits must establish such limits for all pollutants present in a discharge.[19] EPA has made clear that state permit writers must address pollutants omitted from federal ELGs by including best professional judgment (BPJ) limits on a case-by-case basis,[20] yet state CAFO permits typically do not control metals, pharmaceuticals, or other pollutants of concern with BPJ limits. EPA has authority to remedy this by including controls for the full suite of CAFO pollutants in its CAFO ELGs.

EPA must annually review, and if appropriate, revise, its ELGs for each source category.[21] In its Final 2014 Effluent Guidelines Program Plan, the most recent final plan at the time of filing, EPA excluded the CAFO point source category from review altogether because it

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[15] *Id*. §§ 1311(b)(2)(A), 1314(b)(4)(A), 1314(b)(1)(A), 1316.

[16] *Id*. §§ 1314(b)(2)(B), 1314(b)(4)(B); 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. 70418, 70463 (Nov. 20, 2008) [hereinafter 2008 CAFO Rule].

[17] 33 U.S.C. § 1316(a)(1).

[18] 40 C.F.R. § 122.44 ("[E]ach NPDES permit shall include conditions meeting the following requirements . . . Technology-based effluent limitations and standards based on: effluent limitations and standards promulgated under section 301 of the CWA, or new source performance standards promulgated under section 306 of CWA, on [sic] case-by-case effluent limitations determined under section 402(a)(1) of CWA, or a combination of the three, in accordance with § 125.3 of this chapter"); 40 C.F.R. § 125.3 ("Technology-based treatment requirements under section 301(b) of the Act represent the minimum level of control that must be imposed in a permit issued under section 402 of the Act").

[19] 40 C.F.R. § 125.3(a)(2), requiring permits to contain technology-based limits for "conventional pollutants," "all toxic pollutants," and "all pollutants which are neither toxic nor conventional pollutants."

[20] *See* 33 U.S.C. § 1311(b)(2)(A); 40 C.F.R. § 125.3(c)-(d); James A. Hanlon, Director, EPA Office of Wastewater Management, *National Pollutant Discharge Elimination System (NPDES) Permitting of Wastewater Discharges from Flue Gas Desulfurization (FGD) and Coal Combustion Residuals (CCR) Impoundments at Steam Electric Power Plants*, Attachment A 1-2 (Jun. 7, 2010) [hereinafter Hanlon BPJ Memo]. Although this Memorandum discussed coal plant discharge limits, the statutory requirement to establish technology-based limits using BPJ is equally applicable across industries.

[21] 33 U.S.C. §§ 1311(e) (requiring that effluent limits be applied to all point sources of discharge of pollutants); 1314(b) (EPA must revise such regulations, at least annually if appropriate). *See also* 33 U.S.C. § 1311(d) (requiring EPA to review, and if appropriate revise, BAT limits every five years). Effluent limitations include "any restriction established by a State or the Administrator on quantities, rates, and concentrations of chemical, physical, biological, and other constituents which are discharged from point sources into navigable waters." 33 U.S.C. § 1362.

had revised the CAFO ELGs within the past seven years.[22] In its 2015 Annual Review, EPA determined that the CAFO category was not an ELG priority and that ELG revisions are not warranted, and consequently did not propose any review of the CAFO ELGs in the 2016 draft Program Plan.[23] Yet the condition of America's waterways undeniably demonstrates that the current ELGs are not adequate. When EPA completes its 2016 Program Plan, the November 20, 2008 rule will have been in effect for more than seven years, and EPA must review and revise its CAFO NPDES regulations and ELGs without further delay.[24]

B. FACTUAL BACKGROUND

The continued growth, consolidation, and increase in operational scale in the CAFO industry over the past several decades, along with growing evidence of the industry's widespread contamination of waterways, demonstrates that EPA's CAFO regulations are inadequate to control CAFO discharges to the extent required under the CWA. Due to the absence of adequate federal and state oversight, CAFOs have become a significant source of water pollution across the U.S.

a. Growth and Consolidation in Animal Production

Animal production has changed dramatically over the last several decades, with a strong trend toward larger facilities and regional concentration of livestock and poultry operations.[25] A majority of animals are now raised in confinement, and may be transferred between several industrial-scale facilities at different stages of their growth.[26] While the total number of livestock

[22] EPA, Final 2014 Effluent Guidelines Program Plan Sec. 3.2.1, T. 3-1 ("In general, EPA removed an industrial point source category from further consideration during a review cycle if EPA established, revised, or reviewed the category's ELGs within seven years prior to the annual reviews") (July 2015), https://www.epa.gov/sites/production/files/2015-09/documents/final-2014-effluent-guidelines-program-plan_july-2015.pdf.

[23] EPA, Preliminary 2016 Effluent Guidelines Program Plan Sec. 10-1 (June 2016), https://www.epa.gov/sites/production/files/2016-06/documents/prelim-2016-eg-plan_june-2016.pdf. This determination is hard to reconcile with EPA's continued listing of CAFOs as one of its water "enforcement priorities," with the goals of using innovative monitoring and pollution control technologies to reduce CAFO water pollution impacts. *See* EPA, National Enforcement Initiative: Preventing Animal Waste from Contaminating Surface and Ground Water, https://www.epa.gov/enforcement/national-enforcement-initiative-preventing-animal-waste-contaminating-surface-and-ground (last visited Feb. 10, 2017).

[24] In fact, EPA has not undergone a comprehensive review of the CAFO regulations since 2003, when it proposed substantive changes to the CAFO regulations. Aside from affirmatively finding that the BCT limitations in the 2003 rule represent BCT for fecal coliform, the 2008 rule did not revisit the technology-based effluent limits for CAFO pollutants, nor did the minor amendments published without notice and comment in 2012.

[25] Claudia Copeland, *Animal Waste and Hazardous Substances: Current Laws and Legislative Issues*, CRS Report RL33691 1 (Nov. 8, 2011) [hereinafter *Animal Waste and Hazardous Substances*], https://fas.org/sgp/crs/misc/RL33691.pdf.

[26] EPA, *Literature Review of Contaminants in Livestock and Poultry Manure and Implications for Water Quality*, EPA 820-R-13-002 5 (July 2013) [hereinafter EPA Literature Review],

animals raised has grown, the number of farms has declined substantially.[27] In fact, since the 1950s the production of livestock and poultry in the U.S. has more than doubled, while the number of operations has decreased by 80%.[28] As a result of this growth, factory farm livestock produced an estimated thirteen times as much waste as the entire U.S. population in 2012.[29]

CAFOs and entire livestock sectors are also increasingly concentrated in certain watersheds and areas of the country, which has increased water quality risks as waste production surpasses land available for disposal. The Government Accountability Office has analyzed this trend, finding that EPA's approach to CAFO regulation under the CWA has been under-protective of water quality, and has allowed CAFO manure generation to surpass cropland in some regions, leading to contamination of surface and ground waters in counties with insufficient cropland to agronomically utilize manure nutrients.[30] Reviewing this trend towards consolidation of manure nutrient production nationwide, the U.S. Department of Agriculture similarly found dramatic increases in manure nutrients relative to the ability of cropland to utilize them between 1982 and 1997.[31]

b. CAFO Water Pollution Impacts

Standard CAFO operation and waste disposal practices have led to widespread water pollution. Numerous studies identify agriculture as the nation's leading contributor to water quality impairments in rivers and lakes, with manure responsible for a significant share of that

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https://www.scribd.com/document/214717740/Literature-Review-of-Contaminants-in-Livestock-and-Poultry-Manure-and-Implications-for-Water-Quality.

[27] *Id*. at 1. For example, the number of dairy farms fell by about 40% between 1999 and 2008, but during the same period, the number of dairy cows decreased by only 16%, while total milk production increased by 18%. John C. Becker & John H. Howard, *A Historical View of the Solutions Offered to Regulate Concentrate Animal Feeding Operations under the Clean Water Act: What Has Been Learned*, 3 Ky. J. Equine Agric. & Nat. Res. L. 71, 75 (2010). Similarly, between 1994 and 2001 the number of hog farms in the U.S. decreased by approximately 120,000 while the number of hogs remained relatively stable. Susan M. Brehm, *From Red Barn to Facility: Changing Environmental Liability to Fit the Changing Structure of Livestock Production*, 93 Cal. L. Rev. 797, 801 (2005). The poultry market peaked even earlier, with the number of broiler chicken farms dropping 35% between 1969 and 1992, while the number of chickens produced tripled. John Marks, *Regulating Agricultural Pollution in Georgia: Recent Trends and the Debate over Integrator Liability*, 18 Ga. State Univ. L. Rev. 1031, 1035 (2002).

[28] EPA Literature Review at 1.

[29] EPA, National Pollutant Discharge Elimination System (NPDES) Concentrated Animal Feeding Operation (CAFO) Reporting Rule, Proposed Rule, 76 Fed. Reg. 65431, 65433 (Oct. 21, 2011) [hereinafter Proposed CAFO Reporting Rule]; Food & Water Watch, *Factory Farm Nation 2015 Edition* 3 (2015) [hereinafter *Factory Farm Nation*], http://www.foodandwaterwatch.org/sites/default/files/factory-farm-nation-report-may-2015.pdf.

[30] GAO, *Concentrated Animal Feeding Operations: EPA Needs More Information and a Clearly Defined Strategy to Protect Air and Water Quality from Pollutants of Concern* 21-22 (2008), http://www.gao.gov/assets/290/280229.pdf [hereinafter GAO CAFO Report]. *See also Animal Waste and Hazardous Substances* at 1 (noting that 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).

[31] Robert L. Kellogg, et al., *Manure Nutrients Relative to the Capacity of Cropland and Pastureland to Assimilate Nutrients: Spatial and Temporal Trends for the U.S.*, USDA Pub. No. nps00-0579 75 (2000), http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs143_012133.pdf. This does not address other manure pollutants that are not agronomically valuable in any quantity.

pollution.[32] Twenty–nine states have specifically identified AFOs as contributing to their water quality impairments,[33] and states with high concentrations of CAFOs "experience on average 20 to 30 serious water quality problems per year as a result of manure management problems."[34] EPA has acknowledged that "[w]ater quality impacts from CAFOs may be due, in part, to inadequate compliance with existing regulations or to limitations in CAFO permitting programs."[35]

Surface water pollution from CAFOs occurs through two major pathways—production areas and land application fields. Spills, runoff, and other unintentional discharges may occur from numerous parts of a CAFO production area, such as manure lagoons, pits, or stockpiles, feed storage areas, livestock confinement ventilation fans, and mortality management areas. A number of factors, including poor facility design, equipment failure, operator error, and extreme weather events, lead to discharges. Operators may also cause releases intentionally if inadequate storage, poor planning, or rainfall accumulation results in overly full waste impoundments.[36]

Surface water pollution from CAFO production areas in various livestock sectors is widespread and has impacted waterways across the country. Hundreds of documented overflows and catastrophic failures of manure storage systems have resulted in large discharges, which in turn have caused toxic stream conditions and large fish kills in numerous states, including Iowa, Wisconsin, Minnesota, Michigan, Missouri, Illinois, New York, Virginia, and North Carolina.[37] In addition, earthen lagoons, and even most lined lagoons, are not designed to retain all wastewater. These storage systems are designed to allow seepage and/or leaking of manure into groundwater, which can lead to jurisdictional discharges into nearby surface waters.[38] Even deep

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[32] David Osterberg and 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"); Claudia Copeland, *Air Quality Issues and Animal Agriculture—A Primer*, CRS Report RL32948 9 (Apr. 11, 2007) [hereinafter *Air Quality Primer*], http://nationalaglawcenter.org/wp-content/uploads/assets/crs/RL32948.pdf.

[33] Proposed CAFO Reporting Rule, 76 Fed. Reg. at 65434, citing EPA, National Water Quality Inventory: Report to Congress—2004 Reporting Cycle, EPA–841–R–08–001 (Jan. 2009).

[34] Carrie Hribar, Nat'l Ass'n of Local Bds. of Health, *Understanding Concentrated Animal Feeding Operations and Their Impact on Communities* 4 (2010) [hereinafter *Understanding CAFOs and Their Impact on Communities*], http://www.cdc.gov/nceh/ehs/docs/understanding_cafos_nalboh.pdf.

[35] Proposed CAFO Reporting Rule, 76 Fed. Reg. at 65434.

[36] *Id.*

[37] *See, e.g.*, EPA Literature Review at 49 (reviewing reported incidences of fish kills); Iowa DNR, Manure Discharge Chart, http://www.iowadnr.gov/Environmental-Protection/Land-Quality/Animal-Feeding-Operations/EPA-DNR-Workplan-Materials (last visited Feb. 10, 2017); David Jackson and Gary Marx, Chicago Tribune, Spills of Pig Waste Kill Hundreds of Thousands of Fish in Illinois (Aug. 5, 2016), http://www.chicagotribune.com/news/watchdog/pork/ct-pig-farms-pollution-met-20160802-story.html; Lee Bergquist and Kevin Crowe, Milwaukee Journal Sentinel, Manure Spills in 2013 the Highest in Seven Years Statewide (Dec. 5, 2013), http://archive.jsonline.com/news/wisconsin/manure-spills-in-2013-the-highest-in-seven-years-statewide-b99157574z1-234701931.html; Sara Peach, National Geographic, What to Do about Pig Poop? North Carolina Fights a Rising Tide (Oct. 30, 3014), http://news.nationalgeographic.com/news/2014/10/141028-hog-farms-waste-pollution-methane-north-carolina-environment/.

[38] *See* Natural Resources Conservation Service (NRCS), Conservation Practice Standard 359: Waste Treatment Lagoon (Jul. 2004), https://efotg.sc.egov.usda.gov/references/public/AL/tg359.pdf. *See also, e.g.*, Animal Waste

pit systems that retain waste below confinement buildings, as are common in the hog industry, are reliant on pumping systems and are prone to structural and equipment failures that cause discharges to surface and groundwater.[39]

CAFO discharges also occur due to waste application to cropland in excess of crop needs or under conditions that lead to runoff, such as on frozen, saturated, or sloped ground, or when crops are not in place to uptake nutrients. Many manure application fields also contain direct conduits to waterways, such as tile lines, ditches, grassed waterways, or sinkholes, and application practices do not always properly account for the need for setbacks from these features. As a result of application under any of these circumstances, precipitation, erosion, and other natural processes carry excess nutrients and other CAFO pollutants off of land application fields and into surface waters and conduits to surface waters. Collectively, these discharges are responsible for widespread degradation of U.S. waterways, and due to inadequate tracking and regulation, the full magnitude of their water pollution impacts remains unknown.

CAFO wastes contain numerous pollutants that pose substantial threats to human health and the environment. Specifically, these wastes include nitrogen, phosphorous, pathogens, salts, heavy metals, trace elements, antibiotics, pesticides, and hormones.[40] Pathogens associated with CAFO manure include *E. coli*, *Salmonella*, and *Giardia*,[41] which endanger those who come into contact with contaminated water through swimming, boating, or other recreational activities. EPA has found 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 more than 90% of food and waterborne diseases."[42] Various pathogens in CAFO waste can cause symptoms such as diarrhea and an increased risk for severe illness or death.[43]

Management Plan for Lost Valley Ranch Dairy App. A, discussing expected leakage rates from double lined lagoons, http://www.oregon.gov/ODA/programs/NaturalResources/Pages/CAFO.aspx. Although groundwater is not regulated as water of the United States, EPA has a longstanding position that point source discharges into groundwater that then discharge to surface waters via a "direct hydrological connection" are jurisdictional and subject to NPDES permitting requirements. National Pollutant Discharge Elimination System Permit Regulation and Effluent Limitations Guidelines and Standards for Concentrated Animal Feeding Operations, Proposed Rule, 66 Fed. Reg. 2960, 3016 (Jan. 12, 2001) [hereinafter 2001 Proposed CAFO Rule].

[39] *See, e.g.*, Iowa DNR, Manure Discharge Chart, http://www.iowadnr.gov/Environmental-Protection/Land-Quality/Animal-Feeding-Operations/EPA-DNR-Workplan-Materials.

[40] EPA Literature Review at 2. *See also* 2001 Proposed CAFO Rule, 66 Fed. Reg. at 2976-79; *Air Quality Primer* at 9; *Understanding CAFOs and Their Impact on Communities* 2-3 (Animal wastes contain a variety of pollutants, primarily nutrients, such as nitrogen and phosphorous, as well as organic matter, solids, pathogens such as *E. coli*, odorous/volatile compounds, growth hormones, antibiotics, chemicals used as additives to the manure or to clean equipment, silage leachate from corn feed, or copper sulfate used in footbaths for cows.); David Osterberg & David Wallinga, *Addressing Externalities from Swine Production to Reduce Public Health & Environmental Impacts*, 94 Am. J. Pub. Health at 1704.

[41] Claudia Copeland, *Animal Waste and Water Quality: EPA Regulation of Concentrated Animal Feeding Operations (CAFOs)*, CRS Rep. RL31851 5 (Feb. 16, 2010) [hereinafter *Animal Waste and Water Quality*], http://nationalaglawcenter.org/wp-content/uploads/assets/crs/RL31851.pdf.

[42] 2003 CAFO Rule, 68 Fed. Reg. at 7236.

[43] *Understanding CAFOs and Their Impact on Communities* at 8-9.

Nutrients, primarily nitrogen and phosphorus, are also primary pollutants of concern in CAFO waste, due to their impacts on aquatic ecosystems and public health. Excess nitrogen and phosphorus lead to eutrophication of surface waters,[44] generate algal blooms that can produce toxins harmful to wild animals, aquatic life, and humans who come into contact with them,[45] and cause hypoxic "dead zones," such as occur annually in the Gulf of Mexico and the Chesapeake Bay. EPA has recognized that "[n]utrient pollution is one of America's most widespread, costly and challenging environmental problems."[46]

Antimicrobials, including medically important antibiotics, are also common constituents of CAFO waste, and have been detected in both surface and groundwater samples collected near CAFOs.[47] EPA has found that 80-90% of some administered antibiotics end up in animal waste.[48] While antibiotics are often used to promote the growth of livestock, as well as to fight disease in crowded, unsanitary CAFO environments, their use also promotes antibiotic–resistant infections in livestock and humans and the dissemination of antibiotic–resistant bacteria in waterways near CAFOs and their land application areas. The proliferation of antibiotic–resistant bacteria makes it more difficult to treat infections in humans, significantly increasing the likelihood of hospitalization and the average length of hospitalization in those who become infected.[49]

EPA has previously found that heavy metals including "arsenic, cadmium, iron, lead, manganese, and nickel," some of which are added to feed as micronutrients to promote animal growth, "are commonly found in CAFO manure, litter, and process wastewater."[50] Just as with antibiotics fed to livestock, 80-90% of added arsenic, zinc, and copper are excreted in manure, and subsequent land application can lead to metal accumulation in soils and metal-contaminated runoff to waterways. When metal pollutants are present in CAFO discharges, they can damage aquatic ecosystems and cause a broad set of human health impacts."[51] Researchers have found that the full impacts of metal pollution from CAFO waste, both alone and in combination with

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[44] Shauna R. Collins, *Striking the Proper Balance Between the* Carrot *and the* Stick *Approaches to Animal Feeding Operation Regulation*, 2012 U. Ill. L. Rev. 923, 932 (2012).
[45] EPA Literature Review at 47.
[46] EPA, Nutrient Pollution: The Problem, https://www.epa.gov/nutrientpollution/problem (last visited Feb. 10, 2017).
[47] *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); Yi Luo et al., *Trends in Antibiotic Resistance Genes Occurrence in the Haihe River, China*, 44 Envtl. Sci. Tech. 7220 (2010); Pew Commission on Industrial Farm Animal Production, *Putting Meat on the Table: Industrial Farm Animal Production in America* 15-16 (2008), http://www.pewtrusts.org/~/media/legacy/uploadedfiles/peg/publications/report/pcifapfinalpdf.pdf.
[48] Proposed CAFO Reporting Rule, 76 Fed. Reg. at 65434.
[49] 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).
[50] Proposed CAFO Reporting Rule, 76 Fed. Reg. at 65434.
[51] *Id.*

other contaminants, are inadequately understood.[52]

CAFO wastes can also contain large quantities of hormones—both naturally produced and synthetic.[53] While acknowledging that hormone quantities are difficult to estimate due to the lack of reporting requirements, one study estimated that approximately 722,852 pounds of naturally–produced estrogens, androgens, and progestogens were excreted by cattle, swine, and poultry in 2000; accounting for all synthetic hormones in manure, the use of which does not have to be reported, would drive this figure even higher.[54] Hormones and their metabolites are also found in the environment surrounding livestock and poultry facilities, including streams, creeks, and surface waters downstream from beef cattle feedlots,[55] where they can cause serious damage to the endocrine and reproductive systems of aquatic species, lab rats, and human cells.[56]

While CAFO pollution is widespread, it also disproportionately impacts environmental justice communities. Research to date has focused primarily on the hog industry, and several studies have shown that "a disproportionate number of swine CAFOs are located in low-income and nonwhite areas."[57] One study analyzed the locations of large hog CAFOs in 17 states, including Iowa, North Carolina, and Minnesota, which are leaders in hog production where CAFOs had been rapidly expanding. In these three states, the researchers found disproportionate siting and expansion of large hog CAFOs in African American communities in the 1980s and 1990s, and concluded that as hog production shifts from small-scale to large-scale, racial inequity in CAFO siting intensifies.[58] A 2011 study of 16 North Carolina communities concluded that in general, "[i]ndustrial hog operations in North Carolina are disproportionately located in low-income communities of color."[59]

Although many studies have focused on the hog sector, these environmental justice impacts do extend to communities affected by other livestock sectors. EPA recently conducted its own limited analysis of CAFO location in relation to environmental justice populations of concern, and identified areas at risk of disproportional impacts from virtually every CAFO livestock sector: the Delmarva Peninsula, characterized by broiler chicken operations; the Iowa-Minnesota border, characterized by hog, egg layer, and beef feedlot operations; the Carolina

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[52] JoAnn Burkholder et al., *Impacts of Waste from Concentrated Animal Feeding Operations on Water Quality*, 115 Envtl. Health Perspectives 308, 308-309 (2007) [hereinafter *Impacts of Waste from Concentrated Animal Feeding Operations on Water Quality*], http://ir.uiowa.edu/cgi/viewcontent.cgi?article=1025&context=oeh_pubs.
[53] EPA Literature Review at 40-41.
[54] *Id.*
[55] *Id.* at 45.
[56] GAO CAFO Report at 24.
[57] Kelley Donham, Steven Wing, et al., *Community Health and Socioeconomic Issues Surrounding Concentrated Animal Feeding Operations*, 115 Envtl. Health Perspectives 317, 318 (2007).

[58] Jeremy Arney, Janice E. Johnston, and Paul B. Stretesky, *Environmental Inequity: An Analysis of Large-Scale Hog Operations in 17 States, 1982-1997*, 68 Rural Sociology 231, 244 (2003).
[59] Schinasi, et al., *Air Pollution, Lung Function, and Physical Symptoms in Communities Near Concentrated Swine Feeding Operations*, 22 Epidemiology 7 (March 2011).

lowlands, characterized by hog, broiler, and turkey operations; and the California central valley, characterized by dairy operations. All of these regions have both large numbers of CAFOs and large minority and low-income populations.[60]

Recognition of these environmental justice impacts is growing; the Department of Justice recently cited to the disproportionate impact of a Mississippi egg layer operation's water pollution on a low-income community in its 2015 Implementation Progress Report on Environmental Justice,[61] and Maryland's Wicomico County Health Department was recently compelled to conduct a Health Impact Assessment for a proposed 10-house broiler operation in an 80% African American community.[62] EPA's External Civil Rights Compliance Office also recently investigated North Carolina's swine permitting program and found "the possibility that African Americans, Latinos, and Native Americans have been subjected to discrimination as the result of [North Carolina Department of Environmental Quality's] operation of the [program] . . . ."[63]

CAFO pollution also poses a considerable threat to wildlife in the United States. Exposure to the contaminants discharged from these operations, including heavy metals, pharmaceuticals, and pesticides can harm or kill aquatic species. The fish kill events caused by some CAFO discharges, for example, harm not only these observable fish populations, but are also generally indicative of larger aquatic species losses. Relatedly, reproductive and endocrine disruption from exposure to pharmaceuticals in farm animal waste can result in the reduction and imbalance of impacted species' population numbers.[64] Pollution from CAFOs further harms wildlife and ecosystems though loss of ecosystem biodiversity, including through conversion and encroachment of essential species habitat.[65] These harms are particularly acute for endangered

[60] EPA Office of Water, National Pollutant Discharge Elimination System (NPDES) Concentrated Animal Feeding Operation (CAFO) Reporting Rule, Analysis under Executive Order 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations 4 (Oct. 3, 2011).
[61] U.S. Dep't of Justice, 2015 Implementation Progress Report on Environmental Justice 23, https://www.justice.gov/ej/file/870526/download.
[62] Wicomico County Health Dep't, Health Impact Assessment: Proposed Concentrated Animal Feeding Operation in Wicomico County (Apr. 2016), https://www.wicomicohealth.org/file/0/0/Health%20Impact%20Assessment.pdf.
[63] Letter of Concern from Lilian S. Dorka, Director, EPA External Civil Rights Compliance Office to William G. Ross, Jr., Acting Sec'y, N.C. Dep't of Envtl. Quality 1 (Jan. 12, 2017), http://blogs.law.unc.edu/documents/civilrights/epalettertodeq011217.pdf.
[64] 2001 Proposed CAFO Rule, 66 Fed. Reg. at 2981; Food and Agriculture Organization of the United Nations, Livestock's Long Shadow, 209-11 (2008); World Health Organization and United Nationals Environmental Programme, State of the Science of Endocrine Disrupting Chemicals – 2012 vii - xv (2013), http://www.who.int/ceh/publications/endocrine/en/; *see also* J.K. Leet, et al., *Environmental hormones and their impacts on sex differentiation in fathead minnows*, 158 Aquatic Toxicology 98, 98 (2015), https://www.researchgate.net/publication/267870556_Environmental_Hormones_and_Their_Impacts_on_Sex_Differentiation_in_Fathead_Minnows; Ripley, et al., *Utilization of protein expression profiles as indicators of environmental impairment of smallmouth bass (Micropterus dolomieu) from the Shenandoah River, Virginia, USA*, 27 Envtl. Toxicology and Chemistry 1756, 1756 (2008).
[65] USDA, Agricultural Waste Management Field Handbook, Agricultural Wastes, Air, and Animal Resources 3-3 (2012), http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=31441.wba ("Adding wastes to a stream can lower oxygen levels to such an extent that fish and other aquatic life are forced to migrate from the polluted area or die for lack of oxygen."); FWS, Endangered and Threatened Wildlife and Plants; Final Rule to List

and threatened species, where prolonged insecurity or heightened pollution exposure can result in the extirpation and, potentially, extinction of impacted species.[66]

Widespread CAFO water pollution is significantly damaging public health and ecosystems, and although the full extent of this pollution is unknown due to the lack of CAFO permitting and water pollution monitoring, there is overwhelming evidence of EPA's failure to live up to its CWA mandate. The contamination, both expressly authorized and simply overlooked, under EPA's current regulatory approach poses a direct threat to water quality, aquatic ecosystems, and human health. It is therefore incumbent upon EPA to promulgate revised CAFO rules that more effectively confront the environmental and public health risks posed by water pollution from these facilities.

c. Inadequate CAFO Regulation under the Clean Water Act

After more than 40 years of CWA implementation, EPA has acknowledged that it still lacks basic information about where the nation's CAFOs are located and which facilities are discharging pollutants into jurisdictional waterways without required permits.[67] EPA estimates that only approximately 40% of CAFOs are currently regulated under the NPDES program,[68] while as many as 75% discharge as a result of their "standard operational profiles."[69] Despite these major gaps in information and regulation, EPA proved unwilling to stand up to CAFO industry pressure when it abandoned the only nationwide effort it has undertaken in decades to fill these gaps by developing a comprehensive inventory of CAFOs.[70]

This failure by EPA to develop or maintain a CAFO inventory has meant that states must identify CAFOs and determine which are subject to regulation with little guidance or oversight from EPA. Predictably, this has resulted in a patchwork of state programs, inconsistent amounts

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the Topeka Shiner as Endangered, 63 Fed. Reg. 69016, 69017 (Dec. 15, 1998) (For endangered Topeka Shiner populations, "[t]he action most likely impacting the species to the greatest degree in the past is sedimentation and eutrophication . . . resulting from intensive agricultural development . . . . Feedlot operations on or near streams are also known to impact prairie fishes due to organic input resulting in eutrophication."); Blehert, et al., USGS, Investigation of Bacterial Pathogens Associated with Concentrated Animal Feeding Operations (CAFOs) and their Potential Impacts on a National Wildlife Refuge in Oklahoma: Final Report, Project 2N44, 200120004 2 (July 24, 2004).

[66] *See, e.g.*, FWS, CAFOs Feed a Growing Problem, Endangered Species Bulletin, Vol. XXIV No. 1 (January/February 1999), http://www.thefreelibrary.com/CAFOs+Feed+a+Growing+Problem.-a054466913 (In 1998, an 11 million gallon spill of liquid waste from a large poultry operation damaged a wetland vernal pool system in the Merced National Wildlife Refuge, killing endangered vernal pool fairy shrimp and vernal pool tadpole shrimp.).

[67] Proposed CAFO Reporting Rule, 76 Fed. Reg. at 65436.

[68] In 2010, EPA estimated that approximately forty percent of an estimated 19,200 CAFOs were covered by NPDES permits. EPA, National Pollutant Discharge Elimination System (NPDES) Information Collection Rulemaking and CAFOs 1 (Sept. 2010) [hereinafter EPA 2010 NPDES Estimate].

[69] *Id.*

[70] National Pollutant Discharge Elimination System (NPDES) Concentrated Animal Feeding Operation (CAFO) Reporting Rule, Withdrawal, 77 Fed. Reg. 42679 (Jul. 20, 2012).

and qualities of available information, and widely varying approaches to NPDES permitting. For example, Michigan requires all CAFOs with the potential to discharge to obtain a NPDES permit, and this requirement has been upheld by the state's court of appeals.[71] Wisconsin generally requires all Large CAFOs to obtain NPDES permits,[72] while Iowa has refused to issue a single permit to any of its thousands of confinement operations, despite hundreds of documented discharges.[73] In South Dakota, the state has proposed to allow CAFO operators to choose whether to apply for a NPDES permit or a state no-discharge permit.[74] And Delaware regulations purportedly require all CAFOs that propose to discharge to obtain permits, but the state had only recently begun granting its first CAFO NPDES permits (general permit coverage for broiler chicken operations that land-apply) at the date of this petition's filing.[75]

EPA has not prioritized permitting, even where CAFOs have had documented discharges. In its 2008 CAFO Rule preamble and a memo issued by EPA's James Hanlon in response to the *Pork Producers* decision, EPA improperly conflates the legal question of whether a violation is ongoing for purposes of establishing jurisdiction to maintain a CWA citizen suit with the distinct question of whether a facility is a point source discharger subject to NPDES permitting requirements.[76] Based on this flawed analysis, even CAFOs with documented jurisdictional discharges are often not required, or even encouraged, to obtain NPDES permits, because they can claim to have "permanently remedied" the cause of their violations. This loophole is ripe for abuse, and as we can see in the case of Iowa, where *no* confinements with known discharges have obtained permits, such abuse is rampant.

For these reasons, as well as the additional deficiencies in EPA's approach explained throughout this petition, EPA and states have never come close to satisfying the CWA's obligations to permit discharging CAFOs and exercise proper oversight. EPA remains apparently ignorant of the fact that its regulations on paper have not translated to effective regulation in the real world. For example, Allison Wiedeman of the EPA's Water Permits Division was quoted in early 2016 as saying, in describing the current state of CAFO CWA permitting, "[w]e see that it's working. We know that these facilities have to have permits if they discharge, and so all I can

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[71] *See Mich. Farm Bureau et al. v. Mich. Dep't of Envtl. Quality*, 292 Mich. App. 106, 108 (Mar. 29, 2011).
[72] Wis. Admin. Code Ch. NR 243.11 (2015).
[73] *See* Iowa Dep't of Nat. Res., 2016 Annual Report for Work Plan Agreement Between the Iowa Department of Natural Resources and the Environmental Protection Agency Region 7 (Aug. 1, 2016), http://www.iowadnr.gov/Environmental-Protection/Land-Quality/Animal-Feeding-Operations/EPA-DNR-Workplan-Materials.
[74] S.D. Dep't of Env't and Natural Res., Draft General Water Pollution Control Permit for CAFOs (Oct. 2015), http://denr.sd.gov/des/fp/publicnotices/DraftGeneralPermitPN.pdf.
[75] *See* DNREC, Division of Water, Concentrated Animal Feeding Operations, http://www.dnrec.delaware.gov/wr/Information/Pages/CAFO.aspx (last visited Jan. 30, 2017).
[76] 2008 CAFO Rule, 73 Fed. Reg. at 70423; James A. Hanlon, Director, EPA Office of Wastewater Management, *Concentrated Animal Feeding Program Update after* National Pork Producers Council v. EPA (Dec. 8, 2011) (both exclusively citing CWA citizen suit case law).

tell you right now is that the process is working."[77] This head-in-the-sand approach does not protect communities from illegal CAFO pollution.

C. SUMMARY OF RELIEF REQUESTED

Petitioners request that EPA promulgate new CAFO rules that will effectively implement the CWA's pollution control mandate. Specifically, Petitioners request the following relief:

1. EPA should establish an evidentiary presumption that certain CAFOs discharge and are either subject to NPDES permitting or must rebut the presumption by demonstrating they do not discharge;
2. EPA should revise its interpretation of the agricultural stormwater exemption such that no discharges resulting from CAFO activities are exempt as non-point source pollution;
3. EPA must ensure that integrators who meet the CWA definition of owner or operator are co-permitted with contract producers, as the statute has always required;
4. EPA should revise certain definitions in the CAFO regulations;
5. EPA should revise the requirements applicable to all CAFOs, including by requiring water quality monitoring in CAFO NPDES permits to ensure compliance with the CWA and permit terms; and
6. EPA should revise the CAFO ELGs to address additional CAFO pollutants of concern, prohibit practices known to harm water quality, and otherwise strengthen existing requirements.

Petitioners further request that EPA open a docket for this petition and solicit public input on the proposed rule changes.

II. ARGUMENT

EPA's current CAFO regulations are failing to achieve the mandates of the CWA to permit point source dischargers of pollution, require pollution reductions based on appropriate technology-based standards, and ultimately eliminate point source discharges to navigable waters.[78] To meet these mandates, EPA must make certain critical changes to its CAFO regulations.

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[77] Keri Brown, Nat'l Public Radio, When a Chicken Farm Moves Next Door, Odor May Not Be The Only Problem (Jan. 24, 2016), http://www.npr.org/sections/thesalt/2016/01/24/463976110/when-a-chicken-farm-moves-next-door-odor-may-not-be-the-only-problem. Even more recently, former EPA Administrator Gina McCarthy expressed her view that cleaning up agricultural pollution is largely up to voluntary industry practices and the USDA, because EPA is not "in a position to demand it of them." Jenny Hopkinson, Politico Pro Agriculture Whiteboard, EPA's McCarthy: Better That USDA Tell Farmers to Up Their Environmental Game (Oct. 18, 2016).

[78] *See* 33 U.S.C. § 1251(a)(1).

This petition lays out a roadmap for necessary and effective changes EPA must make to its CAFO regulations, addressing the two overarching issues of permit coverage and permit effectiveness. As detailed herein, EPA's existing authority enables it to put a regulatory scheme in place that would ensure all CAFO dischargers are subject to NPDES permits and that those permits adequately limit CAFO discharges and protect water quality. Any action that falls short of achieving these fundamental requirements of the Act would be arbitrary and capricious.

A. EPA's CAFO Regulations Must Ensure that All Discharging CAFOs Obtain NPDES Permits

The CWA prohibits the "discharge of a pollutant" by any person from any point source, unless in compliance with a NPDES permit.[79] Nonetheless, as discussed *supra*, EPA's CAFO regulations have failed for decades to reliably bring discharging CAFOs into the NPDES permitting program. Furthermore, the incentive for a majority of CAFOs to seek coverage was diminished by the Fifth Circuit's holding in *National Pork Producers Council v. EPA*, which invalidated the "duty to apply" for a NPDES permit under the 2008 CAFO rules.[80] The lack of a duty to apply has made it difficult for EPA and states to determine whether CAFOs are discharging and to ensure that all CAFO polluters obtain permits.[81]

This general lack of oversight, along with specific regulatory deficiencies, has allowed polluting facilities to evade permitting requirements for decades. The common-sense amendments to EPA's regulatory approach discussed below would close the loopholes that have allowed so many of these point sources to remain unregulated.

a. EPA Should Establish an Evidentiary Presumption that CAFOs with Certain Characteristics Actually Discharge

The overall lack of complete information about the universe of discharging CAFOs, and the persistent and widespread failures by states and EPA to issue CAFO permits to discharging facilities, demonstrates that EPA's current regulations are simply not resulting in permits when required by the CWA. Therefore, in order to create an effective permitting system, EPA must require all CAFOs with certain characteristics—including but not limited to those that have had a documented discharge to a water of the U.S.—to obtain NPDES permits. To do so in a way that is consistent with recent case law, EPA must establish a presumption that certain operations actually discharge, as opposed to having the potential to discharge or proposing to discharge. EPA has clear authority to establish such a presumption, and abundant evidence with which to support it.

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[79] 33 U.S.C. § 1311(a).
[80] *See Nat'l Pork Producers Council v. EPA*, 635 F.3d 738, 751 (5th Cir. 2011).
[81] GAO CAFO Report at 17-18 (concluding that data collected by EPA and states on the number of CAFOs, discharge status of CAFOs, and number of permits issued by state authorities are unreliable).

i. EPA Has Clear Authority to Establish a Presumption that Certain CAFOs Discharge

Recent judicial decisions have undermined EPA's previous efforts to require polluting CAFOs to obtain NPDES permits. In *Waterkeeper Alliance v. EPA*, the Second Circuit vacated the requirement for each large CAFO to apply for a permit, or to secure a determination from the relevant permitting authority that that CAFO has "'no potential to discharge' manure, litter or process wastewater."[82] The court held that this requirement exceeded EPA's statutory jurisdiction under the Act because "unless there is a 'discharge of any pollutant,' there is no violation of the Act, and point sources are . . . [not] statutorily obligated to seek or obtain an NPDES permit." [83] The Fifth Circuit echoed this holding in *National Pork Producers Council v. EPA*,[84] vacating a similar requirement that CAFOs that "proposed to discharge" must apply for permits. The practical result of these cases and EPA's interpretation of them has been to place the burden on citizens and regulators to identify discharging CAFOs that require permits *and* demonstrate that discharges are likely to recur—a 'catch me if you can' system that has resulted in widespread failure to require permits at the state level.[85]

However, these decisions do not foreclose further action by EPA. While EPA's authority to require NPDES permits is limited to those CAFOs that actually discharge, the Second Circuit noted, in a footnote to the *Waterkeeper* decision, that EPA had not argued that the administrative record in that case "support[ed] a regulatory presumption to the effect that Large CAFOs *actually* discharge."[86] As such, the court did not consider whether EPA "might properly presume that Large CAFOs—or some subset thereof—actually discharge."[87] The court thus suggested that EPA may be able to martial evidence to support a regulatory presumption that all or certain categories of CAFOs discharge.[88]

Under well–settled principles of administrative law, agencies have the power to establish evidentiary presumptions.[89] EPA recognized this authority when it proposed establishing a

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[82] *Waterkeeper Alliance v. EPA*, 399 F.3d 486, 506 (2d Cir. 2005).
[83] *Id.* at 504.
[84] *Nat'l Pork Producers Council*, 635 F.3d at 750-51.
[85] As discussed *supra*, even when facilities experience documented discharges, some states allow operators to "remedy" the cause of the violation rather than apply for NPDES permits.
[86] *Waterkeeper Alliance*, 399 F.3d at 506 n.22.
[87] *Id.* (citing *NLRB v. Curtin Matheson Scientific, Inc.*, 494 U.S. 775 (1990); *Nat'l Mining Ass'n v. Babbitt*, 172 F.3d 906 (D.C. Cir. 1999)).
[88] In the subsequent *Nat'l Pork Producers Council* case, EPA did not argue that it had established such a presumption in the 2008 CAFO rulemaking; indeed, it argued the opposite. *See* Final Brief of Respondent U.S. EPA at 62, *Nat'l Pork Producers Council*, 635 F.3d 738 (argument heading: "Nothing in 40 C.F.R. § 122.23(j) Alters the Evidentiary Burden for a CAFO Alleged to Have Discharged Without a Permit"). The court therefore offered no opinion on whether an evidentiary presumption could be properly invoked to shift the burden of producing evidence of no-discharge to the regulated entity.
[89] *See e.g., NLRB v. Baptist Hospital*, 442 U.S. 773, 787 (1979); *Nat'l Mining Ass'n v. U.S. Dept. of Interior*, 177 F.3d 1, 6 (D.C. Cir. 1999); *U.S. Steel Corp. v. Astrue*, 495 F.3d 1272, 1284 (11th Cir. 2007); *Cole v. USDA*, 33 F.3d

rebuttable presumption that CAFO lagoons discharge to surface water via groundwater, suggesting a requirement that CAFOs either conduct groundwater pollution monitoring or rebut the presumption of discharge by providing a hydrologist's report demonstrating that no such connection exists at a facility.[90] A court will deem such an evidentiary presumption valid so long as a there is "some rational connection between the fact proved and the ultimate fact presumed, and [] the inference of one fact from proof of another [is] not so unreasonable as to be a purely arbitrary mandate."[91] Regulatory presumptions, i.e., evidentiary presumptions established through rulemaking, are therefore entitled to substantial deference.[92] It follows that, by establishing an evidentiary presumption that certain CAFOs actually discharge, EPA can validly either treat them as discharging facilities or require them to produce evidence that they do not discharge, and therefore should not be subject to the NPDES program.[93] Moreover, case law strongly supports the use of this kind of legal device to increase administrative efficiency, and as a solution to the paucity of reported data pertaining to individual facilities.[94]

ii. EPA Has Sufficient Evidence to Support a Presumption that CAFOs with Certain Characteristics Discharge

In this case, there is overwhelming evidence that many CAFOs actually discharge, so an evidentiary presumption to that effect is appropriate and necessary. EPA's own data already reflect much more than the "rational connection" between the design, construction, and operation of many CAFOs, and their actual discharges, that would be needed to uphold such a

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1263, 1267 (11th Cir. 1994); *Holland Livestock Ranch v. U.S.*, 714 F.2d 90, 92 (9th Cir. 1983); *Chem. Mfrs. Ass'n v. Dep't of Transp*., 105 F.3d 702, 705 (D.C. Cir. 1997).

[90] 2001 Proposed CAFO Rule, 66 Fed. Reg. at 3040.

[91] *Mobile, Jackson & Kansas City R. Co. v. Turnipseed*, 219 U.S. 35, 43 (1910); *See also NLRB v. Baptist Hospital*, 442 U.S. at 787; *Atchison, T. & S. F. Ry. Co. v. ICC*, 580 F.2d 623, 629 (D.C. Cir. 1978); *Nat'l Mining Ass'n v. Babbitt*, 172 F.3d at 912. That the fact presumed does not always and inevitably follow from the predicate fact has no bearing on the validity of an evidentiary presumption. *See Cole v. USDA*, 33 F.3d at 1270 ("The mere statement that the fact presumed does not *always follow necessarily* from the predicate fact obviously leaves ample room for some lesser, though still rational, connection between the two," thus the mere possibility of circumstances in which the relationship might not hold true was insufficient to invalidate a regulatory presumption).

[92] *NLRB v. Baptist Hospital*, 442 U.S. at 796 (Justice Brennan concurring); *NLRB v. Los Angeles New Hospital*, 640 F.2d 1017, 1020 (9th Cir. 1981); *N.Y. Foreign Freight Forwarders & Brokers Ass'n v. Fed. Mar. Comm'n*, 337 F.2d 289, 295 (2d Cir. 1964).

[93] The effect of an evidentiary presumption is to shift the burden of proof, but not the burden of persuasion, to the party against whom the presumption is invoked. *See* Fed. R. Evid. 301 ("In a civil case, unless a federal statute or those rules provide otherwise, the party against whom a presumption is directed has the burden of producing evidence to rebut the presumption. But this rule does not shift the burden of persuasion, which remains on the party who had it originally.").

[94] *Chem. Mfrs. Ass'n v. Dep't of Transp.*, 105 F.3d at 706 (upholding an evidentiary presumption, established by rule, as an exercise of the agency's "reasoned judgment," and a "sensible, timesaving device"); *Nat'l Mining Ass'n v. Babbitt*, 172 F.3d at 912 (finding an evidentiary presumption is permissible "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"). *See also* 2003 CAFO Rule, 68 Fed. Reg. at 7201 ("It is [] much easier for CAFOs to avoid permitting by not reporting their discharges [than it is for operations in other industries]. EPA continues to believe that imposing a duty to apply for all CAFOs is appropriate given that the current regulatory requirements are being misinterpreted or ignored.").

presumption. Two sets of factors are closely correlated with a CAFO's tendency to discharge, and should inform the creation of one or more evidentiary presumptions. First, even under EPA's untenably broad construction of the agricultural stormwater exemption, CAFOs that apply manure to land as fertilizer should be presumed to discharge, because nutrient management tools are simply not calculated to eliminate discharges, even if optimally designed and perfectly implemented, and should be assumed to result in discharges to surface waters and groundwater with a direct hydrologic connection to surface waters.[95] Second, CAFOs with certain production area characteristics that inevitably cause discharges—such as ditches and conduits that flow to jurisdictional waters, barns that spew pollutants from ventilation systems, or certain types of waste storage structures—should also be presumed to discharge. EPA has already done much of the analysis needed to support a presumption related to facilities with certain production area characteristics, and has concluded that 75% of CAFOs do in fact discharge based on their "standard operational profiles."[96]

1. Land Application Discharges

Land application of manure through spreading, spraying, injection, or incorporation is one of the most common methods of disposal of CAFO waste.[97] Yet EPA's current regulations effectively assume that dry weather land application in accordance with a nutrient management plan (NMP) will result in zero discharge, such that no permit is required. Although the regulations do not expressly state that land application in accordance with an NMP renders a permit unnecessary, the NMP is ostensibly designed to "ensure appropriate agricultural utilization of the nutrients . . . ."[98] As a result, many large CAFOs elect not to obtain permits based on reliance on an NMP.[99] Land application of waste is likely the leading source of CAFO water pollution and must be more effectively addressed through NPDES permitting.

As explained in more detail *infra*, EPA's primary assumption that land application does not result in discharges, absent a precipitation event, is fundamentally at odds with scientific

[95] *See* discussion *infra* Section II.A.b., asserting that such land application discharges should never be exempt from the definition of a point source discharge.

[96] EPA 2010 NPDES Estimate at 1. EPA should also presume that facilities that have experienced one or more documented discharges do in fact discharge, and must obtain permits. The current regulatory scheme defies logic by in effect presuming that a facility with a record of unpermitted pollution will never pollute again, and does not require operators to make any affirmative showing that they have made all necessary modifications to the facility to cease all continuous or sporadic discharges.

[97] *Understanding CAFOs and Their Impact on Communities* at 2.

[98] 40 C.F.R. § 122.23(e).

[99] In Iowa, for example, thousands of large confinement hog CAFOs apply waste according to state "manure management plans," but at the time of filing, not a single one had been issued a NPDES permit. Due to the CAFO rules' limitations, even increased EPA oversight of Iowa's NPDES program, in part resulting from EPA's findings that the Iowa Department of Natural Resources fails to issue permits to CAFOs when necessary, has not compelled permitting of confinement operations. *See* Iowa Dep't Natural Res., EPA/DNR Work Plan Materials, http://www.iowadnr.gov/Environmental-Protection/Land-Quality/Animal-Feeding-Operations/EPA-DNR-Workplan-Materials.

research. Despite the legal fiction implied in EPA's rules, NMPs are not designed as zero discharge plans, either for nutrients or for other CAFO waste pollutants.[100] Numerous studies have recognized that runoff and leaching of contaminants from animal waste occurs even where it is applied at recommended application rates.[101] Because land application practices result in actual discharges, EPA has strong grounds on which to presume that all land-applying CAFOs discharge and have a duty to apply for NPDES permits.[102]

EPA's CAFO effluent guidelines do acknowledge that NMPs are not truly zero discharge, by requiring that *permitted* CAFOs' NMPs "minimiz[e]" nutrient runoff to surface waters.[103] Yet the current rules inexplicably allow Large CAFOs to land apply *without* NPDES permits, in effect assuming that these CAFOs' NMPs are even better and will result in *zero* dry weather discharge. This inherently contradictory scheme fails to protect waterways and has led to far less permitting than the CWA requires. The evidence clearly supports—and in fact dictates—a determination that all CAFOs that land apply waste discharge and require NPDES permits.[104]

2. Production Area Characteristics

Similarly, EPA should presume that CAFOs with certain production area characteristics actually discharge. The production area of a CAFO generally includes, but is not limited to, the animal confinement, raw materials storage, mortalities management, and waste containment areas.[105] Numerous studies and EPA guidance documents recognize that facilities with certain characteristics are associated with discharges to surface waters.

After promulgating the 2008 CAFO Rule, EPA published a guidance document identifying certain features of CAFO production areas, both manmade and beyond the operator's

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[100] *See infra* Section II.B.b.iii.

[101] *Impacts of Waste from Concentrated Animal Feeding Operations on Water Quality* at 308 (surveying literature that found high concentrations of nitrogen in surface waters adjacent to sprayfields where animal waste was applied at recommended rates); *see also* L.M. Risse, et al., *Land Application of Manure for Beneficial Reuse,* National Center for Manure and Animal Waste Management White Papers iii (2001), https://www.ars.usda.gov/ARSUserFiles/66120900/SoilManagementAndCarbonSequestration/2001ajfB02.pdf ("Even under ideal conditions, there is still a significant risk of losses to the environment. Agricultural systems leak and elimination of non-point source impacts is practically impossible.").

[102] This petition also requests that EPA strengthen its requirements for land application practices to better protect water quality. However, these two proposals are not in the alternative; because even the requested improvements to the land application regulations would still not eliminate resulting discharges, the presumption of discharge is appropriate and necessary for all CAFOs that land apply, even assuming significantly more stringent nutrient management requirements.

[103] 40 C.F.R. § 412.4(c).

[104] The regulations' failure to account for most non-nutrient pollutants underscores the fact that NMPs are not zero discharge plans. EPA should make further regulatory revisions regarding the agricultural stormwater exemption and the CAFO definitions, as discussed *infra*, to enable it to also require NPDES permits for wet–weather CAFO land application discharges and Medium AFOs that land apply, via establishment of similar presumptions.

[105] 40 C.F.R. § 122.23(b)(8).

control, which support a presumption of discharge.[106] These include: proximity of the CAFO to jurisdictional waters, and whether the CAFO is upslope from such waters; climatic conditions, including whether precipitation exceeds evaporation; type of waste storage system, and the capacity, quality of construction, and presence and extent of built–in safeguards of the storage system; drainage of the production area; and exposure of animal waste and feed to precipitation or other water.[107] As noted previously, EPA has enough information to assess what aspects of CAFO operations are resulting in discharges, and has already used this information to estimate that up to 75% of CAFOs do in fact discharge as a result of their "standard operational profiles;"[108] it therefore can and should re-evaluate these factors in light of available discharge data and establish a list of criteria related to the production area for which it will establish a presumption of discharge.

Ventilation systems also lead to surface water discharges.[109] Chicken house ventilation fans, for example, constantly and intentionally release pollutants such as ammonia, manure, dust, feathers, and feed,[110] and often these pollutants are not kept out of waterways. Many CAFOs are "designed to channel precipitation runoff from the areas around the houses away from the confinement area."[111] At such facilities, contaminants vented from poultry houses will deposit in ditches or waterways that traverse or border production areas.[112] Facilities can also discharge

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[106] EPA, *Implementation Guidance on CAFO Regulations—CAFOs that Discharge or Are Proposing to Discharge* (May 28, 2010), http://www.epa.gov/npdes/pubs/cafo_implementation_guidance.pdf [hereinafter CAFOs that Discharge Guidance].

[107] *Id.* at 2. EPA identified additional factors specific to the production area that determine whether a CAFO will discharge, including:

> (1) Whether there are structural controls in place to divert clean water and what condition they are in;
> (2) Inspection and maintenance schedules for clean water diversion controls, such as berms, gutters, and channels;
> (3) Whether design and maintenance of pipes, valves, ditches, drains, etc. associated with the collection of manure and wastewater from the animal confinement area prevents spills and leakage;
> (4) Whether any secondary containment to manage contaminated runoff is designed, operated and maintained to handle all pollutant loads; and
> (5) Whether the animal confinement area prevents animals from having direct contact with waters of the U.S.

Id. at 5.

[108] EPA 2010 NPDES Estimate at 1.

[109] EPA guidance indicates that a number of factors contribute to the likelihood that a ventilated confinement house system will discharge, including the way water is drained from the site and proximity to jurisdictional waters. CAFOs that Discharge Guidance at 13.

[110] *Understanding CAFOs and Their Impact on Communities* at 5.

[111] CAFOs that Discharge Guidance at 13.

[112] *See* EPA, NPDES Permit Writers' Manual for Concentrated Animal Feeding Operations, EPA 833-F-2-001 4-18 (2012) [hereinafter Permit Writers' Manual] (noting that pollutants including manure, feathers, and feed fall to the ground immediately downward from confinement building exhaust ducts and ventilation fans and "are carried by precipitation-related or other runoff to waters of the U.S."); *see also Nat'l Cotton Council v. EPA*, 553 F.3d 927, 939-40 (6th Cir. 2009), finding that pesticide pollutants deposited into waterways after their release from a point source, similar to ventilated ammonia emissions that deposit in waterways, are subject to NPDES permitting requirements.

directly via deposition of ventilated pollutants into waterways. A North Carolina trial court has recognized that this constitutes a jurisdictional discharge, finding that ammonia and other pollutants that reach jurisdictional waters after being expelled by ventilation fans are subject to NPDES permitting requirements.[113] EPA should presume that both CAFOs in close proximity to waterways or conduits to waterways that fail to capture ventilated pollutants, as well as CAFOs designed to channel precipitation and production area pollutants off of the facility into ditches and waterways, do in fact discharge.

These findings with respect to land application practices and specific production area characteristics reflect a larger body of evidence that demonstrates that CAFOs with certain practices and characteristics are not only prone to discharge, but they do *in fact* discharge. EPA should use its technical expertise and available research to identify the full suite of practices and characteristics that support presumptions that certain CAFOs discharge in fact, and adopt presumptions based on these determinations. Because the evidence demonstrates that many CAFOs actually discharge pollutants, as opposed to merely having the potential to discharge or proposing to discharge, EPA has clear authority to establish an evidentiary presumption to that effect, notwithstanding the decisions of the Second and Fifth Circuits on previous CAFO rulemakings.

iii. Establishing a Presumption that Certain CAFOs Discharge is Necessary to Achieve the Purposes of the Act

The stated objective of the CWA is not merely to reduce, but to eliminate pollution discharges to navigable waters.[114] Yet the current regime essentially allows CAFOs to determine for themselves whether they are subject to regulation, an approach that has resulted in wildly inconsistent and inadequate permitting at the state level, along with widespread unregulated pollution from CAFOs.[115] Moreover, this scheme's 'zero discharge' fiction discourages states from establishing water quality based effluent limitations (WQBELs) for CAFO discharges into impaired waters, which further hinders proper implementation of the Act and undermines its mandate to achieve compliance with water quality standards. A rebuttable presumption that certain CAFOs discharge is necessary to mitigate these failings and meet EPA's obligations under the CWA.

Under EPA's current approach, the majority of CAFOs are responsible for determining for themselves whether they discharge or are exempt from permitting requirements. But EPA has

[113] *Rose Acre Farms, Inc. v. N.C. Dep't of Env't and Natural Res.*, No. 12-CVS-10 ¶¶ 54, 55 (Jan. 4, 2013).
[114] 33 U.S.C. § 1251(a)(1).
[115] *See, e.g.*, T.J. Centner, *Challenging NPDES Permits Granted without Public Participation*, 38 Boston Coll. Envtl. Aff. L. Rev. 1, 8 (2011) (noting that regulation of unpermitted CAFOs under state law "has been unsuccessful"); 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 1 2 (2014), http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0089870.

acknowledged that CAFO operators will not voluntarily subject themselves to regulations, and will therefore not apply for CAFO permits if they are not required to do so.[116] In the preamble to the 2001 proposed CAFO rule, EPA noted that only about 2,500 of the 12,000 CAFOs that should have applied for permits at the time had done so.[117] Based on the continued CAFO–related impairment of neighboring watersheds, EPA concluded that many of these large facilities were "actually discharging" and should have applied for a permit.[118] Years later, the *Waterkeeper* court similarly found that owners and operators of discharging Large CAFOs have historically "improperly tried to circumvent the permitting process."[119] The history of the CAFO regulations' implementation demonstrates, therefore, that CAFOs, and particularly those facilities with no history of documented discharges, have little incentive to seek permit coverage absent a regulatory presumption that they must.[120]

Requiring permit coverage of facilities that actually discharge is not only consistent with the purposes of the Act, but it is necessary to effectuate the *Waterkeeper* court's call for regulation "in fact, not just in principle."[121] Given the overwhelming evidence that CAFO facilities and land application areas are significant sources of point source pollution, and that they are not effectively regulated under the current NPDES program, a decision not to establish a presumption that certain CAFOs actually discharge would be arbitrary and capricious. Moreover, as the next section will discuss, a presumption that all CAFOs that land apply also discharge pollutants would independently follow from a more reasonable interpretation of the agricultural stormwater exemption.

b. EPA Must Revise its Interpretation of the Agricultural Stormwater Exemption to Give Effect to Congress' Intent that No CAFO–Related Discharges Are Exempt from the Act's Permitting Requirements

The failure of the current permitting scheme to effectively limit pollutant discharges from CAFOs is also attributable in part to EPA's strained interpretation of the agricultural stormwater exemption. Despite the fact that the environmental impacts from land application of manure are well known, EPA has adopted an overly broad reading of the agricultural stormwater exemption that has tied its hands from regulating much of this CAFO pollution. This reading, which defines precipitation-related discharges of manure as non-point source pollution when land-applied in accordance with an NMP, rather than as point source pollution subject to the NPDES program, is

[116] 2001 Proposed CAFO Rule, 66 Fed. Reg. at 2963.
[117] *Id.*
[118] 2003 CAFO Rule, 68 Fed. Reg. at 7180.
[119] *Waterkeeper Alliance*, 399 F.3d at 506, n.22.
[120] Cases holding EPA lacks authority to assess administrative penalties for the failure to apply for a NPDES permit have made the situation worse by removing much of the incentive for sporadic dischargers to apply for NPDES permits. *See Service Oil v. EPA*, 590 F.3d 545, 550-51 (8th Cir. 2009), *Nat'l Pork Producers Council*, 635 F.3d at 752-53.
[121] *Waterkeeper Alliance*, 399 F.3d at 498.

contrary to the language and purpose of the Act. Moreover, it virtually guarantees that there will be unregulated runoff of CAFO pollution to waterways—the very concern that prompted Congress to regulate CAFOs as point sources in the first place.[122]

In light of mounting evidence that the current interpretation and permit scheme have generally failed to result in CAFO permitting, allowing pollution from this industry to continue degrading waterways across the country, EPA's current interpretation of the exemption is arbitrary and capricious, and contrary to the CWA. EPA must therefore revise its interpretation of the exemption by bringing it in line with the statutory directive to regulate CAFO discharges as point source pollution.

i. EPA's Current Interpretation of the Agricultural Stormwater Exemption

The CWA specifically excludes "agricultural stormwater" from the definition of point source, but does not define the term, leaving some discretion to EPA to interpret the exemption's scope in light of the statutory context. EPA's current CAFO regulations define "agricultural stormwater discharge" as "a precipitation-related discharge of manure, litter or process waste water from land areas under the control of a CAFO" where such materials have been applied "in accordance with site specific nutrient management practices."[123] CAFO discharges associated with precipitation are therefore considered non–point source pollution, and are exempt from permitting requirements under the NPDES program.

This interpretation has made it virtually impossible for EPA and state regulators to ensure that discharges are actually caused by precipitation events, rather than by over–application of CAFO wastes to fields, or otherwise improper manure management. The rules impose minimal requirements before a CAFO operator is permitted to avail him or herself of this blanket exemption from regulation under the Act. Unpermitted Large CAFOs are simply instructed to maintain on–site documentation demonstrating nutrient management practices that "ensure appropriate agricultural utilization of the nutrients in the manure, litter, or process wastewater" in

[122] *See* S. Rep. No. 92-414, 92-93 (1971), *reprinted in* 1972 U.S.C.C.A.N. 3668, 3670 ("Animal and poultry waste, until recent years, has not been considered a major pollutant . . . . 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 . . . . Precipitation runoff from these areas picks up high concentrations of pollutants which reduce oxygen levels in receiving streams and lakes . . . . [W]aste management systems are required to prevent waste generated in concentrated production areas from causing serious harm to surface and ground waters."). While the *Waterkeeper Alliance* court did not find this legislative history dispositive on the meaning of the subsequently enacted exemption, it underscores the ambiguity in the statute that affords EPA authority to revise its interpretation.

[123] 40 C.F.R. § 122.23(e).

order to qualify for the exemption.[124] CAFO operators must make such documentation available to EPA or state permitting agencies upon request.[125]

These site-specific NMPs are never submitted to regulatory authorities unless EPA or state agencies specifically request to review a plan, and the rules do not require any independent verification that NMPs are calculated to ensure land application of wastes occurs at agronomic rates.[126] Consequently, despite the fact that land application is a predominant means of CAFO waste disposal,[127] there is no federal requirement that EPA or state permitting authorities exercise *any* oversight to ensure animal wastes will be applied to land at agronomic rates[128] and that any discharges are precipitation-related. The current permitting requirements therefore incentivize CAFO operators to over–apply animal wastes to cropland, while claiming any confirmed discharges are exempt from permitting as agricultural stormwater and avoiding regulation under the NPDES program.

ii. EPA Has Clear Authority to Revise its Interpretation of the Agricultural Stormwater Exemption as Requested in this Petition

Because the term "agricultural stormwater" is not defined in the CWA, the statute is somewhat ambiguous as to the scope of the agricultural stormwater exemption, and EPA is free to revise its interpretation so long as it reflects a permissible construction of the statute.[129] It is well–settled that agencies are "free to change course as their expertise and experience may suggest or require."[130] Over the past decade, the Agency has continued to amass evidence of widespread CAFO land application pollution, increasing scale and concentration of CAFOs and their waste, and persistent failures to require permits for CAFOs whose land application contribute to water impairments under the existing regulatory scheme—precisely the type of circumstances in which an updating of statutory interpretation is reasonable and necessary. The *Waterkeeper* decision in no way diminishes EPA's authority to revise its interpretation. While the *Waterkeeper* court upheld EPA's current interpretation of the agricultural stormwater

[124] *Id.*; *Id.* § 122.42(e)(1)(vi)-(ix) (specifying additional criteria that land application practices must meet in order to qualify for the "agricultural stormwater exemption").
[125] *Id.* § 122.23(e)(2).
[126] State laws may impose additional requirements.
[127] Marc Ribaudo, et al., *Consequences of Federal Manure Management Proposals: Cost to Swine Operations from Land Applying Manure* 1 (paper presented at American Agricultural Economics Association Meeting, Long Beach, CA, July 28-30, 2002), http://ageconsearch.umn.edu/bitstream/19735/1/sp02ri01.pdf.
[128] Though, as discussed elsewhere in this Petition, even "agronomic" application rates are not capable of achieving zero discharge.
[129] *Chevron v. NRDC*, 467 U.S. 837, 863-64 (1984) ("the fact that the agency has from time to time changed its interpretation of [a statutory term] does not . . . lead us to conclude that no deference should be accorded the agency's interpretation of the statute").
[130] *Ramaprakash v. FAA*, 346 F.3d 1121, 1124 (D.C. Cir. 2003) (citing *Greater Boston Television Corp. v. FCC*, 444 F.2d 841, 852 (D.C. Cir. 1970)).

discharge exemption against challenges from environmental groups, it did so based on deference principles, clearly indicating that other interpretations may be more reasonable.[131]

More than a decade after the *Waterkeeper* decision, there is a growing body of factual evidence demonstrating that the current interpretation is in fact unreasonable because it subverts the central purpose of the Act. Evidence of widespread CAFO pollution escaping CWA regulation necessitates a revision of EPA's current interpretation. EPA must adopt the interpretation that no discharges from CAFOs—including from land application areas under the control of the CAFO—are exempt from the definition of point source pursuant to the agricultural stormwater exemption. Even assuming the *Waterkeeper* court properly deferred to EPA's current interpretation in 2005, a mutually exclusive reading of the two terms is the most reasonable interpretation of the agricultural stormwater exemption because it effectuates the plain language of the statute, which provides that CAFOs are to be regulated as point sources, and aims to eliminate pollution from such sources. EPA's revised interpretation of the agricultural stormwater discharge exemption would be entitled to substantial deference, so long as the Agency provides a reasonable explanation for the revision.[132]

iii. The Language and History of the Statute Indicate Congress' Intent to Regulate All CAFO Pollution

Beginning with the 1972 drafting of the Water Pollution Control Act Amendments, Congress made a policy judgment that CAFO wastes were fundamentally different from other types of agricultural pollution. The 1972 Act Amendments encoded this policy judgment, recognizing that the volume and concentration of waste produced by CAFOs necessitated treating these types of facilities differently than other sources of agricultural pollution.[133] There is no general exemption from compliance with the CWA for agricultural pollution sources. To the contrary, the Act broadly prohibits the "discharge of a pollutant," including agricultural wastes,[134] by any person from any point source, including CAFOs.[135] The Act's default rule therefore requires regulation of CAFOs under the NPDES program, as distinct from other sources of agricultural pollution, which were historically exempt.

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[131] *Waterkeeper Alliance*, 399 F.3d at 507 ("Congress has not addressed the precise issue . . . as a result, the operative question we must consider becomes, pursuant to *Chevron*, whether the CAFO Rule's exemption for 'precipitation-related' land application discharges is grounded in a 'permissible construction' of the Clean Water Act."). In other words, the Court at that time found that EPA's interpretation was a permissible one, but not necessarily the most reasonable or the only reasonable interpretation of the statute. *Id*. at 509.

[132] *Chevron*, 467 U.S. at 863-64; *FCC v. Fox Television Stations*, 556 U.S. 502, 515 (2009). The Supreme Court has noted that agency inconsistency "is not a basis for declining to analyze the agency's interpretation under the *Chevron* framework." *Nat'l Cable & Telecomm. Ass'n v. Brand X Internet Servs.*, 545 U.S. 967, 981 (2005).

[133] *See* S. Rep. No. 92-414, 92-93 (1971), *reprinted in* 1972 U.S.C.C.A.N. 3668, 3670. *See also Cmty. Ass'n for Restoration of the Env't v. Sid Koopman Dairy*, 54 F.Supp.2d 976, 981 (E.D. Wash. 1999) (finding that it would "avoid the clear intent of Congress as expressed in the CWA and by EPA in its NPDES regulations" to exempt discharges resulting from the land application of manure from the definition of "point source").

[134] 33 U.S.C. § 1362(6).

[135] *Id*. §§ 1311(a), 1362(14).

The legislative and regulatory history of the 1987 Amendment, which established the agricultural stormwater exemption, make clear that the terms "agricultural stormwater" and "concentrated animal feeding operation" are most logically read as being mutually exclusive. While Congress did not explain the relationship between the new term "agricultural stormwater" and the existing "concentrated animal feeding operation,"[136] the new language was merely added to the end of the definition of "point source," without any alteration of the existing text. Because there is no indication in the statute or in the legislative history that Congress sought to re–address the status of CAFOs as point sources, the 1987 Amendment cannot be read to amend this existing policy judgment. To the contrary, it is well–settled law that "Congress does not alter a regulatory scheme's fundamental details in vague terms or ancillary provisions."[137]

Here, Congress left no indication that it had reconsidered its reasons for including CAFOs in the definition of point source. Nor did it discuss the definition of "agricultural stormwater" in a way that could justify a departure from the meaning of that term as it was understood at the time. Rather, the 1987 Amendment is best read to codify already–existing exemptions for certain types of non–point source agricultural pollution and clarify that the non-exclusive definition of point source was not intended to sweep such non-CAFO farm runoff into the regulatory scheme. By retaining the term "concentrated animal feeding operation," unqualified, in the definition of "point source," the legislative history makes clear that the addition of the "agricultural stormwater" exclusion was not intended to alter the scope of the NPDES program with respect to CAFOs.

The regulatory history preceding the statutory amendment supports the conclusion that Congress did not intend to include any CAFO–related discharges within the meaning of "agricultural stormwater." Prior to the 1987 Amendment, EPA had already established certain agricultural exemptions from the point source definition through rulemaking. The 1980 CWA implementing regulations excluded certain types of agricultural discharges from NPDES permit requirements.[138] Specifically, the regulations excluded from the permit program "[a]ny introduction of pollutants from non–point–source agricultural and silvicultural activities, including runoff from orchards, cultivated crops, pastures, range lands, and forest lands, *but not discharges from concentrated animal feeding operations*."[139] In other words, while certain non–point source agricultural runoff was exempt from NPDES program requirements under the regulations, waste from CAFOs was not considered non–point source pollution, and was therefore ineligible for the exemption. As such, the 1987 addition of an "agricultural stormwater

[136] *Waterkeeper Alliance*, 399 F.3d at 507 ("the Act makes absolutely no attempt to reconcile the two [provisions]").
[137] *See Whitman v. Am. Trucking Ass'ns*, 531 U.S. 457, 458 (2001).
[138] *Consolidated Permit Regulations: RCRA Hazardous Waste, SDWA Underground Injection Control; CWA National Pollutant Discharge Elimination System; CWA Section 404 Dredge or Fill Programs; and CAA Prevention of Significant Deterioration*, 45 Fed. Reg. 33290, 33442 (May 19, 1980) (codified in relevant part at 40 C.F.R. § 122.3(e)); *see also* 48 Fed. Reg. 14146-01 (Apr. 1, 1983) (reorganized version of permit program requirements).
[139] *Id.* (emphasis added). This exclusion was challenged in *NRDC v. EPA*, No. 80-1607 (filed June 3, 1980), but that challenge was dismissed as a result of the agricultural stormwater discharge amendment in 1987. *See* National Pollutant Discharge Elimination System Permit Requirements, 54 Fed. Reg. 246-01, 247 (Jan. 4, 1989).

discharge" exemption is most reasonably read to codify EPA's then–existing exemption for certain non-CAFO-related agricultural pollution.[140] Congress did not indicate any intent to depart from the existing regulatory scheme, so the agricultural stormwater exemption cannot be read to cover CAFO–related discharges.[141]

Because the current interpretation allows the exception to swallow the rule, EPA must adopt the position that no CAFO–related discharges are exempt from regulation as point source pollution under the agricultural stormwater discharge exemption. EPA has authority to revise its interpretation of the exemption, and the proposal to read "CAFO" and "agricultural stormwater" as mutually exclusive would not only be entitled to substantial deference, but would be the most natural reading of the Act, its legislative history, and its regulatory history. A revised interpretation of the agricultural stormwater exemption would also best implement the policy choice underlying Congress' decision to treat CAFOs as point sources of pollution and its intent to eliminate point source discharges of pollution to waters of the U.S.

c. EPA Must Ensure that Permitting Agencies Co-Permit Integrators and other Operators with Producers

EPA has long understood that entities that "exercise substantial operational control over CAFOs" meet the CWA regulatory definition of "operator" and should therefore be co-permitted or required to hold a separate NPDES permit.[142] In the 2001 proposed CAFO rule, EPA acknowledged that integrators are increasingly exercising control over where CAFOs are located, how they raise animals, and how they manage waste, including through production contracts and direct ownership of CAFO livestock.[143] As EPA pointed out, even in 2001 "[p]roduction contracting dominate[d] U.S. broiler and turkey production," and 40% and 30% of eggs and hogs, respectively, were produced under contract.[144] By 2014 just four companies controlled production of nearly one third of U.S. layer hens, and by 2012 more than 60% of hogs were raised under contract and packers owned more than one in twenty cattle slaughtered.[145]

These dramatic increases in processor consolidation and control over CAFOs directly impacts water quality, in part because CAFOs "tend to locate in close proximity to feed and meat packing plants," which leads to increased concentration and "thus rais[es] the potential for increased environmental pressure in those areas."[146] In the tightly controlled broiler chicken industry, this has led to such regional concentration that "in many regions, the scale at which

[140] *See Concerned Area Residents for the Env't v. Southview Farm*, 34 F.3d 114, 123 (2d Cir. 1994) (holding that CAFOs, which are defined by the Act as "point sources," are "not to be treated as [] agricultural nonpoint source operation[s]").
[141] *See Whitman v. Am. Trucking Ass'ns*, 531 U.S. at 458.
[142] 2001 Proposed CAFO Rule, 66 Fed. Reg. at 3023.
[143] *Id*. at 3024.
[144] *Id*.
[145] *Factory Farm Nation* at 10, 11, 15.
[146] 2001 Proposed CAFO Rule, 66 Fed. Reg. at 3024.

chicken litter is produced is far more than crops can absorb."[147] Moreover, "[e]very aspect of the birds' care is regulated by the integrator," and as a result, contract growers "do not have control over the inputs . . . including feed, medication, and the chickens themselves."[148] Many of these inputs, such as pharmaceuticals, will end up in the chicken litter. Integrators' many requirements thereby dictate their contract CAFOs' day to day operations, as well as the location, quantity, and characteristics of the waste they produce.

Because integrators and other corporate entities are a driving force behind so many CAFOs' operations and exercise so much control over them, EPA's 2001 proposed rule solicited input on whether it should establish specific factors, such as ownership of CAFO animals or contractual agreements that dictate CAFO activities, that permitting agencies must consider in identifying "substantial operational control." Recognizing that many of these integrators and other entities already meet the definition of an "operator," EPA explained that its "proposal would *clarify*" that such entities "are subject to NPDES permitting requirements."[149] EPA went further and stated unequivocally that it "believes that ownership of the animals establishes an ownership interest in the pollutant generating activity at the CAFO that is sufficient to hold the owner of the animal responsible for the discharge of pollutants from the CAFO."[150] Despite all of these findings, EPA decided to maintain the status quo in the 2003 final rule.

The past 15 years have demonstrated that EPA's hands-off approach has granted far too much discretion to states. In the absence of clear requirements from EPA explaining which entities meet the definition of an operator and must have permits, permitting agencies are simply not requiring co-permitting. In fact, in 2015 the Center for Progressive Reform found that *no states* are co-permitting integrators with their CAFO producers under their delegated NPDES programs.[151] Just as EPA predicted in 2001, a scheme that leaves operator determinations to the state agency has meant that "the state . . . might not make them at all" and operators have continued to "inappropriately . . . avoid liability."[152]

EPA has more recently revisited the idea that unpermitted integrators are operators and should be permitted. In 2010, EPA issued its Chesapeake Bay Compliance and Enforcement Strategy, which was meant to complement the multi-jurisdictional Chesapeake Bay Total Maximum Daily Loads (TMDL) effort to restore the Bay. In the Strategy EPA named CAFO integrator liability enforcement actions in the Bay region among the "immediate" actions it could

[147] Rural Advancement Foundation International-USA, Under Contract: Farmers and the Fine Print, Viewers Guide 24 (2017), http://rafiusa.org/undercontractfilm/press-kit/.
[148] *Id*. at 20.
[149] 2001 Proposed CAFO Rule, 66 Fed. Reg. at 3024 (emphasis added).
[150] *Id*. at 3025.
[151] Ctr. for Progressive Reform, *Integrator Liability: Legal Tools to Hold the Biggest Chicken Companies Responsible for Waste* 3, http://www.progressivereform.org/articles/Integrator_Liability_IssueAlert_1502.pdf (Mar. 2015).

[152] 2001 Proposed CAFO Rule, 66 Fed. Reg. at 3025.

take to drive pollution reductions while the Bay states put longer-term TMDL programs into place.[153] More than six years later, it has failed to initiate any such actions, and took no action to support citizen litigants when they sued Perdue in federal court for illegal discharges from a Maryland contract operation.[154]

Corporations such as Perdue and Tyson exercise substantial control over their contractors' production process and collect the profits generated. In light of their substantial stake in the venture, they should share in the liability that may result from discharges. Placing the entire permitting burden on producers is not only unfair, but also inefficient: if contracted farmers are wholly liable for the costs associated with water pollution, the integrators who control their operations will have no incentive to minimize the extent of such pollution. Co-permitting integrators would be an equitable step that would also create a sensible incentive scheme and likely to lead to the development of more cost-effective waste management systems.

EPA has already established that many of these corporate entities are CWA operators, but it must now clarify by regulation which entities meet the definition of an operator and are required to obtain NPDES permits. It will be entitled to substantial deference for a reasonable articulation of "substantial operational control," similar to that proposed in 2001. However, EPA must establish a more bright-line test for substantial operational control, rather than leaving that determination to state permitting agencies as previously proposed.[155] In light of the lack of integrator liability for operators that exercise increasing control over CAFOs and their pollution, a failure to impose unambiguous co-permitting requirements on integrators and state permitting agencies would be arbitrary and capricious.

d. EPA Should Revise the CAFO and Production Area Definitions and Designation Authorities, 40 C.F.R. § 122.23(b)-(c)

EPA should revise the definition of production area to resolve uncertainty created by courts, and should revise the CAFO definitions because as written, the current definitions prevent effective regulation of medium and small AFOs that are nonetheless significant sources of water pollution. Moreover, they create incentives for operators to avoid regulation by maintaining herd sizes just below the regulatory threshold. Specifically, EPA should revise its

[153] EPA Office of Enforcement and Compliance Assurance, Chesapeake Bay Compliance and Enforcement Strategy 4 (May 2010), http://www.epa.gov/oecaerth/civil/initiatives/chesapeake-strategy-enforcement.pdf.

[154] *See Waterkeeper Alliance, Inc. v. Alan Hudson*, No. WMN–10–487, 2012 WL 6651930 (D. Md. Dec. 20, 2012). Perdue ultimately prevailed in this case when the court did not find sufficient proof of a discharge from the broiler operation. But the judge's prior order denying Perdue's Motion to Dismiss recognized that integrators who exercise sufficient control over contractors may be held liable as CWA operators. Memorandum on Motions to Dismiss, *Assateague Coastkeeper et al. v. Alan and Kristin Hudson Farm et al.*, 727 F. Supp. 2d 433 (D. Md. Jul. 21, 2010).

[155] *See* 2001 Proposed CAFO Rule, 66 Fed. Reg. at 3025 ("The proposed regulations would provide that a person is an 'operator' when 'the Director determines' that the person exercises substantial operational control over the CAFO.").

CAFO definitions to either eliminate or shrink the "Medium CAFO" category and to make it easier for both state agencies and EPA to designate a Small (or Medium, if EPA retains that category) AFO as a CAFO, such that facilities with the same environmental impact as Large CAFOs are subject to the same degree of environmental regulation.[156]

i. EPA Should Revise the Definition of Production Area

EPA's existing definition of "production area" is appropriately broad and non-exclusive. A reasonable interpretation of this definition should ensure that all Large CAFO-related discharges are subject to the ELGs if they are not from land application areas, and should preclude any application of the agricultural stormwater exemption to discharges from non-land application areas associated with a CAFO. However, the 2014 *Alt v. EPA* decision adopted a strained interpretation of the production area, creating the new concept of a CAFO "farmyard" that it declared eligible for the agricultural stormwater exemption, and thereby created uncertainty where none had previously existed.[157] EPA failed to appeal that erroneous District Court decision, and must now eliminate any purported ambiguity or regulatory gaps through its rulemaking authority.

Of course, if EPA acts to properly limit the scope of the agricultural stormwater exemption, that revision would remedy much of the uncertainty created by *Alt*. However, EPA should additionally clarify the scope of the production area to ensure that all areas associated with the CAFO facility are subject to the CAFO ELGs. EPA can do this by simply adding language to the existing production area definition explaining that each CAFO has a single, contiguous production area that encompasses all listed aspects of the operation and all areas in between, and that the agricultural stormwater exemption may never be applied to discharges from the CAFO production area.

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[156] The regulations divide AFOs into three groups—Large, Medium, and Small, based on the number of animals raised at the facility. All large AFOs are considered Large CAFOs, based solely on the size threshold. But a Medium AFO is only considered a CAFO if it both meets the specified size threshold and satisfies one of two conditions: (1) the facility must discharge pollutants to a water of the U.S. through a man–made ditch, flushing system, or other similar man–made device; or (2) the facility must discharge pollutants directly into a water of the U.S which originates outside of and passes over, across, or through the facility, or otherwise comes into direct contact with the animals confined in the facility. "Small CAFO" is defined in the regulations as any AFO "that is designated as a CAFO and is not a Medium CAFO." Irrespective of size threshold, AFOs can be designated as CAFOs by the appropriate NPDES permitting authority if, upon inspection of the operation, the authority determines that the facility "is a significant contributor of pollutants to waters of the United States." 40 C.F.R. § 122.23(b)-(c). In making this designation, permitting authorities are directed to consider: (1) the size of the AFO and the amount of waste reaching waters of the U.S.; (2) the location of the AFO relative to jurisdictional waters; (3) the means of conveyance of animal wastes and process waste waters to waters of the U.S.; (4) the slope, vegetation, rainfall, and other factors affecting likelihood or frequency of discharge; and (5) other relevant factors. *Id.* § 122.23(c)(2).

[157] *Alt v. EPA*, 979 F. Supp. 2d 701, 711 (N.D. W. Va., Oct. 23, 2013).

ii. EPA Should Revise or Eliminate the "Medium CAFO" Category

While the environmental concerns associated with many Medium AFOs differ only in scale, not type, from those caused by Large CAFOs, EPA's default position under the current regulations is to leave the former unregulated. However, there is evidence that Medium AFOs are significant polluters,[158] and EPA's current approach does not adequately ensure that polluting Medium AFOs are designated as CAFOs or that designated CAFOs are sufficiently regulated.

The current definition of "Medium CAFO" inhibits effective regulation of these facilities in two ways. First, a Medium AFO can only be defined as a CAFO if the operation discharges from the production area directly or via a manmade conveyance, and can only be designated as a CAFO after an on–site inspection demonstrates that it is a significant contributor of pollutants to a water of the U.S.[159] This means that Medium AFOs have no incentive or obligation to seek NPDES permit coverage until they have been caught directly discharging into a jurisdictional water, nor do they have any incentive or obligation to control their land application discharges. Even the most egregious over-application of waste on cropland or application in circumstances that lead to discharges are not grounds for CAFO designation. As discussed elsewhere in this Petition, even permitted CAFOs' NMPs are not "zero discharge" plans; the application practices of facilities with no plans whatsoever are even more likely to lead to discharges. Second, even where Medium (or Small) AFOs are designated as CAFOs, EPA has not promulgated federal ELGs for these facilities, leaving permitting authorities to establish BPJ effluent limitations for these operations on an ad hoc basis.[160]

Despite EPA's failure to comprehensively track the nation's CAFOs, literature and anecdotal evidence indicate that the current size–based Large CAFO definition has incentivized AFO operators to skirt environmental regulations by maintaining animal numbers just under the Large CAFO threshold. One empirical study found, for example, that in the four years after promulgation of the 2003 CAFO Rule, "7.7% of potentially regulated operations near the threshold 'avoided' [regulation] by remaining just below the cutoff."[161] The same study found that "avoidance" is even more prominent among new facilities than among existing

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[158] *See, e.g.*, J. Mark Powell, et al., *Environmental Policy and Factors that Impact Manure Management on Wisconsin Dairy Farms*, Proceedings of the Symposium on the State of the Science of Animal Manure 3-4 (2005) (Wisconsin dairy farms with small and medium herd sizes have the lowest manure collection rates, and are often located close to streams or springs; these farms may require "particular attention" with respect to manure management).

[159] 40 C.F.R. §§ 122.23(b)(6), (c).

[160] *Id*. § 412; Permit Writers' Manual at 4-17; EPA, *Producers' Compliance Guide for CAFOs* 5 (2003), https://www.epa.gov/sites/production/files/2015-06/documents/compliance-cafos.pdf.

[161] Stacy Sneeringer and Nigel Key, *Effects of Size-Based Environmental Regulations: Evidence of Regulatory Avoidance*, 93 Am. J. Agric. Econ. 1189, 1190 (2011), http://faculty.smu.edu/millimet/classes/eco7377/papers/sneeringer%20key%202011.pdf.

operations.[162] Summarizing its findings, the study concluded that increased numbers of operations just under the regulatory thresholds between 1997 and 2007 coincided with increased environmental regulations—namely EPA's 2003 CAFO Rule.[163]

Producer–oriented publications from various agricultural extension networks further support this common–sense finding. In a document entitled "How to Avoid CAFO Status," soil specialists at the Colorado State University Cooperative Extension recommended that AFO operators inspect their facilities to determine whether any of the size or discharge criteria that would render such facilities CAFOs were met—and if so, "change it, so you won't be defined or designated as a CAFO in the future."[164]

While EPA adopted this three–tiered system in order to ease states' burdens in revising CAFO regulations, many of which had included this structure prior to the 2003 Rule,[165] as implemented, this system arbitrarily exempts a large number of operations approaching the Large CAFO size threshold and their land application practices from regulation, and encourages circumvention of laws governing permitted facilities. Given these failings, EPA should either eliminate the "Medium CAFO" category altogether and expand the Large CAFO category to include these facilities, or remove the requirement that a Medium AFO directly discharge from the production area to qualify as a CAFO. Such a revision, particularly if made in conjunction with the proposed revision to the agricultural stormwater exemption, would bring many discharging Medium AFOs into the NPDES permit program and significantly benefit water quality.

iii. EPA Should Impose Meaningful Limits on States' Discretion in Designating AFOs as CAFOs

Current CAFO regulations allow states an inordinate amount of discretion in determining whether to regulate Small or Medium AFOs by designating them as CAFOs. Such a designation requires that a facility be "a significant contributor of pollutants to waters of the United States."[166] The term "significant" is not defined in the regulations, however, so state permitting authorities have an enormous amount of leeway in determining whether to designate an AFO as

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[162] *Id.* at 1202 (noting that "new entrants exhibit a 10.5% avoidance rate, while that for continuing operations is only 5.2%").
[163] *Id.* at 1207-09; *see also* Bradley Crawford, *Going Half Hog: CAFOs Downscale in the Face of Regulation*, Chicago Policy Review (May 3, 2012), http://chicagopolicyreview.org/2012/05/03/going-half-hog/.
[164] Jessica G. Davis, How to Avoid CAFO Status, Colorado State University Cooperative Extension.
[165] *See* 2003 CAFO Rule, 68 Fed. Reg. at 7189-90 (stating that eliminating the three-tier structure "at this point in time would be unnecessarily disruptive in a number of States that currently have three-tier CAFO programs in place.").
[166] 40 C.F.R § 122.23(c). In making this designation, permitting authorities are directed to consider: (1) the size of the AFO and the amount of waste reaching waters of the U.S.; (2) the location of the AFO relative to jurisdictional waters; (3) the means of conveyance of animal wastes and process waste waters to waters of the U.S.; (4) the slope, vegetation, rainfall, and other factors affecting likelihood or frequency of discharge; and (5) other relevant factors. *Id.* § 122.23(c)(2).

a CAFO. Moreover, this term is so vague that it essentially precludes citizens from contesting the determination of the state agency.

While the regulations provide an open–ended list of criteria that permitting authorities may consider in making such a determination, the rules give no indication of how permitting authorities are to weigh these criteria. The complete lack of standards or accountability for state designation of Small CAFOs, in practice, renders this tier of the CAFO definition a nullity, despite the fact that even Small AFOs can cause large discharges and severe water quality impacts.[167] EPA should therefore revise the definition of "Small CAFO" to apply the current criteria for the Medium CAFO definition – if a Small AFO discharges from the production area, it should be defined as a CAFO. It simply defies logic to permit direct discharges from any size of AFO into jurisdictional waters without imposing basic NPDES permit requirements. Finally, EPA should expand its own authority to designate an AFO as a CAFO in other circumstances when the state permitting agency fails to act. This authority should not hinge on a finding that an AFO is contributing to a downstream water quality impairment.[168]

Overall, EPA's current CAFO regulations have failed to effectively bring discharging CAFOs and AFOs into the NPDES program, and EPA must establish presumptions that certain CAFOs discharge, close the agricultural stormwater loophole, affirm that integrators who qualify as operators must obtain permits, and update its CAFO definitions to reflect the fact that a functional program must better control pollution from Medium and Small AFOs. Any course of action short of adopting this set of revisions will allow the status quo of unregulated CAFO pollution to continue.

B. EPA Must Strengthen CAFO NPDES Permits to Adequately Protect Water Quality

Under EPA's current regulations and effluent guidelines, even the minority of CAFOs that have NPDES permits are inadequately regulated. The regulations applicable to all CAFOs purport to require CAFOs to maintain adequate waste storage and implement NMPs, and the effluent guidelines applicable to Large CAFOs further impose a zero discharge requirement on the production area under most circumstances and require various best management practices and minimization of runoff from land application areas. Yet the CAFO rules suffer from unclear language and fail to require the basic water quality monitoring required of virtually every other point source category, instead relying only on annual reports of waste applications. Such

[167] *See, e.g.*, Adam Rodewald, Green Bay Press-Gazette, Manure Spills Putting Water Supply at Risk (Feb. 8, 2015), http://www.greenbaypressgazette.com/story/news/investigations/2015/02/06/manure-spills-water-supply/22983669/; Bob Dohr, Green Bay Press-Gazette, One Million Gallons of Manure Dumped in Spencer Wetland (Aug. 13, 2014), http://www.greenbaypressgazette.com/story/news/local/2014/08/12/farm-cited-manure-discharge/13983497/ (discussing a 120-head Wisconsin dairy that spilled an estimated one million gallons of manure from a storage tank into a wetland and the Eau Pleine River between 2013 and 2014).

[168] 40 C.F.R. § 122.23(c)(1).

monitoring is essential, particularly given the other weaknesses in EPA's permit scheme. EPA's CAFO ELGs do not apply to Small or Medium CAFOs, leaving these permits' limits up to states. The ELGs also fail to prohibit certain practices that inherently pose threats to water quality from both the production and land application areas, and rely on state-based nutrient management requirements derived to maximize crop yield, rather than protect water quality. This approach addresses CAFO waste as though it is merely manure, and as a result EPA has also entirely overlooked numerous pollutants of concern.

To ensure that CAFO permits adequately protect water quality and provide necessary transparency and enforceability, EPA must adopt common-sense waste management and monitoring requirements, strengthen the basic requirements applicable to all CAFOs, regulate all important CAFO pollutants through the CAFO ELGs, and otherwise strengthen the CAFO ELGs to prohibit practices known to harm water quality.

a. EPA Must Strengthen and Clarify the Requirements Applicable to All CAFOs, 40 C.F.R. § 122.42(e)

While it is commendable that EPA has established industry-specific regulations for CAFO NPDES permits in addition to the ELGs, unlike many other regulated industries, the regulations lack clarity and accountability. The Large CAFO ELGs do not adequately make up for these shortcomings.

i. EPA Must Require Water Quality Monitoring in CAFO NPDES Permits

EPA has long failed to require CAFOs to meet one of the most basic requirements of NPDES permits—water quality monitoring capable of assuring compliance with permit terms. The CWA's permitting provisions require that NPDES permits contain conditions, including conditions on data collection and reporting, to "ensure compliance" with the Act.[169] The accompanying CWA regulations clearly require all NPDES permits to include certain monitoring and reporting requirements designed to "assure compliance with permit limitations . . . ."[170] These include, *inter alia*, "requirements to monitor" "[t]he mass (or other measurement specified in the permit) for each pollutant limited in the permit," "[t]he volume of effluent discharged from

[169] 33. U.S.C. § 1342. *See also NRDC v. EPA*, 808 F.3d 556, 580 (2d Cir. 2015) ("Under the CWA, NPDES permits must contain conditions that require both *monitoring* and *reporting of monitoring results* of TBELs and WQBELs to ensure compliance.").

[170] 40 C.F.R. § 122.41(i)(1). Moreover, because these monitoring requirements apply to all NPDES permits, EPA's rejection of groundwater and surface water monitoring requirements in determining BAT for the CAFO industry, and the *Waterkeeper* court's deference to EPA's rejection of groundwater monitoring, is irrelevant to this consideration. The question of surface water monitoring as part of BAT was not before the court, nor was the question of surface water monitoring as a general requirement of NPDES permits. *Waterkeeper Alliance*, 399 F.3d at 513-15.

each outfall," or "[o]ther measurements as appropriate."[171] Permit monitoring provisions must further specify the "type, intervals, and frequency [of sampling] sufficient to yield data which are representative of the monitored activity, including, when appropriate, continuous monitoring."[172] Permittees must report monitoring results "on a frequency dependent on the nature and effect of the discharge, but in no case less than once a year."[173] In light of these statutory and regulatory requirements, "[g]enerally, 'an NPDES permit is unlawful if a permittee is not required to effectively monitor its permit compliance.'"[174]

CAFOs are point sources subject to these permitting provisions, and persistent pollution from these sources has demonstrated that facility-level effluent monitoring on or adjacent to CAFO production and land application areas is necessary to meet the objectives of the CWA. Yet permitting agencies have overwhelmingly failed to incorporate any of these required monitoring provisions into CAFO NPDES permits. EPA must fill this regulatory gap by directly addressing monitoring in the CAFO regulations. To properly implement compliance monitoring, CAFO permits must require monitoring for, *inter alia*, pH, total nitrogen, ammonia nitrogen, nitrate, total phosphorus, specific conductance, biochemical oxygen demand, fecal coliform, temperature, and total suspended solids,[175] and must require such monitoring at points of discharge from the production and land application areas, as identified on a site-specific basis by a certified nutrient management planner. CAFO monitoring plans must be designed based on consistent EPA criteria for representative sampling and subject to public notice and comment prior to permit issuance.

EPA rejected water quality monitoring requirements in the 2003 CAFO Rule, citing "concerns regarding the difficulty of designing and implementing" an effective monitoring program, and "because the addition of in-stream monitoring does not by itself achieve any better controls on the discharges from CAFOs . . . ."[176] EPA did not revisit that decision in the 2008

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[171] 40 C.F.R. § 122.44(i).

[172] 40 C.F.R. §§ 122.48(b), 122.44(i)(1). *See also* 40 C.F.R. § 122.41(j)(1). Section 308 of the CWA provides further support for monitoring, stating that "whenever [it is] required to carry out the objective" of the CWA, a permitting agency "(A) shall require the owner or operator of any point source to . . . (iii) install, use, and maintain such monitoring equipment or methods . . . as may reasonably be require[d]." 33 U.S.C. § 1318(a)(1)(A)(iii).

[173] 40 C.F.R. § 122.44(i)(2). The regulations further set out required monitoring methodologies, 40 C.F.R. § 136, and state that all NPDES permits must specify "[r]equirements concerning the proper use, maintenance, and installation, when appropriate, of monitoring equipment or methods." 40 C.F.R. § 122.48(a).

[174] *NRDC v. EPA*, 808 F.3d at 583, quoting *NRDC v. Cty. of L.A.*, 725 F.3d 1194, 1207 (9th Cir. 2013).

[175] *See, e.g.*, Ca. Reg'l Water Quality Control Bd., North Coast Region, General NPDES Permit No. CAG011001, NPDES Permit for CAFOs, Attachment E – Monitoring and Reporting Program at E-4 [hereinafter CA CAFO Permit], http://www.waterboards.ca.gov/northcoast/water_issues/programs/dairies/pdf/120127/npdes/120127_12_0001_NPDES_CAFO.pdf. This California CAFO General Permit requires surface and groundwater monitoring for numerous pollutant parameters. EPA should also require monitoring for additional pollutants of concern added to the CAFO ELGs, as proposed *infra*.

[176] 2003 CAFO Rule, 68 Fed. Reg. at 7217.

CAFO Rule.[177] But while EPA may believe that CAFO monitoring is more difficult than with other point source industry sectors, there are no exemptions from these basic compliance monitoring requirements. Moreover, various states have demonstrated that such monitoring is in fact practicable and affordable. California, for example, issues CAFO permits with representative effluent monitoring requirements for numerous CAFO pollutants of concern at both production and land application area discharge points.[178] Maryland also has language in its CAFO General Permit authorizing the state to require operators to design a monitoring plan to sample various manure pollutants and pesticides that could be present at potential production and land application area discharge points, to "evaluate the effectiveness" of the facility's nutrient management plan and thereby assure compliance.[179] Contrary to EPA's 2003 findings, it is now practicable to design and implement such CAFO monitoring requirements.

Outside of the CAFO permitting context, other states have found it possible to derive monitoring methods for pollution runoff from agricultural operations, or to require operations to derive their own methods on a case-by-case basis. The emergence of pollution credit trading programs has created the incentive for such monitoring to verify agricultural credit generation where states do not merely rely on modeling, such as in Oregon, where the creation of credits must be accompanied by a monitoring plan, and Ohio, where soil and water conservation professionals must monitor water quality to assess the effectiveness of agricultural credit sellers' practices.[180] Evidently it is possible to develop representative monitoring of pollution from agricultural sources when those sources and permitting agencies have the incentive to do so; EPA cannot credibly claim that such monitoring is impracticable or ineffective while concurrently allowing states to use similar methods to verify credits and ostensibly demonstrate permit compliance in trading programs.

No existing CAFO requirements satisfy these monitoring requirements. The limited manure and soil nutrient sampling required under EPA's regulations is helpful in attempting to determine an agronomic rate for waste application, but does not provide any information relevant to the CWA's requirement that NPDES permits must assure compliance with water quality

[177] No group challenged this deficiency of the 2003 and 2008 CAFO Rules, and no court has upheld the agency's decision to ignore these requirements.
[178] CA CAFO Permit at Attachment E.
[179] Md. Dep't of the Env't, General Discharge Permit for Animal Feeding Operations, Part V.A. (Dec. 1, 2014), http://www.mde.state.md.us/programs/Land/RecyclingandOperationsprogram/AFO/Documents/gd_permit%20signed.pdf.
[180] *See, e.g.*, Oregon Water Quality Trading Program Regulations, OAR 340-039-0025(5)(g), http://arcweb.sos.state.or.us/pages/rules/oars_300/oar_340/340_039.html; Ohio Water Quality Trading Regulations, OAC 3745-5-04(K), http://epa.ohio.gov/portals/35/rules/05-04.pdf. While these two programs are not specifically designed to assure compliance with effluent limitations and leave too much discretion to individual agricultural polluters to design monitoring plans, they demonstrate that such site-by-site agricultural monitoring requirements do not suffer from the "prohibitive[] expens[e]" or "severe technological limitations" necessary for EPA to lawfully omit them from CAFO permits. *See NRDC v. EPA*, 808 F.3d at 582.

standards[181] or EPA's CAFO ELG requirements to prevent production area discharges and minimize the potential for nutrient pollution from land application fields. EPA's regulations applicable to all NPDES permits speak for themselves, and must be given effect in permitting of CAFOs. In place of the 'honor system' currently in effect, EPA must require all permitted CAFOs to conduct periodic, representative water sampling and submit the results regularly via discharge monitoring reports—just like other industries are required to do. Absent such monitoring requirements, determining CAFO compliance with permit provisions becomes essentially impossible and CAFOs cannot reliably be held accountable for violations of permit terms.

ii. EPA Must Strengthen Annual Reporting Requirements

EPA should add to the CAFO annual reporting requirements, 40 C.F.R. § 122.42(e)(4). The annual report should of course include the results of the water quality monitoring discussed *supra*, though these results should also be submitted the permitting agency and EPA and made available to the public within 30 days of the monitoring event. The annual report should also include a summary of any discharges from land areas under the control of the CAFO; currently only production area discharges are subject to annual reporting requirements. In addition, the annual report should include not only the estimated amount of manure transferred to other persons, but also all of the manure transfer documentation that CAFOs are currently required only to keep on site pursuant to 40 C.F.R. § 122.42(e)(3). These common-sense additions to the existing annual report requirements will provide regulators and the public with far more of the information they need to assess a facility's compliance status without imposing significantly greater administrative burdens on permittees.

b. EPA Must Revise the Large CAFO Effluent Guidelines, 40 C.F.R. § 412

EPA's Large CAFO ELGs purport to prevent all production area discharges, absent a major storm event, and minimize the potential for nutrient runoff from land application.[182] Specifically, land application practices must be subject to best management practices (BMPs) specified in 40 C.F.R. § 412.4.[183] BMPs for land application include the requirement that a CAFO utilizing land application develop a nutrient management plan meeting nine minimum

[181] 40 C.F.R. § 122.4(d). For the same reason, EPA's 2003 rejection of monitoring in part because monitoring does not itself reduce CAFO pollution, 68 Fed. Reg. at 7217, is not a valid reason to omit monitoring requirements because as explained, that is not the purpose of monitoring requirements. Monitoring is required to demonstrate compliance, not to achieve it.

[182] 40 C.F.R. § 412.31(a) (explaining BPT for dairy cows and cattle other than veal calves); 412.32 (explaining BCT for the same); 412.33 (explaining BAT for the same); 412.43 (explaining BPT for swine, poultry, and veal calves); 412.44 (explaining BCT for the same); 412.45 (explaining BAT for the same).

[183] *See also* 40 C.F.R. §§ 412.31(b); 412.33(b); 412.43(b); 412.44(b); 412.45(b).

elements;[184] determine application rates for manure, litter, and other process wastewater that minimize phosphorous and nitrogen transport to surface waters; sample and analyze manure and soil; inspect land application equipment for leaks; and comply with setback requirements.[185]

But as evidenced by manure spills and widespread water contamination, these ELGs are failing to adequately control CAFO pollution. The regulations only require states to set BPJ limits for pollutants from Medium and Small CAFOs, ignore numerous pollutants of concern, leave various waste pathways unregulated, and fail to prohibit practices that are known to harm water quality and that prevent CAFOs from meeting narrative effluent limits. In short, they fall far short of representing the appropriate level of technology for reducing CAFO pollution.

i. The CAFO ELGs Should Apply to All CAFOs

In the 2001 CAFO rule preamble, EPA considered broadening the applicability of the CAFO ELGs beyond Large CAFOs to establish broader water quality protections and more uniform permit requirements, but its final 2003 rule maintained the status quo established in the 1970's.[186] EPA's rationale for leaving Small and Medium CAFO technology-based effluent limit determinations up to state permit writers was primarily out of a concern for flexibility and cost-effectiveness, as well as a finding that smaller facilities were more likely to have adequate land for manure disposal.[187] But the past decade has shown that the current approach is inadequate to protect water quality, and this is one aspect of the regulations where EPA could easily improve the quality and consistency of permits for a class of operations. If EPA applies the CAFO ELGs to all CAFOs, it will lessen the resource burden on state permit writers and improve water quality outcomes from this category of NPDES permits. Moreover, if EPA adopts certain rule changes discussed *supra*, particularly the revised Medium CAFO and agricultural stormwater definitions, far more facilities currently classified as non-CAFO AFOs will be subject to NPDES permitting requirements, increasing the cost benefits of uniform ELGs for state agencies and the

[184] NMP requirements are spelled out in 40 C.F.R.§ 122.42, which requires that NMPs: (1) ensure adequate storage of manure, litter, and process wastewater; (2) ensure proper management of mortalities; (3) ensure that clean water is diverted from the production area; (4) prevent direct contact of confined animals with waters of the U.S.; (5) ensure that chemicals and other contaminants handled on-site are not disposed of in any manure, litter, process wastewater, or storm water or treatment system; (6) identify appropriate site specific conservation practices to be implemented (BMPs); (7) identify protocols for testing of manure, litter, process wastewater, and soil; (8) establish protocols to land apply manure, litter, or process wastewater in accordance with site specific nutrient management practices; and (9) identify records that will be maintained to document implementation and management of these requirements. 40 C.F.R. § 122.42(e)(1)(i)-(ix).

[185] 40 C.F.R. § 412.4(c)(1)-(5). The regulations also provide two alternatives to compliance with setback requirements. CAFOs can instead implement vegetated buffers meeting certain standards, or demonstrate that alternative conservation practices or field-specific conditions will provide pollutant reductions equivalent to, or better than, the otherwise required setback. 40 C.F.R. § 412.4(c)(5).

[186] 2003 CAFO Rule, 68 Fed. Reg. at 7208.

[187] *Id.*

regulatory certainty for operators.[188] At the very least, EPA should revisit its analysis of whether certain size classes of CAFOs have adequate land base for manure disposal, as this is a primary basis for EPA's differential treatment of these operations. The updated analysis should rely on current data and acknowledge the gaps in EPA's information about the CAFO universe, adopting conservative assumptions where critical information is unavailable.

ii. EPA Must Establish Application Disclosure requirements, BAT and NSPS Limits, and Monitoring Requirements for Additional CAFO Pollutants of Concern

EPA's long-standing approach to regulating CAFO discharges is reliant on the fundamental misconception that CAFO waste is comprised solely of manure. This approach has led EPA to disregard numerous pollutants of concern and instead simply regulate fecal coliform and certain constituents of CAFO waste that have agronomic value. This failure to establish BAT and NSPS limits for numerous pollutants that are not even currently disclosed in permit applications, in combination with the regulations' failure to require basic water quality monitoring, has led to a regulatory scheme in which CAFOs can use unknown combinations and quantities of metals, pharmaceuticals, cleaning products, and synthetic hormones, and then dispose of what ends up in the waste stream without demonstrated, effective controls. EPA must require CAFOs to disclose their use of these pollutants in permit applications, analyze the most effective means to prevent discharges of these pollutants, which are generally not agronomically useful and cannot be assumed to be utilized by crops, establish BAT and NSPS standards for CAFOs to control these pollutants, and incorporate these standards into the CAFO ELGs.

EPA's NPDES regulations require most applicants for NPDES permits to disclose pollutants of concern in their discharge in their permit application. For example, industrial facilities and large publicly owned treatment works must disclose any of a long list of hazardous substances if they will likely be present in their effluent, and provide monitoring data.[189] This is the only way for a permitting agency to ensure that it has established adequate limits to protect water quality, and a lack of such information hinders public participation in the permitting process. But inexplicably, EPA does not require CAFOs to disclose any pollutants beyond providing the quantity of "manure, litter, and wastewater" generated.[190] EPA must remedy this by establishing effluent limits on the full suite of CAFO pollutants of concern and incorporating application disclosure requirements into CAFO permit application Form 2B.

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[188] Even if EPA adopts the recommended changes to the CAFO definitions, which would re-define certain CAFOs as Large CAFOs, broadening the applicability of the ELGs to all CAFOs would benefit water quality and streamline permitting for state agencies—particularly if adopted in conjunction with the proposals, discussed *infra*, to strengthen the ELGs and make them more protective of water quality.
[189] 40 C.F.R. §§ 122.21(2)(i), (iv); EPA NPDES Forms 2A and 2C.
[190] EPA NPDES Form 2B.

Each of the constituents listed above meets the CWA definition of a "pollutant." Most of these substances are added to livestock feed, and EPA has established that the significant majority ends up in the animals' manure. EPA regulates the various heavy metals sometimes used by CAFOs as feed additives as priority pollutants, and has noted their harmful impacts on aquatic life, as well as crops and public health.[191] Pharmaceuticals and synthetic hormones added to livestock feed also plainly constitute pollutants. The CWA's broad pollutant definition includes all "biological materials," which clearly include biological pharmaceutical additives. And in the case of non-biological pharmaceutical and hormone agents, once they have fulfilled their purpose and been excreted in livestock waste, they are no longer serving a useful purpose and qualify as "chemical wastes."[192]

EPA acknowledges that its CAFO ELGs do not address all pollution that CAFOs discharge from the production area,[193] but it also fails to address other important pollutants discharged from both production and land application areas, and state permitting agencies are not acting to fill either of these gaps. Although permitting agencies are required to establish BPJ limits for pollutants that are not regulated under ELGs,[194] Petitioners are unaware of any state or EPA permits that address these pollutants, likely due both to the lack of CAFO monitoring requirements and the fact that the agricultural stormwater loophole enables states to simply assume without evidence that there are only minimal point source discharges of these constituents of CAFO waste. EPA and state agencies are not free to ignore these pollutants altogether, and the only reasonable way to ensure that permits adequately control all relevant pollutants is to establish BAT and NSPS standards for these pollutants and address them in the CAFO ELGs.

In addition to analyzing the availability of BMPs to reduce runoff from CAFO production and land application areas, the Agency has abundant recent evidence to inform an analysis of the costs of reducing or removing various feed additives from the waste stream altogether. Examples of tested pollution-reduction strategies include voluntary actions to remove arsenicals from poultry feed and certain companies' decisions to reduce use of medically important antibiotics, in both cases without any significant adverse economic consequences.[195] CAFO operators have the

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[191] *See* 40 C.F.R. § 423, App. A; 76 Fed. Reg. at 65434.

[192] 33 U.S.C. § 1362(6); *Nat'l Cotton Council*, 553 F.3d at 935-38.

[193] EPA has noted that the current CAFO ELGs do not address "plate chiller waste, filter backwash water, chemicals used in the production area (for disinfection) or pollutants that have fallen to the ground immediately downward from confinement building exhaust ducts and ventilation fans and are carried by precipitation-related or other runoff to waters of the US." Permit Writers' Manual at 4-18. This does not acknowledge metals, pharmaceuticals, or other pollutants of concern.

[194] *See* Hanlon BPJ Memo at Attachment A, pgs. 1-2 ("[A]n authorized state must include technology-based effluent limitations in its permits for pollutants not addressed by the effluent guidelines for that industry. 33 USC § 1314(b); 40 CFR § 122.44(a)(1), 123.25, 125.3. In the absence of an effluent guideline for those pollutants, the CWA requires permitting authorities to conduct the "BPJ" analysis discussed above on a case-by-case basis for those pollutants in each permit.").

[195] In fact, recent USDA research indicates that the economic impact on producers of banning all growth promoting antibiotics—not only those used in human medicine—would be minimal. *See, e.g.*, Stacy Sneeringer, James

ability to directly and significantly reduce the presence of metals and pharmaceuticals in their waste stream through modifying livestock feed inputs, and EPA cannot simply assume that the existing ELGs adequately address these pollutants. Some of these pollutants do not naturally break down or die like coliform bacteria, and may run off or move through soils differently than other pollutants, rendering different BMPs more effective at reducing their discharges and necessitating different BAT requirements.

Regarding metals, EPA's 2003 Rule estimated that the proposed regulations would only reduce Large and Medium CAFOs' metal discharges by 5%, and that assumed incorrectly that all Large CAFOs would obtain permits.[196] Given the low rates of permitting since, it follows that any reductions in metal pollution from the recent series of CAFO regulations have been negligible. EPA needs to address these pollutants directly by independently analyzing what technologies and practices are currently available to obtain results that are more protective of water quality. A useful analogy is sewage sludge, which shares certain characteristics with animal waste. EPA's sewage sludge application regulations impose metal concentration, cumulative loading, and annual loading limits. This is a stark example of EPA's inconsistent approaches to regulating human and animal wastes, and also provides a logical starting point in assessing BAT for CAFO applications of these pollutants.[197]

iii. The CAFO ELGs' NMP Requirements Must Prioritize Protecting Water Quality

Even in the absence of discharge monitoring requirements and the data they would provide, it is apparent that EPA's reliance on states to establish effective nutrient management requirements has failed to protect water quality. The CAFO regulations must provide a stronger backstop against weak state permitting provisions. Specifically, EPA must establish stronger federal requirements to minimize harmful runoff, rather than relying almost solely on NMPs and on state-promulgated technical standards.

MacDonald, et al., *Economics of Antibiotic Use in U.S. Livestock Production*, ERR-200, USDA Econ. Res. Serv. 55 (Nov. 2015), https://www.ers.usda.gov/webdocs/publications/err200/55529_err200.pdf?v=42401; Choices, Economics of Antibiotic Use in U.S. Swine and Poultry Production (2015), http://www.choicesmagazine.org/choices-magazine/theme-articles/theme-overview/economics-of-antibiotic-use-in-us-swine-and-poultry-production. Research has also indicated that "[s]ome antibiotics no longer work as growth promoters or yield a result so slight that the additional profit does not even cover the cost of the antibiotics, yielding a net loss." Food & Water Watch, *Antibiotic Resistance 101: How Antibiotic Misuse on Factory Farms Can Make You Sick* 13 (Mar. 2015), http://www.foodandwaterwatch.org/sites/default/files/Antibiotic%20Resistance%20101%20Report%20March%202015.pdf, citing Bonnie Marshall and Stuart Levy, *Food Animals and Antimicrobials: Impacts on Human Health*, 24 Clinical Microbiology Reviews 718, 723 (2011); S.S. Dritz et al., *Effects of Administration of Antimicrobials in Feed on Growth Rate and Feed Efficiency of Pigs in Multisite Production Systems*, 220 J. Am. Veterinary Med. Ass'n. 1690, 1690 (2002); J.P. Graham et al, *Growth Promoting Antibiotics in Food Animal Production: An Economic Analysis*, 121 Public Health Reports 79, 79 (2006).

[196] 2003 CAFO Rule, 68 Fed. Reg. at 7239.
[197] 40 C.F.R. § 503.13.

Research increasingly demonstrates that CAFO NMPs and other BMPs do not minimize pollution to the degree previously assumed. NMPs are designed to optimize crop yield, by specifying agronomically optimal nutrient goals, and therefore are not designed to minimize runoff to surface and ground water. Even when nutrient management planners have created site-specific nutrient application standards, inaccuracies in estimates of water delivery and utilization by crops and differential nutrient uptake rates by plants limit NMP effectiveness.[198] As a result, the NMP approach alone does not achieve the rates of pollution reduction required by the CWA.

Moreover, while EPA and states have identified certain nutrient management practices known to harm water quality (*see infra*, section B.b.iv), the federal regulations stop short of prohibiting these practices. These shortcomings weaken the efficacy of the CAFO regulatory program, and have resulted in a patchwork of state regulations pertaining to CAFOs with widely varying degrees of effectiveness. While some variation in land application restrictions may be appropriate due to varying climates, soils, crops, and other site–specific characteristics that will affect which practices will best protect water quality, EPA must reduce its reliance on state–based nutrient management planning. A stronger baseline of nationally–applicable standards is needed to make water quality protection, rather than crop yield, the primary consideration of CAFO nutrient management, and to ensure that states do not engage in a regulatory "race to the bottom."[199]

For CAFOs that land apply wastes, the ELGs require states to establish technical standards for nutrient management. Technical standards must address the form, source, amount, timing, and method of application of nutrients on each field, based on a field-specific assessment of the potential for nitrogen and phosphorous transport from the field to waterways.[200] These standards are supposed to be calculated to achieve realistic production goals while minimizing nitrogen and phosphorous movement to waters of the U.S.[201]

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[198] *See, e.g.*, EPA, *Transport and Fate of Nutrients and Indicator Microorganisms at a Dairy Lagoon Water Application Site: An Assessment of Nutrient Management Plans* 66 (Mar. 2011), http://nepis.epa.gov/Adobe/PDF/P100DOTV.pdf.

[199] *See, e.g.*, Stacy Sneeringer & Regina Hogle, *Variation in Environmental Regulations in California and Effects on Dairy Location*, 37 Agric. & Res. Econ. Rev. 133, 135 (2008) (surveying academic articles that have tested and supported the hypothesis that environmental regulations influence the location of dairies).

[200] 40 C.F.R. § 412.4(c)(2) (determination of application rates).

[201] *Id.*; *see also* Permit Writers' Manual at 6-12. EPA relies on the NRCS, a branch of USDA, to develop technical standards for nutrient management. *See* 2003 CAFO Rule, 68 Fed. Reg. at 7209 (allowing permitting authorities to rely on NRCS practice standards to meet required technical standards); 2008 CAFO Rule, 73 Fed. Reg. at 70430 (reiterating that permit applicants may rely on NRCS' technical guidance for CNMPs to fulfill NMP eligibility requirements).

Research has demonstrated, however, that "just having a NMP does not reduce excess nutrient application nor does it guarantee improvements in water quality."[202] The dual goals, expressed in EPA's regulations and state technical standards, of maximizing production and minimizing pollution are often incompatible, and when in doubt, state standards typically authorize operators to over–apply animal wastes and other supplements in order to ensure that crops have sufficient nutrients to ensure optimal growth.[203] As one researcher explained, "it cannot be assumed that there is a direct relationship between the soil test calibration for crop response to [nutrients] and surface runoff enrichment potential . . . . At what levels should recommendations for [nutrient] application change from being agronomic to environmentally based?"[204] Under the current regulations, states have too much discretion in balancing these competing interests.

Nutrient management requirements typically rely on the idea of a nutrient budget, limited either by nitrogen or phosphorous, in order to determine how much animal waste or other fertilizer can be applied to a crop.[205] NMPs should consider all nutrient input sources, and compare these to volatilization, mineralization, and plant uptake rates, as well as factors affecting the risk of loss, such as slope, in order to determine the amount of additional nutrients that can be added to a crop.[206] After taking all of these factors into account, "nutrient management planners [] assume that if waste is applied in accordance with an NMP, all CAFO contaminants will be taken up, inactivated, retained, or degraded in the root zone, so that surface and groundwater are inherently protected."[207] But while these calculations seek to consider relevant factors and involve some direct measurement of nutrient concentrations, they also rely on assumptions about the movement of water and physical and chemical interactions that may or may not reflect actual conditions.[208] As a result, these simplified models of nutrient uptake and transport ultimately fail to achieve environmentally optimal results.

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[202] R. Shepard, *Nutrient Management Planning: Is it the Answer to Better Management?*, 60 J. Soil and Water Conservation 171, 176 (2005).
[203] USDA, Nitrogen in Agricultural Systems: Implications for Conservation Policy 4, 46 (Sept. 2011), https://www.ers.usda.gov/webdocs/publications/err127/6767_err127.pdf?v=41056 (describing simultaneous environmental and economic optimization of nitrogen management as "a juggling act" and noting that reducing application rates may increase farmers' perceived risk of reduced yields); Robert Flynn, *Regulatory vs Agronomic Protection of Groundwater in New Mexico: A Case Study in Nutrient Management* 6 Western Nutrient Mgmt. Conference 165, 168 (2005) (noting that farmers "are not likely to allow crops to become deficient in nitrogen"); Andrew Sharpley, *Agricultural Phosphorous, Water Quality, and Poultry Production: Are They Compatible?* 78 Poultry Sci. 660, 668 (1999) (noting the importance of measuring the phosphorus content of both manure to be applied and that is already in the soil because "there is a tendency among farmers and their advisors to underestimate the fertilizer value of manure without these determinations.").
[204] Andrew Sharpley, *Agricultural Phosphorous, Water Quality, and Poultry Production: Are They Compatible?* at 668.
[205] EPA, *Transport and Fate of Nutrients and Indicator Microorganisms at a Dairy Lagoon Water Application Site: An Assessment of Nutrient Management Plans* at 5.
[206] *Id.*
[207] *Id.* at 7.
[208] *Id.*

Current nutrient management planning approaches also often allow over-application of phosphorus. Because most crops require more nitrogen than phosphorous, nitrogen-based approaches to manure application are more common than phosphorus-based.[209] This "presents a special problem because the N-to-P ratio in manures is lower than that needed by crops . . . [causing] excess P [to] build[] up to environmentally harmful levels in fields that received repeated applications."[210] EPA has come to similar conclusions when considering liquid dairy waste:

> "[A] potential problem arises when the relative content of nitrogen and phosphorous in lagoon water differs from that in the crop. In this case, NMPs that are designed to meet the nitrogen requirement for crops may result in the over-application of phosphorous."[211]

Other studies, including those looking at dry litter systems, echo this problem, finding that "[b]ecause most NMPs are based on plant N requirements, this invariably means that P is over–applied relative to needs."[212] Once excess phosphorous in soil reaches a particular saturation point, it begins to leach into surface and groundwater.[213] Some states do require that NMPs include phosphorus-based plans under certain circumstances.[214] Nonetheless, these approaches are highly variable, and recent studies demonstrate that phosphorous is often over-applied with respect to crop needs even in states with phosphorus-based plans. A 2014 report by the Environmental Integrity Project found, for example, that 75% of phosphorous from poultry operations on Maryland's Eastern Shore was applied in excess of crop needs.[215]

EPA's regulations should account for the modeling and design deficiencies that undermine the effectiveness of NMPs, rather than assuming that optimizing crop yield will also

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[209] University of Georgia Cooperative Extension, *Small Farm Nutrient Management Primer: For Un-permitted Animal Feeding Operations* 4-6 (Jan. 2006), http://extension.uga.edu/publications/files/pdf/B%201293_5.PDF; L.M. Risse, et al., *Land Application of Manure for Beneficial Reuse* at ii.
[210] L.M. Risse, et al., *Land Application of Manure for Beneficial Reuse* at ii.
[211] EPA, *Transport and Fate of Nutrients and Indicator Microorganisms at a Dairy Lagoon Water Application Site: An Assessment of Nutrient Management Plans* at 8. *See also* University of Georgia Cooperative Extension, *Small Farm Nutrient Management Primer: For Un-permitted Animal Feeding Operations* at 4-6; Risse, et al., *Land Application of Manure for Beneficial Reuse* at 18 ("Nutrients applied from animal manure should match the needs of the crop, but the ratios of N, P, K, and the various micro nutrients excreted by animals are generally different from crop requirements.").
[212] University of Kentucky Research Foundation, *Demonstration of Enhanced Technologies for Land Application of Animal Nutrient Sources in Sensitive Watersheds: Final Progress Report* 2 (2008), http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1044927.pdf.
[213] Chesapeake Bay Foundation, *Manure's Impacts on Rivers, Streams, and the Chesapeake Bay* 8 (July 28, 2004), http://www.cbf.org/document.doc?id=137.
[214] *Id.* at 8-9 (noting that Virginia, Delaware, Pennsylvania, and Maryland all require that NMPs account for crop phosphorus needs to some extent).
[215] Environmental Integrity Project, *Manure Overload on Maryland's Eastern Shore* 8 (Dec. 8, 2014), http://dcpgonline.org/uploads/EIP_POULTRY-REPORT_-_Manure_Overload.pdf.

"minimize nitrogen and phosphorous movement to waters of the U.S."[216] At a minimum, EPA must expressly require the use of phosphorous-based plans, rather than nitrogen-based plans, where phosphorus is the limiting nutrient. However, even phosphorus-based plans fail to minimize the over–application of harmful manure constituents like *E. coli* and other pollutants, and EPA must commit to regularly strengthening CAFO nutrient management requirements as the science develops, including by analyzing the results of the requested land application monitoring data discussed *supra*. Put simply, the CWA mandates that EPA and states tip the scales in favor of water quality protection, not crop yield, requiring appropriate technology-based effluent limitations as mandated by the Act. The current NMP regulations fail to do so.

Stronger NMP regulations are also necessary to effectuate the Act's requirements that permits include stricter limits as needed to comply with water quality standards[217] and that permitting authorities may not issue a NPDES permit to a newly constructed or modified facility if discharges from that facility would cause or contribute to the violation of water quality standards.[218] Of course, the current permitting scheme discourages CAFO operators from obtaining permits in the first place, and as a result undermines the Act's mandate to protect water quality through more stringent permits when technology-based permits do not suffice. But even where CAFOs are required to obtain NPDES permits, the legal fiction that NMPs designed to maximize crop yield will also achieve minimal or zero discharge makes it unlikely that a permit writer will seek to establish more stringent requirements when a receiving water is impaired or the CAFO may cause or contribute to a violation of water quality standards.

Even in the case of land application, where EPA's ELGs merely require a few BMPs in addition to the NMP, there is nothing in EPA's rules to enable a permit writer to derive practices sufficiently protective to reduce loadings and ensure the discharge will not cause or contribute to water quality standards violations. Because many discharges under this scheme are assumed to be non-existent or not subject to regulation, and NMPs are already assumed to minimize the potential for runoff, there is no mechanism for permit writers to establish water quality-based permit limits where a receiving water is already impaired. Absent effective regulations that reflect the reality that NMPs are not zero discharge plans and that require discharging CAFOs to obtain permits in the first place, permitting authorities will continue failing to impose WQBELs to protect the uses of individual waterbodies.

[216] *See* 40 C.F.R. 412.4(c)(2).
[217] *See* 33 U.S.C. § 1311(b)(1)(C) (NPDES permits must include "any more stringent limitations . . . necessary to meet water quality standards"); 40 C.F.R. § 122.44(d) (permitting authorities must include WQBELs for pollutants that "have the reasonable potential to cause, or contribute to an excursion above any State water quality standard").
[218] *See* 40 C.F.R. §122.4(i). *See also Friends of Pinto Creek v. EPA*, 504 F.3d 1007, 1014 (9th Cir. 2007).

iv. Technical Standards Must Prohibit Practices Known to Harm Water Quality

As written, EPA's ELGs for Large CAFOs allow CAFO operators to engage in several production and land application area practices known to cause discharges and harm water quality, undermining permits' narrative requirements to eliminate or minimize discharges, respectively. EPA's failure to promulgate CAFO technical standards that prohibit harmful practices is arbitrary and capricious, and contrary to EPA's obligations to develop guidelines sufficient to protect water quality and make progress towards the Act's goal of eliminating pollution.

The CAFO industry has grown and consolidated significantly since EPA conducted its BPT, BCT, BAT, and NSPS analyses for the CAFO ELGs, and its considerations of both the availability of better technologies and the industry's ability to afford certain practices has become outdated. EPA also knows far more now about the impacts of certain CAFO practices than it did in 2003, and should revisit the appropriateness of its current requirements and prohibitions. Moreover, EPA's prior analysis gave outsized consideration to the economic affordability factor; the mounting evidence that the existing ELGs cannot adequately control CAFO pollution, rendering EPA incapable of meeting its CWA obligations, dictates that the agency must reconsider its analysis with a greater focus on achieving acceptable water quality outcomes. Under such an updated and appropriately balanced analysis, the Petitioners believe that the proposed revisions are affordable for the industry as a whole and are appropriate for both new and existing CAFOs. Petitioners specifically request that EPA supplement the requirements of 40 C.F.R. § 412.4 (Best management practices for land application of manure, litter, and process wastewater) to prohibit the practices discussed below.

1. Manure Storage in Unlined and Inadequately Lined Lagoons and Impoundments

Studies have documented the fact that storage of manure in unlined lagoons and impoundments pollutes surface waters through hydrologic discharges,[219] and there is sufficient evidence to support a CAFO ELG provision that prohibits storage of manure and other animal wastes in lagoons without impermeable synthetic liners. While groundwater is not regulated as a

[219] *See, e.g.*, S. Koike, et al., *Monitoring and Source Tracking of Tetracycline Resistance Genes in Lagoons and Groundwater Adjacent to Swine Production Facilities over a 3-Year Period*, 73 Applied Envtl. Microbiology 4813, 4822 (2007) (noting that animal waste seepage from unlined lagoons at two swine CAFOs was associated with the spread of antibiotic resistance genes in bacteria found in groundwater near the facilities); Shai Arnon, et al., *Transport of Testosterone and Estrogen from Dairy-Farm Waste Lagoons to Groundwater*, 42 Envtl. Sci. & Tech. 5521, 5525 (2008) (concluding that clay lining of lagoons "cannot efficiently protect the groundwater environment from waste lagoon leachates under long-term exposure," where a study demonstrated potential seepage of hormones and inorganic contaminants from CAFO waste lagoons to deep groundwater, even where thick layer of clay was present).

water of the U.S., pollution of groundwater often leads to pollution discharges into jurisdictional surface waters through hydrologic connections. As discussed *supra*, such hydrologic discharges of groundwater to jurisdictional waterways are so prevalent that EPA has previously proposed establishing a presumption that CAFO lagoon discharges to groundwater will have a hydrologic connection to surface waters.[220]

The current CAFO rules essentially ignore this discharge pathway, and put the burden on citizens to demonstrate that a CAFO waste structure will cause a jurisdictional discharge. In its Permit Writers' Manual, EPA does recommend that Large CAFOs near a waterbody listed "as impaired due to nutrients, dissolved oxygen or bacteria," or in areas where there is a "reasonable potential" that anticipated discharges will violate water quality standards, should use more protective practices like "installing an impermeable lining in a lagoon or storage pond."[221] This effectively presumes that such facilities will discharge via their lagoons in the absence of effective liners. However, the water pollution risks from unlined lagoons indicate that a mere recommendation is insufficient. EPA must prohibit this practice in order for permitted CAFOs to actually achieve the technology-based standards of zero production area discharges in most weather conditions.

Historically, CAFO operators have not been required to line waste storage impoundments because of the belief that the animal wastes themselves create a protective lining. A recent literature review of lagoon leaching studies demonstrates, however, that leaching rates are highly variable and dependent on site–specific factors such as soil type.[222] Moreover, even where lagoons are lined with soil containing at least 10% clay, "significant leaching can occur through shrink–swell fractures in lagoon sidewalls."[223] In contrast, "[p]roperly constructed and maintained, synthetic liner systems provide excellent protection from groundwater degradation."[224] In short, "synthetic liners can protect groundwater quality, while other liners require substantial post-construction monitoring."[225]

Given current research on the effectiveness of synthetic lagoon liners, and in keeping with the requirement that EPA develop standards which reflect best available technology economically achievable, EPA must directly address hydrologic discharges by imposing technical standards that require the use of the best available synthetic liners at all existing and new waste lagoons. NRCS has extensively analyzed the seepage rates of different liner materials

[220] 2001 Proposed CAFO Rule, 66 Fed. Reg. at 3040. Although such a presumption of hydrologic connection is not necessary to impose this BMP requirement on permitted CAFOs, EPA should nonetheless revisit this analysis to provide further evidence in support of a more general presumption of discharge by CAFOs or categories of CAFOs.
[221] Permit Writers' Manual at 4-36.
[222] Thomas Harter, et al., *Assessing Potential Impacts of Livestock Management on Groundwater*, Nicholas Institute for Environmental Policy Solutions 6 (Mar. 2014), http://nicholasinstitute.duke.edu/sites/default/files/ni_r_14-03_sr2_final.pdf (noting studies had found high leaching rates where unlined lagoons were built on sandy or gravelly soils).
[223] *Id.*
[224] *Id.*
[225] *Id.*

and the other factors that affect manure storage system discharges to groundwater, as well as their relative costs, and EPA should use this information and other recent research in deriving its technology standards.[226]

2. Ventilation of Pollutants near Waters or Conduits to Waters of the U.S.

EPA should further amend the CAFO ELGs to address pollution discharges from livestock confinement ventilation systems near waterways, ditches, or other conduits that carry pollutants to waters of the U.S. Ventilated animal houses may release significant quantities of ammonia, feathers, dust, and other pollutants. Where houses are located near waterways, these pollutants can re–deposit directly to surface waters, and where CAFO facilities contain ditches, pipes, or other conduits to surface waters, they can carry ventilated pollutants directly to waterways. The current ELGs do not account for these pollution pathways, despite the fact that EPA has affirmed that discharges of CAFO ventilation system pollutants into jurisdictional waters, or conduits to such waters, constitute prohibited point source discharges.[227]

Ammonia gas that is intentionally vented out of livestock houses provides a concrete example of how significant this uncontrolled pollution pathway can be. According to the Chesapeake Bay TMDL, atmospheric sources of nitrogen contribute roughly one-third of the total nitrogen load to the Chesapeake Bay.[228] In 2010, EPA projected that between 2010 and 2020, roughly half of the atmospheric nitrogen depositing in the Chesapeake Bay watershed was ammonia.[229] In other words, roughly 17% of the enormous nitrogen load currently impairing the Chesapeake Bay comes from atmospheric ammonia. Much of this atmospheric ammonia comes from CAFOs: according to the most recent EPA National Emissions Inventory, 55% of national ammonia emissions come from livestock waste.[230] In areas where CAFOs are concentrated, this proportion is higher. In Maryland, for example, 74% of ammonia emissions come from livestock waste.[231] In short, the emissions of ammonia from CAFOs, including emissions from livestock

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[226] *See* NRCS, Agricultural Waste Management Field Handbook Chapter 10, Appendices 10D and 10E (Aug. 2009), http://www.wcc.nrcs.usda.gov/ftpref/wntsc/AWM/handbook/ch10.pdf; NRCS Conservation Practice Standard 521A, Pond Sealing or Lining—Flexible Membrane (Sept. 2011), https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1046899.pdf.

[227] *See Nat'l Pork Producers Council*, 635 F.3d at 754-56; *see also Rose Acre Farms, Inc. v. N.C. Dep't of Env't and Natural Res.*, No. 12-CVS-10, ¶¶ 54, 55 (Jan. 4, 2013) (finding that ammonia and other pollutants that reach jurisdictional waters after being expelled by CAFO ventilation fans are subject to NPDES permitting requirements, and are not exempt as agricultural stormwater).

[228] EPA, Chesapeake Bay Total Maximum Daily Load for Nitrogen, Phosphorus and Sediment 4-33 (Dec. 29, 2010), https://www.epa.gov/chesapeake-bay-tmdl/chesapeake-bay-tmdl-document.

[229] *Id*. at Appendix L, Table L3.

[230] EPA, 2011 National Emissions Inventory, https://www.epa.gov/air-emissions-inventories/2011-national-emissions-inventory-nei-data.

[231] *Id*.

confinement ventilation systems, are directly and substantially contributing to the ongoing impairment of the Chesapeake Bay. This is not a trivial pollution pathway.

The current Large CAFO ELGs ostensibly require existing CAFOs and new dairy and cattle CAFOs to meet a zero discharge standard for the production area, except in the case of a 25–year, 24–hour storm event, and require new hog and poultry CAFOs to achieve a zero discharge production area standard regardless of storm events.[232] However, many CAFOs fail to achieve these requirements in practice, due to the regulations'—and in turn, state permitting agencies'—failure to specifically address ventilation system pollution emissions that become discharges. EPA should require all CAFOs using ventilation systems to either prevent pollutant releases with biofilters or other existing technology, or to capture all ventilated pollution and divert it into the waste containment area to prevent any prohibited discharges of manure, litter, or process wastewater pollutants. To the extent that EPA finds that these technologies cannot eliminate all ventilation system discharges, which is particularly a concern for ammonia, such a finding would only bolster this Petition's argument that CAFOs do in fact discharge, and that a presumption of discharge is necessary to carry out the Act.

3. Application on Frozen, Saturated, or Snow-Covered Ground

EPA and other agencies recognize that spreading manure on frozen, snow–covered, or saturated ground results in high risk of runoff and pollutant transport. In the NPDES Permit Writers' Manual for CAFOs, EPA says that state programs "should either prohibit application of manure and process wastewater on snow, ice, and frozen ground, or include specific protocols that CAFO owners or operators . . . will use to conclude whether application to a frozen or snow–or ice–covered field (or a portion thereof) poses a reasonable risk of runoff."[233] Similarly, NRCS, EPA's primary resource for developing technical standards,[234] advises that "[n]utrients must not be surface–applied if nutrient losses offsite are likely" and warns against spreading on "frozen and/or snow–covered soils, and when the top 2 inches of soil are saturated from rainfall or snow melt."[235] But rather than prohibiting these dangerous practices, EPA merely "strongly encourages" states to adopt such prohibitions themselves.[236] This recommendation has proven inadequate.

The increased likelihood of runoff associated with application of manure to frozen, saturated, or snow–covered ground is widely recognized by agricultural experts, including

[232] 40 C.F.R. § 412.
[233] Permit Writers' Manual at 6-15.
[234] USDA and EPA, *Unified National Strategy for Animal Feeding Operations* Sec. 3.2 (March 9, 1990), http://www.epa.gov/npdes/pubs/finafost.pdf.
[235] NRCS Conservation Practice Standard 590, Nutrient Management 3 (Oct. 2013), https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1192371.pdf.
[236] Permit Writers' Manual at 6-16. *See also id.* at 5-30 (listing standards, including prohibiting application of manure to frozen or snow-covered ground, which permit authorities "may include" as technology-based standards).

agricultural extension program technical staff, state agencies, and EPA itself. Liquid or semi–liquid manure cannot easily permeate ground that is already saturated or that is frozen, and thus is much more likely to run off into nearby waterways, particularly when snow or frozen ground begins to melt.[237] Moreover, in areas where soils reach freezing temperatures, there are generally no winter crops available to uptake the nutrients in manure, meaning there is little to no agronomic benefit to winter applications and nutrients are susceptible to loss before any spring crop has been planted.[238] EPA's own peer–reviewed technical guidance similarly concludes that "[f]rom the dual perspectives of nutrient utilization and pollution prevention, [] winter is the least desirable time for land application."[239]

Other authorities, ranging from the state level to international, have also recognized the harms likely to result from land application in winter months and on frozen ground. The International Joint Commission, an international organization created by the Boundary Waters Treaty (ratified by the United States and Canada in 1909), recommends that to protect Lake Erie, all adjacent states should ban the spreading of manure on frozen or snow–covered ground because of the likelihood of those practices polluting surface waters.[240] The Iowa State University Extension acknowledges that "[b]roadcasting manure onto frozen, snow-covered, water-saturated soils increases the potential for nutrient losses with rainfall or snowmelt runoff to surface water systems."[241] Similarly, the Penn State Extension warns that "winter is not the best time to apply manure and should be our last choice,"[242] and the Ohio State University Extension advises that "[w]inter application should not be part of a manure management plan and it should only be viewed as a last resort."[243]

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[237] International Joint Commission, *A Balanced Diet for Lake Erie: Reducing Phosphorous Loadings and Harmful Algal Blooms* 75 (2014) [hereinafter 2014 IJC Report], http://www.ijc.org/files/publications/2014%20IJC%20LEEP%20REPORT.pdf.

[238] Ontario Ministry of Agriculture, Food, and Rural Affairs, *Winter Application of Manure and Other Agricultural Source Material*, OMAFRA Fact Sheet 10-073 (Sept. 2010), http://www.omafra.gov.on.ca/english/engineer/facts/10-073.htm#5. Similarly, in a PowerPoint presentation derived from a white paper prepared for EPA by contract company Tetra Tech, Tetra Tech noted that a "comprehensive literature review found no published research to support agronomic factors as a basis for recommending winter manure application." Tetra Tech, *Winter Manure Application and Water Quality: Overview of the Literature* 4 (Oct. 30, 2014), http://bloximages.chicago2.vip.townnews.com/auburnpub.com/content/tncms/assets/v3/editorial/f/ef/fef9f5a8-8a50-53b9-a377-eaf2a11a9362/5483213e3e237.pdf.pdf.

[239] Permit Writers' Manual at App. G-1-2, *Interim Final Technical Guidance for the Application of CAFO Manure on Land in the Winter* (noting that "[w]here there is a reasonable risk [of runoff from application on snow, ice, and frozen soil], EPA strongly prefers that technical standards prohibit application on the field or the pertinent portion thereof during times that the risk exists or may arise").

[240] 2014 IJC Report at 9.

[241] Iowa State Univ. Extension and Outreach, *Using Manure Nutrients for Crop Production* 6 (May 2016), http://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=1089&context=extension_pubs.

[242] Penn State Extension, *Winter Manure Application Considerations* (Jan. 2013), http://extension.psu.edu/plants/crops/news/2013/01/winter-manure-application-considerations.

[243] Amanda Meddles, Ohio State University Extension, *Properly Applying Manure on Frozen Ground*, Ohio's Country Journal (Jan. 24, 2012), http://ocj.com/2012/01/properly-applying-manure-on-frozen-ground/. *See also* Utah Farmstead Assessment for Ground Water and Surface Water Protection, *How to Manage Stored Manure and*

Despite the broad consensus on the dangers of winter application practices, however, many states with numerous CAFOs and severe winter conditions fail to prohibit such practices in their NPDES implementing regulations.[244] Absent a national prohibition on such irresponsible manure application practices, many operators will fail to maintain adequate storage to avoid winter application, will continue to land apply waste under high-risk conditions, and will continue to adversely impact surface water quality through preventable land application discharges. Moreover, climate change heightens the risk that applying waste under these circumstances poses to water quality. State regulators have understood for more than a decade that intermittent melting spells increase the risk of surface runoff.[245] In regions where the ground once predictably stayed frozen for the entire winter, but where such intermittent melting is now a more frequent occurrence, the relationship between season and runoff potential has changed. EPA should re–evaluate this relationship with recent data, because assumptions about winter runoff potential are likely no longer accurate.[246]

EPA must strengthen the CAFO ELGs to prohibit the spreading of manure on frozen, saturated, or snow–covered ground, or during periods of crop dormancy when such conditions are expected to occur before crop nutrient uptake occurs, because manure application under these conditions is known to lead to surface water discharges, and is therefore inconsistent with the requirement that land application be conducted in such a way that minimizes the risk of nutrient loss. In conjunction with this requirement, EPA must require adequate storage to ensure that operators may not simply dump excess stored manure on fields each spring, as that would also lead to unacceptable risk of pollution runoff. The technology to prevent these land application discharges is clearly available, and anything short of such a prohibition will continue to allow irresponsible manure disposal, rather than application calculated to best protect water quality, and fall short of what the CWA requires.

Protect Your Water 7 (Rev'd Mar. 2012), http://extension.usu.edu/files/publications/factsheet/WQFA-13.pdf (advising on proper manure handling and storage for water protection, and directing that "[m]anure should not be applied to frozen or snow covered ground unless all runoff can be controlled."); Ohio Dep't of Agric., Ohio Dep't of Natural Res., Ohio Envtl. Prot. Agency, Lake Erie Comm'n, *Ohio Lake Erie Phosphorus Task Force II Final Report* 51 (Nov. 2013), http://lakeerie.ohio.gov/portals/0/reports/task_force_report_october_2013.pdf.

[244] *See, e.g.*, Wis. Dep't of Natural Res., WPDES Permit No. WI-0063274-01: Large Dairy CAFO General Permit 3.7.4-3.7.7 (Apr. 4, 2011), http://dnr.wi.gov/topic/AgBusiness/documents/LargeDairyCAFOGP-WPDESPermit.pdf (allowing for liquid and solid manure application on frozen and snow-covered ground under various circumstances) [hereinafter Wis. CAFO Permit]; Ill. Envtl. Prot. Agency, *Considerations for Manure Application Setbacks* 2, http://www.epa.state.il.us/water/permits/cafo/documents/show/602 (providing that application to snow-covered soils is "not recommended" but may be permitted in order to address waste storage concerns); Sierra Club Michigan Chapter, *Why are CAFOs Bad?*, http://www.sierraclub.org/michigan/why-are-cafos-bad (noting that Michigan CAFOs may be permitted, either through their NMP or under an order from the state with specifications for winter application, to apply waste to snow or frozen ground).

[245] *See, e.g.*, Gregg Hoffmann, *Wintertime manure spreading under scrutiny*, WisBusiness (Apr. 7, 2005), http://www.wisbusiness.com/index.iml?Article=34685.

[246] 2014 IJC Report at 78.

4. Spray Irrigation of Manure

The CAFO ELGs should also expressly prohibit all methods of spray irrigation of manure, which threaten surface waters and present significant human health risks. Some of the unique water quality risks associated with spray irrigation relate to the fact that irrigation often takes place at night, center-pivot irrigation may occur without supervision, excessive irrigation can result in waste ponding, and dry weather discharges can occur via drift, surface runoff, and leaching.[247] Over-application via spray irrigation has been cited as a cause of water pollution in states where CAFOs use this application method.[248] Irrigation systems are also reliant on pipes and hoses to connect lagoons with sprayfields, and these can leak or break.[249]

Compared to other forms of irrigation, spray irrigation may also result in higher rates of evaporation and volatilization of a range of CAFO pollutants, including ammonia.[250] Indeed, several studies have found that where manure is not incorporated into soil, more than half of the manure ammonia is lost, likely due to volatilization.[251] This directly impacts water quality, because volatilized ammonia will re-deposit on land and water, where, as we have seen in the context of the Chesapeake Bay, it contributes to algae blooms and dead zones. In addition, spraying methods may result in liquid manure droplets drifting onto neighboring properties, roads, and other areas, where it can subsequently run off into waterways.[252] Spray irrigation is simply incompatible with the goal of agronomic use of manure nutrients, as well as with the CWA's requirements to limit and ultimately eliminate CAFO discharges to waters of the U.S.

Spray irrigation of waste also threatens public health, because it "create[s] a potentially hazardous situation as pathogens may become aerosolized and transported to downwind receptors [and] . . . could potentially be directly inhaled or ingested after they land on fomites, water sources, or food crops."[253] These bioaerosols can contain bacteria, viruses, parasites, fungi,

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[247] *See, e.g.*, Wis. Manure Irrigation Workgroup, *Considerations for the Use of Manure Irrigation Practices* 40-42 (Apr. 2016), https://fyi.uwex.edu/manureirrigation/files/2016/04/Manure-Irrigation-Workgroup-Report-2016.pdf.
[248] *See, e.g.*, Ron Seely, Wisconsin Watch, *Manure Spraying Under Scrutiny* (Apr. 27, 2014), http://wisconsinwatch.org/2014/04/manure-spraying-under-scrutiny/.
[249] NRDC, *Cesspools of Shame: How Factory Farm Lagoons and Sprayfields Threaten Environmental and Public Health* 29 (Jul. 2001) [hereinafter *Cesspools of Shame*], http://www.nrdc.org/water/pollution/cesspools/cesspools.pdf.
[250] *Id.* at 17; Iowa State Univ. Extension and Outreach, *Using Manure Nutrients for Crop Production* Table 2 (showing that spray irrigation has the highest volatilization rate of various application practices).
[251] *Cesspools of Shame* at 37.
[252] Penn State Extension, *Irrigation of Liquid Manures*, http://extension.psu.edu/plants/nutrient-management/educational/manure-storage-and-handling/irrigation-of-liquid-manures.
[253] R.S. Dungan, *Board-Invited Review: Fate and Transport of Bioaerosols Associated with Livestock Operations and Manures*, 88 J. Animal Sci. 3693, 3696, 3702 (2010), https://www.animalsciencepublications.org/publications/jas/pdfs/88/11/3693 (noting that spray irrigation methods contribute to the formation of bioaerosols at greater concentrations than found in background environments, and that there is increased potential for exposure to airborne pathogens and microbial by-products both on and off-site of CAFOs as a result of these practices).

and other microbes harmful to human health.[254] As the liquid manure is sprayed into the air, the risk of decreased droplet size and longer transport distances increases, as compared to other forms of manure application.[255] Because it poses threats to water quality as well as public health, EPA should prohibit spray irrigation methods of manure application in the CAFO ELGs.

5. Manure Application on Steep Slopes

Similarly, EPA cautions against, but fails to prohibit spreading of manure—even liquid manure—on steep slopes.[256] Steeply sloped areas often lack soil properties that foster normal plant growth, meaning that it is less likely that nutrients from manure will be fully assimilated by plants, and more likely that these excess nutrients will be transported to surface and ground waters.[257] In EPA's own literature review of academic research relating to livestock and poultry manure impacts, the Agency found land slope to be a key determinant of runoff and of the likelihood of pathogen transport.[258] Regulating this activity is clearly practicable, because several states do restrict the spreading, in winter or otherwise, of manure on sloped land above a certain grade.[259] Nonetheless, EPA and NRCS currently leave it up to the states to determine what grade is acceptable for manure spreading and what precautions, if any, CAFO owners and operators must take when spreading on sloped land.[260] This has resulted in a patchwork of state-based requirements,[261] indicating that a baseline of nationally applicable restrictions is necessary to protect water quality. For example, Illinois allows operators to apply manure to fields with slopes as high as 15%,[262] while Wisconsin does not impose any slope restrictions on manure spreading unless it takes place on frozen or snow-covered ground.[263]

EPA's failure to prohibit spreading on slopes that lead to discharges of nutrients and other pollutants renders permits incapable of achieving the narrative effluent limits in the CAFO ELGs, absent stronger state requirements. EPA has the technical expertise to determine, for various soil and manure types and percentages of solid content, the maximum slope grade

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[254] *See* Patricia D. Millner, *Bioaerosols Associated with Animal Production Operations*, 100 Bioresource Tech. 5379, 5379-80 (2009), https://pubag.nal.usda.gov/pubag/downloadPDF.xhtml?id=33386&content=PDF.
[255] Dungan, *Board-Invited Review: Fate and Transport of Bioaerosols Associated with Livestock Operations and Manures* at 3698-99.
[256] Permit Writers' Manual at 5-30.
[257] *Id.* at A-8.
[258] EPA Literature Review at 23, 25.
[259] State regulations vary widely with respect to restrictions related to land application on steep slopes. *See, e.g.*, Envtl. Law & Policy Ctr., *Cultivating Clean Water: State-Based Regulation of Agricultural Runoff Pollution* 47-51 (2010) [hereinafter *Cultivating Clean Water*], http://elpc.org/wp-content/uploads/2010/05/ELPC-Cultivating-Clean-Water-updated-May-5-2010.pdf.
[260] *See* NRCS Standard 590 at 3, which only mentions slope as a consideration factor when allowing nutrient application despite a likelihood of runoff, such as on frozen, snow-covered, or saturated soils.
[261] *See, e.g.*, *Cultivating Clean Water* at 47-51.
[262] Ill. Envtl. Prot. Agency, *Considerations for Manure Application* 2, http://www.epa.state.il.us/water/permits/cafo/documents/show/602.
[263] Wis. Admin. Code Ch. NR 243.14 (2015); Wis. CAFO Permit at Sec. 3.7.

consistent with the requirement to minimize nutrient loss and other discharges of pollutants. It should determine these and strengthen the ELGs to restrict land application accordingly.

6. Manure Storage in Exposed Stockpiles

Storage of manure in uncovered stockpiles also leads to preventable pollutant discharges to surface waters. EPA advises permit writers that "[i]deally, stockpiled manure and litter should be stored under cover on an impervious surface" to minimize pollutant runoff.[264] The EPA Office of Enforcement and Compliance Assurance also recognizes the dangers of this practice, warning that leaving manure in uncovered stockpiles is likely to result in pollutants escaping into the environment.[265] Manure stockpiles can contain vast quantities of waste and pollutants; a poultry litter stockpile generally ranges from 75 to 200 tons of waste, and precipitation events can carry pollutants from an uncovered pile to surface and ground water.[266]

As with the inherently risky practices discussed above, EPA has acknowledged the threat to water quality but has failed to impose appropriate and necessary permit restrictions. While EPA has properly defined stockpiles as part of the CAFO production area,[267] it continues to allow states to create loopholes from adequate regulation. For example, Delaware allows CAFOs to stockpile manure on application fields for up to 90 days, using the phrase "field staging" for the practice, and subsequently fails to impose a zero discharge requirement on the piles. This in effect improperly treats discharges from these piles as land application, rather than production area, discharges.[268]

All exposed stockpiles of litter are most likely to result in discharges of pollutants in the first few days after construction, when nutrients are at their highest levels.[269] As a result, even where stockpiles are considered part of the land application area, rather than the production area, they also fail to meet EPA's land application ELG requirement to "minimiz[e] nitrogen and phosphorus movement to surface waters."[270] Permitting the continued use of uncovered solid waste stockpiles, unless the CAFO operator demonstrates that all runoff and leaching from the piles will be diverted into a waste storage facility, simply fails to meet EPA's requirement to implement BMPs capable of "ensur[ing] appropriate agricultural utilization" of nutrients.[271] EPA must give effect to its zero discharge production area requirements for waste stockpiles by

[264] Permit Writers' Manual at 5-39.
[265] EPA Office of Enforcement and Compliance Assurance, *EPA Targets Clean Water Act Violations at Livestock Feeding Operations*, 10 Enforcement Alert 1, EPA 325-F-09-001 (2009).

[266] Gregory D. Binford and George Malone, Evaluating BMPs for Temporary Stockpiling of Poultry Litter 4 (Dec. 22, 2008), http://mda.maryland.gov/SiteAssets/Pages/Manure/PL_Storage_Report_BINFORD_FINAL.PDF.
[267] 40 C.F.R. § 122.23(b)(8).
[268] Del. Nutrient Mgmt. Program, Del. Conservation Practice Standard: Temporary Field Staging (Jul. 2010), http://dda.delaware.gov/nutrients/downloads/Draft_TechStandards/Temp_Field_Storage.pdf.
[269] Gregory D. Binford and George Malone, Evaluating BMPs for Temporary Stockpiling of Poultry Litter at 12.
[270] 40 C.F.R. § 412.4(c)(2)(i).
[271] 40 C.F.R. § 122.42(e)(1)(viii).

imposing requirements to actually prevent them from discharging. Without a federal BMP specifically mandating stockpile pads and covers for all CAFOs subject to the ELGs, nutrient runoff from manure stockpiles will continue unabated.

v. State Permitting Programs Cannot Effectively Fill the Gaps Left by the Absence of Strong National Standards

Although EPA either discourages the use of these harmful practices or encourages states to prohibit the practice themselves, such suggestions are not adequate stand–ins for effective federal regulation. In a study examining state–based regulation of agricultural pollution, the Environmental Law and Policy Center examined regulatory programs in seven states—California, Delaware, Iowa, Kentucky, Maryland, Oregon, and Wisconsin—and noted that "[t]hus far, no state has demonstrated that measureable water quality improvements have resulted from its regulatory program."[272] State programs often lack adequate resources to fully implement CWA permitting programs for all sources.[273] Documenting violations of BMPs is costly and time consuming, and actions against individual producers often only address small amounts of pollution.[274] These deficiencies may lead state agencies to support interpretations of the CWA that minimize the need for regulatory oversight, rather than electing to go beyond federal requirements.[275] EPA itself has noted that states have not prioritized regulation of feedlot wastes, and that budgetary constraints make it unlikely that states will meet—much less exceed—program and permitting responsibilities under the current rules.[276]

The proliferation of "no more stringent than" laws in several states has erected an additional barrier to effective state regulation. Many states have adopted statutes or rules prohibiting administrative bodies from promulgating environmental protections more stringent than federal rules require. A study conducted by the Environmental Law Institute found that 13 states have enacted broad "no more stringent than" laws that prohibit the state from imposing

[272] *Cultivating Clean Water* at 11 (primarily examining nitrogen and phosphorous pollution caused by the application of animal waste and chemical fertilizers to land).
[273] Clifford Rechtschaffen, *Enforcing the Clean Water Act in the Twenty-First Century: Harnessing the Power of the Public Spotlight*, Center for Progressive Reform White Paper 7 (Oct. 2004); *Animal Waste and Water Quality* at 18 ("it is unclear how state agencies will find the resources needed to carry out their responsibilities under the revised rules without reducing resources for other important activities"); Terence J. Centner, *Regulating the Land Application of Manure from Animal Production Facilities in the USA*, 14 Water Policy 319, 329 (2012) (noting that "[s]tate regulatory agencies do not have the resources to penalize producers who fail to follow BMPs").
[274] Centner, *Regulating the land application of manure from animal production facilities in the USA* at 329.
[275] Terence J. Centner, *Challenging NPDES Permits Granted Without Public Participation*, 38 B.C. Envtl. Aff. L. Rev. 1, 10-11 (2011), http://lawdigitalcommons.bc.edu/ealr/vol38/iss1/2/.
[276] *Animal Waste and Water Quality* at 24; 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* at 4 (survey of state policies generated response from a state agency staff member indicating that compliance inspections are only initiated "on a complaint basis" because they "don't have staff or money").

more protective requirements than the minimum required by the CWA and federal regulations.[277] An additional 23 states have adopted laws that make it more difficult to establish state standards that surpass these minimum federal requirements.[278] Consequently, many states are unable to impose additional pollution control measures, even where local conditions may necessitate them to protect water quality. Iowa has even gone so far as to specifically prohibit the state from issuing CAFO NPDES regulations more stringent than required under federal law.[279] Even if EPA had intended that states would prohibit many harmful practices on their own, it is unreasonable to expect that this will happen given numerous state laws that prohibit adoption of more protective rules.

vi. EPA's Assumptions Regarding the Frequency of Storm Events Are No Longer Accurate

To meet its obligations under the CWA, EPA must review and update its process for designating precipitation events with a probable recurrence interval to reflect new weather patterns. Large CAFOs are required to maintain waste storage capacity to contain a 25–year, 24–hour storm event.[280] EPA determines the likelihood and magnitude of such events based on a 1961 National Weather Service rainfall atlas, known as Technical Paper No. 40 (TP40).[281] The Department of Commerce published TP40 in 1961 based on 100 years of rainfall data.[282] However, more recent research calls into question whether TP40 utilizes the best available techniques and data to determine the magnitude of 25–year, 24–hour storm events. Because certain design standards for CAFOs, such as standards for storage lagoons, are based on the anticipated frequency of major storm events, accurately predicting the likelihood and magnitude of such events is critical to preventing the need for manure application at high-risk times of year, as well as storage facility failures and overflows. A method that underestimates the likelihood or magnitude of precipitation events will mean that CAFO structures are designed to fail and reach capacity more frequently.

Due to changing weather patterns, precipitation events that were rare by 1961 standards may not be so infrequent today. Climate research has demonstrated that precipitation patterns are changing, and many places are experiencing a trend towards increased frequency of extreme

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[277] Envtl. Law Inst., *State Constraints: State-Imposed Limitations on the Authority of Agencies to Regulate Waters Beyond the Scope of the Federal Clean Water Act* 1 (2013), http://www.eli.org/sites/default/files/eli-pubs/d23-04.pdf.
[278] *Id*.
[279] *Id*. at 93; Iowa Code 459.311(2).
[280] 40 C.F.R. § 412.2(i).
[281] *Id*.
[282] *See* Dep't of Commerce, Weather Bureau, *Technical Paper No. 40, Rainfall Frequency Atlas of the United States* (1961), http://www.nws.noaa.gov/oh/hdsc/PF_documents/TechnicalPaper_No40.pdf.

precipitation events.[283] The U.S. Global Change Research Program has observed an increase in very heavy precipitation events in every region of the country except Hawaii.[284] The Program found that "[t]here is a clear national trend toward a greater amount of precipitation being concentrated in very heavy events . . . ."[285] EPA has recognized this as well, stating "[t]he amount of rain falling in heavy precipitation events is likely to increase in most regions . . . ."[286] Larger and more frequent storm events mean that the current ELGs will likely be insufficient to prevent catastrophic failures, such as breached and overflowing waste lagoons.

Numerous studies indicate that newer, more accurate climate data are available to inform weather–based design standards.[287] For example, in 1992 the Midwestern Climate Center, part of the National Weather Service, in conjunction with the Illinois State Water Survey, released a Rainfall Frequency Atlas of the Midwest.[288] The study aimed to update TP40, which, even in 1992, was considered too old to be reliable.[289] New findings indicated that climate trends since TP40 changed precipitation patterns in the Midwest, and the study authors determined that TP40 did not provide sufficiently detailed spatial analysis for variations in rainfall amounts for given durations and recurrence intervals.[290]

The Southern Regional Climate Center at Louisiana State University created a Rainfall Frequency/Magnitude Atlas for the South–Central United States in 1997 for similar reasons.[291] The primary rationale for that analysis was that "[t]he rainfall frequency and magnitude patterns illustrated in TP40 need to be reexamined" in light of new data and global climate change. In addition, data limitations at the time of TP40's publication were thought to have resulted in an overgeneralized analysis of rainfall events. The authors cite specific findings that demonstrate TP40's inaccuracy, such as research indicating that "the 24-hour, 100-year value from TP40 was exceeded 3 times more often than expected in Michigan," and that both Wisconsin and Illinois had almost double the number of 100–year, 24–hour rain events that TP40 anticipates.[292] For 24–hour rainfall events, the study indicated storms may be three inches greater than TP40 predicts in

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[283] *See, e.g.* Jerry Melillo, et al., Eds., 2014: *Climate Change Impacts in the United States: The Third National Climate Assessment*, U.S. Global Change Research Program 9 (Rev'd Oct. 2014), http://nca2014.globalchange.gov/downloads.
[284] *Id.*
[285] *Id.*
[286] EPA, Climate Change Science: Future of Climate Change, https://www.epa.gov/climate-change-science/future-climate-change (last accessed Jan. 13, 2017).
[287] NOAA, an agency within the Department of Commerce, also maintains more recent data sources about precipitation frequency by location. *See* Nat'l Oceanic and Atmospheric Admin., Precipitation Frequency Data Server, http://hdsc.nws.noaa.gov/hdsc/pfds/ (last accessed Jan. 13, 2017).
[288] Floyd A. Huff and James R. Angel, Ill. State Water Survey, Bulletin 71, *Rainfall Frequency Atlas of the Midwest* (1992), https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs141p2_024033.pdf.
[289] *Id.* at 1.
[290] *Id.*
[291] Gregory E. Faiers, et al., La. State Univ. S. Reg'l Climate Ctr., *Rainfall Frequency Magnitude/Atlas for the South-Central United States*, SRCC Technical Report 97-1 (1997), http://www.losc.lsu.edu/tech97_2.pdf.
[292] *Id.* at 1.

some regions.[293] EPA must revise its ELGs to require permitting agencies to use the most up-to-date rainfall data available, to ensure that design standards accurately reflect anticipated weather events.

III. CONCLUSION

Decades after passage of the CWA, CAFOs remain a significant—and substantially unregulated—source of water pollution throughout the United States. EPA's recent efforts at imposing a workable NPDES permitting scheme for the industry have failed on two major fronts: requiring permits of all CAFOs that discharge, and requiring adequate safeguards in the relatively small number of permits issued. Petitioners are aware of the unique challenges in regulating CAFO discharges. However, courts have repeatedly established that "this ambitious statute is not hospitable to the concept that the appropriate response to a difficult pollution problem is not to try at all."[294] EPA has significant authority to revise its approach and strengthen its oversight of industrial livestock pollution, and Petitioners believe that EPA has an obligation pursuant to its CWA duties to do so without further delay.

[293] *Id.* at 7.

[294] *NW Envtl. Advocates v. EPA*, 537 F.3d 1006, 1026 (9th Cir. 2008), quoting *NRDC v. Costle*, 568 F.2d 1369, 1380 (D.C. Cir. 1977); *see also Union Elec. Co. v. EPA*, 427 U.S. 246, 268-69 (1976) ("Allowing such [feasibility] claims to be raised . . . would frustrate congressional intent.").

Exhibit 2

2011 NPDES CAFO Rule Implementation Status

NPDES CAFO Rule Implementation Status -- National Summary, Endyear 2011, completed 12/31/11 (as reported by EPA Regions)

State	EPA Region	Total CAFOs: Estimated number of facilities defined as CAFOs under NPDES[1]	CAFOs with NPDES permits[2]	Date by which State was to have updated regulations/ statutes to reflect 2008 CAFO regulation[3]	State's planned date for completing NPDES program revisions to address all provisions of CAFO NPDES regulations[4]	Expiration date for pre-2008 reg NPDES GP, if any	Date for NPDES GP under 2008 regs	Tech stds submitted by State Director[5]	Tech stds address 2008 regs[6]
Connecticut	1	6	0	None needed	None needed	none	IP planned FY 11	In progress	
Maine	1	4	4	None needed	None needed	none	Ips only	Y	
Massachusetts	1	1	0	not auth	N/A--State does not have NPDES program authorization	none	Ips only	N/A	
New Hampshire	1	1	0	not auth	N/A--State does not have NPDES program authorization	none	Ips only	N/A	
Rhode Island	1	0	0	no CAFOs	(no CAFOs)	none	n/a	N	
Vermont	1	17	0	None needed	None needed	none	planned 2011	Y	
New Jersey	2	5	5	2010	planned 10/10	exp 5/13	issued 6/08	Y	
New York	2	604	604	2010	TBD	exp 6/30/09	TBD	Y	
Puerto Rico	2	1	0	not auth	N/A--PR does not have NPDES program authorization	none	Ips only	N/A	
Virgin Islands	2	0	0	no CAFOs	(no CAFOs)	none	n/a	N	
Delaware	3	73	2	2009	Regs approved 1/12 (approval of tech standards pending)	none	Ips only	Y	
Maryland	3	150	164	2009	Regs approved 1/10 (approval of tech standards pending)	none	Expires 1/2014	Y	
Pennsylvania	3	349	306	2009	TBD	9/11	TBD	Y	
Virginia	3	188	0	2009	Regs approved 6/10 (approval of tech standards pending)	none	Ips only	Y	
West Virginia	3	68	0	2010	Regs reviewed 12/11, State's action pending	none	Ips only	Y	
Alabama	4	558	487	2/11 (permit)	permit by rule effective since August 2011	exp 2/11	planned 7/10	Y	
Florida	4	100	53	2009	completed 3/10	Ips only	Ips only	Y	
Georgia	4	828	152	2009	completed 6/12	exp 6/07	No GP	Y	
Kentucky	4	150	67	2009	completed 1/10	exp 10/05	No GP	Y	
Mississippi	4	433	190	2009	completed 1/10	poultry exp 1/09; swine exp 8/10	completed 8/10	Y	
North Carolina	4	1,222	14	2009	completed; effective based on revision filed w/ Senate 3/09	exp 6/12	planned 6/12	Y	
South Carolina	4	201	0	2009	TBD	exp 5/09	State operating permits only	Y	
Tennessee	4	129	79	2009	competed 5/11	exp 8/09	Ips for large CAFOs	Y	
Illinois	5	500	31	2009	rulemaking package in sign off at state agency; next step submit package to IPCB	exp 9/14	issued 10/09	Y	
Indiana	5	634	529	2009	rules submitted to AG and governor for final adoption; target April 2012	lps only	lps only	Y	
Michigan	5	220	197	2009	None needed (per State assessment)	exp 4/15	completed 4/10	Y	
Minnesota	5	1,255	1,250	2009	None needed (per State assessment)	exp 1/16	completed 2/10	Y	
Ohio	5	192	35	2009	transfer NPDES CAFO authority to ODA pending	lps only	Ips only	Y	
Wisconsin	5	233	233	2010	TBD	exp 3/16	issued 4/11	Y	
Arkansas	6	2,110	0	2009	None needed (per State assessment)	none	issued 10/11	Y	TBD
Louisiana	6	250	5	2009	completed 4/09	none	Ips only	Y	TBD
New Mexico	6	171	21	not auth	N/A--State does not have NPDES program authorization	none	issued 8/09	N/A	N/A
Oklahoma	6	626	0	not auth	N/A--State does not have NPDES CAFO program authorization	none	issued 1/12	N/A	N/A
Texas	6	1,108	609	2009	planned spring 2013	exp 7/14	planned 2014	Y	EPA/TCEQ coordinating updates
Iowa	7	1,648	150	2009	planned Fall 2012 (after EPA revises duty to apply rule)	lps only	lps only	Y	updating
Kansas	7	447	447	2009	need to revise NSPS only - 12/2012	lps only	lps only	Y	Y
Missouri	7	517	517	2009	Passed 1/2012 effective 4/2012	exp 2/13	planned 2/13	Y	Y
Nebraska	7	862	389	2009	completed 6/25/2011	exp 3/13	planned 4/13	Y	EPA coordinating updates
Indian Country (R7)	7	8	4	not auth	N/A--tribes do not have NPDES program authorization	lps only	Ips only	N/A	N/A
Colorado	8	187	71	2009	planned 1/12	exp 8/10; admin extended	planned 5/12	Y	
Indian Country (R8)	8	4	4	not auth	N/A--tribes do not have NPDES program authorization	lps only	Ips only	N/A	
Montana	8	117	90	2009	planned 12/12	exp 10/31/13	planned 10/13	Y	
North Dakota	8	76	0	2009	TBD	none	tbd	Y	
South Dakota	8	408	408	2009	TBD	exp 10/19/08	tbd	Y	
Utah	8	64	55	2009	planned 3/12	exp 9/30/05	planned 9/12	Y	
Wyoming	8	64	45	2009	planned 6/10; submitted revision package to EPA for review 12/09	lps only	Ips only	Y	
Arizona	9	100	2	2009	Rulemaking moratorium--TBD	exp 4/09	(State reg moratorium until 6/10)	Y	
California	9	1,011	188	None needed	No revision--State adopts prospectively	RB7 - exp 6/2013; RB8 - exp 9/6/2012	RB5 dairy GP issued 12/10; RB1 issued GP 1/2012	Y[a]	see box below
Hawaii	9	1	0	None needed	TBD	none	Ips only	N	
Indian Country (R9)	9	1	0	not auth	N/A--no NPDES program authorization	none	n/a	N/A	
Nevada	9	9	6	2009	None needed (per State assessment)	none	Ips only	Y	
Alaska	10	0	0	no CAFOs	(no CAFOs)	none	n/a	N	
Idaho	10	365	103	not auth	N/A--State does not have NPDES program authorization	current GP administratively extended	planned 03/12	Y	Y
Oregon	10	114	114	TBD	None needed (per State assessment)	exp 5/31/14	issued 6/09	Y	
Washington	10	150	12	TBD	None needed (per State assessment)	exp 7/21/11	planned 12/12	Y	
TOTALS		18,540	7,642						

[1] All AFOs with numbers of animals above the size thresholds set out for large CAFOs are defined as CAFOs under the NPDES federal regulations. In some cases, such as Arkansas and Louisiana, the numbers have not yet been confirmed by the State.

[2] The NPDES CAFO regulations require CAFOs that discharge to have NPDES permit coverage (40 CFR 122.23(d)(1)). As a consequence, the portion of CAFOs in each State that need NPDES coverage can vary from State to State.

[3] Under the terms of federal NPDES regulations at 40 CFR 123.62(e), authorized States that need to revise their regulations to conform to updated federal regulations are allocated 1 year to complete the revisions; states that need statutory revisions to conform to amended federal regulations are allocated 2 years to complete the necessary revisions.

[4] Status indicated reflects current plans. In some cases, plans are still under discussion.

[a] Technical standards were submitted for each Regional Board with the exception of 2, 4, 6 and 9. These RBs either do not have CAFOs or do not have CAFOs that land apply manure.

[b] EPA is reviewing State technical standards to ensure they address the requirements of the 2008 rule. EPA is in the process of posting State standards that address the 2008 rule on the EPA website.

RB1 - no changes needed
RB3 - pending OWM/TT review
RB5 - no changes needed?
RB7 - submitted evaluation to RB staff
RB8 - submitted evaluation to RB staff

Exhibit 3

2021 NPDES CAFO Permitting Status Report

NPDES CAFO Permitting Status Report:
National Summary, Endyear 2021, completed 07/20/22
(as reported by EPA Regions)

State	EPA Region	Total CAFOs[1]	CAFOs with NPDES permits[2]
Alabama	4	558	487
Alaska	10	0	0
Arizona	9	115	1
Arkansas	6	776	0
California	9	1,083	141
Colorado	8	218	107
Connecticut	1	1	0
Delaware	3	604	186
Florida	4	100	58
Georgia	4	828	53
Hawaii	9	0	0
Idaho	10	365	0
Illinois	5	436	10
Indian Country (R7)	7	9	9
Indian Country (R8)	8	4	3
Indiana	5	873	0
Iowa	7	3,951	167
Kansas	7	430	430
Kentucky	4	150	2
Louisiana	6	250	4
Maine	1	6	5
Maryland	3	525	509
Massachusetts	1	0	0
Michigan	5	284	268
Minnesota	5	1,586	1,031
Mississippi	4	433	54
Missouri	7	514	51
Montana	8	99	99
Nebraska	7	1,540	490
Nevada	9	16	8
New Hampshire	1	1	1
New Jersey	2	2	2
New Mexico	6	171	21
New York	2	488	0
North Carolina	4	1,222	14
North Dakota	8	93	0
Ohio	5	277	23
Oklahoma	6	39	36
Oregon	10	125	355
Pennsylvania	3	415	415
Puerto Rico	2	0	0
Rhode Island	1	0	0
South Carolina	4	201	0
South Dakota	8	442	250
Tennessee	4	129	44
Texas	6	1,049	523
Utah	8	55	5
Vermont	1	35	0
Virgin Islands	2	0	0
Virginia	3	199	10
Washington	10	136	23
West Virginia	3	21	2
Wisconsin	5	340	326
Wyoming	8	43	43
TOTALS		21,237	6,266

[1] All AFOs with numbers of animals above the size thresholds set out for large CAFOs are defined as CAFOs under the NPDES federal regulations.

[2] NPDES CAFO regulations require CAFOs that discharge to have NPDES permit coverage (40 CFR 122.23(d)(1)). As a consequence, the portion of CAFOs that need NPDES coverage can vary from State to State.

Exhibit 4

Literature Review of Contaminants in Livestock and Poultry Manure and Implications for Water Quality

(excerpted: cover page, pages v, 5–10, 47–49)

Literature Review of Contaminants in Livestock and Poultry Manure and Implications for Water Quality

July 2013

Executive Summary

This *Literature Review of Contaminants in Livestock and Poultry Manure and Implications for Water Quality* was prepared by the United States Environmental Protection Agency (USEPA) as part of ongoing efforts to better understand the environmental occurrence and potential effects related to contaminants of emerging concern. Past reviews of animal manure have focused primarily on nutrient issues. This report focuses on summarizing technical information on other components, particularly pathogens and contaminants of emerging concern such as antimicrobials and hormones that may affect water quality. The report makes no policy or regulatory recommendations; it does identify information gaps that may help define research needs for USEPA and its federal, state and local partners to better understand these issues.

Over the past 60 years in the United States (U.S.), farm operations have become fewer in number but larger in size. This has been particularly true in livestock and poultry production. Since the 1950s, the production of livestock and poultry in the U.S. has more than doubled; however, the number of operations has decreased by 80%. Food animal production has shifted to more concentrated facilities with animals often raised in confinement. Production has also become more regionally concentrated. This has been done, in part, to meet the demands for meat and animal products from a growing human population in the U.S. and abroad.

The U.S. Department of Agriculture's (USDA) 2007 Census of Agriculture data are used to estimate beef and dairy cattle, swine, and poultry production. Using standard USDA methods, an estimated 2.2 billion head of livestock and poultry generated approximately 1.1 billion tons of manure in 2007. Manure can be a valuable resource as a natural fertilizer. However, if not managed properly, manure can degrade environmental quality, particularly surface water and ground water resources. The increasing concentration of animal production can lead to concentrations of manure that exceed the beneficial needs of the farmland where it was produced. A 2001 report from the USDA's Economic Research Service found that 60%-70% of the manure nitrogen and phosphorus may not be able to be assimilated by the farmland on which it was generated. As an example of the increasing concentration of production, from 1997 to 2007, the number of swine produced in the US increased by 45%, but the number of swine farms decreased by 30%; over 40% of all swine were produced in just two states, Iowa and North Carolina. Also illustrating the regionalization, Alabama, Arkansas, and Georgia account for over 30% of U.S. broiler (chicken) production.

Livestock and poultry manure can contain a variety of pathogens. Some are host-adapted and, therefore, not a health risk for humans. Others can produce infection in humans and are thus termed zoonotic. The more common zoonotic pathogens in manure include *Escherichia coli* 0157:H7, *Campylobacter*, *Salmonella*, *Cryptosporidium parvum*, and *Giardia lamblia*. Viruses can also be associated with manure, although less is known about their survival in manure. Survival of microorganisms in manure, soils, and water varies greatly (from days to as much as a year) depending upon the organism and the environmental conditions. Risks from manure-associated pathogens can arise when runoff, spills, or infiltration enable microorganisms to reach surface water or groundwater, or when land-applied manure, or irrigation water impacted by manure, comes into contact with food crops. The level of risk to humans depends upon a number of factors that dictate how readily the microorganisms are transported through the environment and how long they remain infectious, as well as the numbers of microbes and their infectious doses. Most outbreaks of waterborne and foodborne gastrointestinal illness, even those caused by zoonotic pathogens, are attributable to human fecal contamination, although agricultural sources have been implicated in a number of cases. With current surveillance, the degree to which manure-related pathogens may be involved in outbreaks is poorly understood due to difficulties in identifying etiologic agents and sources of contamination, and also because many cases of illness go unreported.

It is estimated that most (60%-80%) livestock and poultry routinely receive antimicrobials. Antimicrobials may be administered to treat and prevent diseases and outbreaks, or at sub-therapeutic levels to promote animal growth and feed efficiency. The U.S. Food and Drug Administration (USFDA) reported that 28.8 million pounds of antimicrobials were sold for animal use in 2009; some estimates suggest this is four times greater than what was used for human health protection during that same year. However, available data are

2. Distribution of Livestock, and Manure Generation and Management

2.1. Background

Livestock and poultry production in the U.S. has changed significantly since the 1960's, transitioning towards larger operations separated from the land base that produces their feed (Graham and Nachman 2010). Also, large operations now typically specialize in production of one animal type, often at one stage of its lifecycle (MacDonald and McBride 2009). For example, in swine production, hogs may be transferred from a farrow-to-feeder farm during the initial life stages, to a feeder-to-finish farm and finally to a slaughter plant, rather than being raised at one facility (MacDonald and McBride 2009). The majority of animals are also now raised in confinement where feed is brought to the animal rather than the animals seeking feed in a pasture or on the range (Ribaudo and Gollehon 2006).

Because of the shift in farming practices towards larger animal feeding operations, livestock and poultry production has become more regionalized, and large volumes of manure are oftentimes generated relative to smaller land areas for application (Gollehon et al. 2001). In some areas, the large quantity of manure generated by large operations relative to the small area available for land application magnifies the potential environmental and human health impacts associated with manure runoff and discharges to surface water and ground water.

- ✓ In 2007, 2.2 billion livestock generated an estimated 1.1 billion tons of manure (as excreted).
- ✓ In 1998, USEPA estimated that the livestock manure produced was 13 times greater than all the human sewage produced in the U.S.
- ✓ From 1997 to 2007, the number of swine produced in the U.S. increased by 45%, but the number of swine farms decreased by over 30%, resulting in more concentrated manure generation. Over 40% of all swine were produced in just two states: Iowa and North Carolina.
- ✓ Cattle (beef, dairy, and other) produce about 80% of all livestock manure in the U.S. – the top 10 producing states produce about 56% of the total.

The mass of manure generated is related to the mass, or size of the animals involved. For example, an average 160-pound human produces approximately two liters of waste per day (feces and urine), whereas an average 1,350-pound lactating dairy cow generates 50 liters of manure (including urine) per day (Rogers 2011). Most animal manure is applied to cropland or grasslands without treatment. Nutrients may be assimilated by the growing plants on cropland and grassland (Graham and Nachman 2010). Through manure storage, handling, and land application, the contaminants associated with manure (i.e., pathogens, antimicrobials, hormones, etc.; see Table 1-1) have the potential to enter the environment (Kumar et al. 2005, Lee et al. 2007, PCIFAP 2008).

2.2. Cattle, Poultry and Swine

This report uses USDA's 2007 Census of Agriculture livestock and poultry inventory counts to illustrate the distribution of the major animal types (beef and dairy cattle, swine, and poultry) in the U.S. and related manure generation. These tables presented below (and in Appendix 1), summarizing this information by state, are simply to provide perspective on the differences that are apparent around the U.S., and to provide insight on the magnitude of the issues at the state and regional level. These comparisons are made using standard conversion factors developed by the USDA's Natural Resources Conservation Service (NRCS); livestock and poultry counts were converted to animal units (AU), which are a unit of measure based on animal weight

(1 AU = 1,000 pounds live animal weight) (see for example Kellogg et al. 2000, Gollehon et al. 2001). For example, one beef cow or steer equals one AU, whereas it takes 250 layer chickens to equal one AU. The amount of manure generated is directly related to animal weight. Therefore, converting animal counts to AUs allows for the estimation of livestock manure generation and is also a method for standardizing farm operation size across livestock types (Gollehon et al. 2001). (For further information on AU and manure generation calculations, refer to Appendix 1). Several USDA and United States Geological Survey (USGS) reports (i.e., Kellogg et al. 2000, Gollehon et al. 2001, Ruddy et al. 2006) have calculated livestock manure generation using the 1997 USDA Census of Agriculture data. Their estimates, and those presented in this report, are very similar in number, scope, and perspective. (These reports, and this current report, all use the same basic conversion factors noted, but the USDA reports also incorporate more detailed livestock marketing data). The USDA and USGS reports present results at a more detailed scale (i.e., county, watershed, or farm-level manure production), and have been focused on nutrients and nutrient management. Livestock and poultry distribution and manure generation are summarized below (more complete and detailed state-by-state livestock inventories and estimates of manure generation are tabulated in Appendix 1).

In 2007, approximately 2.2 billion cattle, swine, and poultry were produced in the U.S. (USDA 2009a), generating an estimated 1.1 billion tons of manure (manure estimates used here are as excreted, wet-weight). Cattle include beef cattle, dairy cattle, and other cattle and calves (such as breeding stock). Swine include market hogs, which are sent to slaughter after reaching market weight, and breeder hogs, which are used for breeding purposes. Poultry includes chickens as broilers (raised for meat), and as layers (produce eggs), and turkeys. Note that the Census of Agriculture numbers do not account for all the marketing of animals that takes place during a year, and end-of-year 2007 counts were used for analyses. Different than cattle, poultry have a high turnover rate throughout the year. For example, broiler chickens are typically sent to slaughter after five to nine weeks (MacDonald and McBride 2009).

Table 2-1. Top ten states with the highest beef cattle production and associated manure generation in 2007.

National Rank	State	Total Beef Cattle AUs	Percent of Total Beef Cattle AUs*	Total Estimated Tons Manure
1	TEXAS	5,259,843	16.0%	60,488,195
2	MISSOURI	2,089,181	6.4%	24,025,582
3	OKLAHOMA	2,063,613	6.3%	23,731,550
4	NEBRASKA	1,889,842	5.8%	21,733,183
5	SOUTH DAKOTA	1,649,492	5.0%	18,969,158
6	MONTANA	1,522,187	4.6%	17,505,151
7	KANSAS	1,516,374	4.6%	17,438,301
8	TENNESSEE	1,179,102	3.6%	13,559,673
9	KENTUCKY	1,166,385	3.6%	13,413,428
10	ARKANSAS	947,765	2.9%	10,899,298
	Top Ten Subtotal	*19,283,784*	*59%*	*221,763,516*
	U.S. TOTAL	**32,834,801**		**377,600,212**

** Animal units (AUs) represent 1,000 pounds of live animal weight, or one beef cattle per AU (see Kellogg et al. 2000, Gollehon et al. 2001). See Appendix 1 for complete listing of all states. Reference: Inventory data from USDA 2009a.*

The changes in livestock and poultry production – the shift towards fewer, larger, more concentrated production facilities – has resulted in regional and local differences in the distribution of the 2.2 billion animals raised in the U.S. These differences will in turn relate to differences in the issues involved in manure management and the potential for environmental impacts of various contaminants. For example, beef cattle are produced predominantly in the Great Plains and Midwest. According to USDA's 2007 Census of Agriculture, Texas alone accounts for 16% of U.S. beef cattle production with an estimated 60.5 million tons of manure generated – two and a half times greater than the amount generated by the second largest beef cattle producing state (Table 2-1). In contrast, swine are largely produced in Iowa and North Carolina, accounting for 27% and 16%, respectively, of total U.S. production (Table 2-2). Broiler production is predominantly based in the southern and eastern U.S., with Georgia, Arkansas, and Alabama accounting for nearly 30% of U.S. production. An estimated 20.3 million tons of manure from broiler chickens was generated in those three states in 2007 (Table 2-3).

Table 2-2. Top ten states with the highest total swine (market and breeder hogs) production and associated manure generation in 2007.

National Rank	State	Total Swine AUs	Percent of Total Swine AUs*	Total Estimated Tons Manure
1	IOWA	2,409,994	27.0%	31,912,337
2	NORTH CAROLINA	1,382,252	15.5%	17,056,820
3	MINNESOTA	999,762	11.2%	12,767,962
4	ILLINOIS	607,844	6.8%	7,289,960
5	INDIANA	486,599	5.5%	6,140,286
6	NEBRASKA	462,548	5.2%	5,543,892
7	MISSOURI	435,930	4.9%	5,252,950
8	OKLAHOMA	367,821	4.1%	4,140,186
9	KANSAS	256,349	2.9%	3,171,100
10	OHIO	243,700	2.7%	3,066,558
	Top Ten Subtotal	*7,652,800*	*86%*	*96,342,051*
	U.S. TOTAL	**8,910,943**		**111,256,177**

** Animal units (AUs) represent 1,000 pounds of live animal weight (see Kellogg et al. 2000, Gollehon et al. 2001). See Appendix 1 for complete listing of all states. Reference: Inventory data from USDA 2009a.*

Manure management is inherently a local issue, related to the number and type of animals, the land base for application of the manure, the type of operations (i.e., confined feeding operations), and many management factors. Detailed information on all these factors is more difficult to come by, and such estimates are not the purpose or within the scope of this report. (The USDA's Census of Agriculture also does not provide this information (Gollehon et al. 2001)). However, in 2002, a comprehensive review of state livestock production programs was conducted on behalf of USEPA to provide estimates of the number of Animal Feeding Operations (AFOs) and Concentrated Animal Feeding Operations (CAFOs) in each state (Tetra Tech, Inc. 2002). According to that study, the states that had the most AFOs with more than 1,000 AUs were Iowa, North Carolina, Georgia, and California.

Table 2-3. Top ten states with the highest broiler chicken production and associated manure generation in 2007.

National Rank	State	Total Broiler AUs	Percent of Total Broiler AUs*	Total Estimated Tons Manure
1	GEORGIA	517,363	14.7%	7,744,926
2	ARKANSAS	444,830	12.6%	6,659,104
3	ALABAMA	391,953	11.1%	5,867,541
4	MISSISSIPPI	330,982	9.4%	4,954,799
5	NORTH CAROLINA	329,498	9.4%	4,932,592
6	TEXAS	260,686	7.4%	3,902,473
7	MARYLAND	143,964	4.1%	2,155,138
8	DELAWARE	112,291	3.2%	1,680,999
9	KENTUCKY	109,399	3.1%	1,637,707
10	MISSOURI	102,537	2.9%	1,534,984
	Top Ten Subtotal	*2,743,505*	*78%*	*41,070,264*
	U.S. TOTAL	**3,522,083**		**52,725,576**

** Animal units (AUs) represent 1,000 pounds of live animal weight, or 455 broilers per AU (see Kellogg et al. 2000, Gollehon et al. 2001). See Appendix 1 for complete listing of all states. Reference: Inventory data from USDA 2009a.*

While manure use and management is a local issue, the state data can also provide some illustrations and valuable perspectives. Table 2-4 summarizes the top ten states related to manure production (this is the sum of the AUs for all livestock, swine, and poultry, and the estimated manure production, as excreted; see Appendix 1). As might be expected, the list is comprised of the major agricultural states, including Texas, Iowa, and California. Texas accounts for about 12% of the AUs and manure produced in the U.S. Total AUs and manure are dominated by beef and dairy numbers because of their body size. Nationally, cattle were responsible for nearly 83% of total livestock manure generation in 2007, followed by swine (10%) and poultry (7%). Refer to Appendix 1 for complete livestock and poultry production and manure generation tables.

As discussed, many of the concerns for environmental impacts of manure generation relate to settings where there is a large mass of manure but a relatively small land base for application of the manure. Even at the state level, these differences can be illustrated. The top livestock states, such as Texas, California, and Iowa (Table 2-4) also have large areas of farm land. Presenting total manure generation on a farmland area basis paints a different picture. Table 2-5 shows the state level estimate for tons of manure generated per farmland acre. Smaller states along the eastern seaboard rise to the top of the list; these states are key poultry and swine producing states but have far more limited farmland than the major farm states. (This tabulation divides the total estimated manure for livestock and poultry by the acreage for "land in farms" from the 2007 Census of Agriculture (USDA 2009a). "Land in farms" is defined by the USDA (2009a) as primarily agricultural land used for grazing, pasture, or crops, but it may also include woodland and wasteland that is not under cultivation or used for grazing or pasture, provided it is on the farm operator's operation. This is an oversimplification at the state level: land in farms is an overestimate of the actual land likely available for application of manure; manure as excreted is likely an overestimate of the mass of manure to be handled, dependent on the management practice. However, it illustrates the differences that are inherent in the distribution of the different types of livestock and poultry settings around the U.S.

Table 2-4. Top ten livestock and poultry manure producing states in 2007.

National Rank	State	Total AUs	Percent of Total U.S. Manure	Total Estimated Tons Manure
1	TEXAS	11,109,770	11.5%	128,048,896
2	CALIFORNIA	5,235,439	6.2%	68,496,143
3	IOWA	5,586,515	6.1%	68,360,493
4	NEBRASKA	5,235,899	5.3%	59,100,556
5	KANSAS	4,932,902	5.0%	55,792,510
6	OKLAHOMA	4,571,012	4.7%	52,036,892
7	MISSOURI	4,178,962	4.3%	48,070,611
8	WISCONSIN	3,213,092	3.8%	42,531,594
9	MINNESOTA	3,268,570	3.6%	39,816,914
10	SOUTH DAKOTA	3,179,772	3.3%	36,358,712
	U.S. TOTAL	**92,969,509**		**1,113,232,385**

** Data estimated from USDA's 2007 Census of Agriculture livestock counts converted to animal units, following USDA's NRCS methodology. Reference: USDA 2009a.*

Table 2-5. Top ten states with the highest manure generation in 2007 on a farmland area basis.

National Rank	State	Estimated Tons Manure/Acre Farmland*
1	NORTH CAROLINA	3.85
2	DELAWARE	3.81
3	VERMONT	3.05
4	PENNSYLVANIA	2.99
5	WISCONSIN	2.80
6	CALIFORNIA	2.70
7	NEW YORK	2.66
8	MARYLAND	2.23
9	VIRGINIA	2.22
10	IOWA	2.22

** Refer to Appendix 1 for further description on livestock manure generation calculations. Reference: USDA 2009a.*

The way in which livestock and poultry are raised differs by animal type as well as the size of the production facility. Chapter 8 provides further information on manure management programs and strategies. Beef cattle tend to be raised outdoors in pens or corrals, where the manure accumulates and is scraped up along with any bedding materials and soil (in pens), stored in a facility, or stockpiled until it can be land applied on or off-site (USEPA 2009a). In larger, concentrated operations, drainage ditches may flow through beef cattle operations, discharging stormwater, manure, animal feed, bedding materials, and other waste to a nearby collection pond or lagoon (Gullick et al. 2007). Dairy cows may be housed in tie stall barns, free stall barns, or outdoor open lots (USEPA 2009b). Dairy cow manure may be scraped from indoor barns and temporarily stored in a solid stack in steel or concrete tanks, or flushed from barn surfaces and discharged to lagoons (Zhao et al. 2008). Swine are typically housed over slatted floors, allowing manure to be washed down and routinely flushed out of the housing facility (Gullick et al. 2007). Swine manure may be flushed to an underground pit (57% of operations), a lagoon (23% of operations), or another storage area, like a manure pile (20% of operations)

(USDA 2002a). Poultry, including broilers, layers, and turkeys, are almost always raised indoors with manure accumulating and mixing with bedding material (Zhao et al. 2008). Most layers are housed in elevated cages, allowing manure to accumulate below or drop onto a conveyer belt that removes the manure from the building (Gullick et al. 2007). Manure from layers is typically washed from the housing facility to a storage pit (Zhao et al. 2008).

Swine and dairy cow production, in particular, have become increasingly concentrated. Between 1997 and 2007, there was a 33% decrease in the number of swine farms yet a 45% increase in the number of swine processed (USDA 2009a). As shown in Table 2-2, 86% of all U.S. swine production in 2007 occurred in the top ten swine producing states, and the top five states alone account for over two-thirds of U.S. production. From 1997 to 2007 there was a 44% decrease in the number of dairy farms in the U.S., yet the number of dairy cows has remained relatively level, increasing by 1% during that time period (USDA 2009a).

2.3. Aquaculture

Aquaculture is a unique component of commercial animal production, very directly related to water resources, and it is also discussed in this report where information is available. The aquaculture sector of U.S. agriculture has been steadily increasing, with a rise in demand for seafood coinciding with declining wild fish and shellfish populations; in providing controlled conditions it may offer production advantages of selective breeding as well as improved disease control (Cole et al. 2009). The USDA's 2005 Census of Aquaculture reported over 4,300 aquaculture farms in the U.S., covering nearly 700,000 acres (USDA 2006). Aquaculture operations may be either freshwater or saltwater, producing an array of aquatic organisms. Aquaculture products include food fish (e.g., catfish, salmon, carp), sport fish (e.g., bass, crappie, walleye), ornamental fish (e.g., goldfish, koi), baitfish (e.g., crawfish, fathead minnows), crustaceans (e.g., crawfish, lobsters, shrimp), mollusks (e.g., mussels, oysters), aquatic plants, and other animals (e.g., alligators, snails, turtles) (USDA 2006). According to the USDA's Aquaculture Census, production in 2005 was situated predominantly in the southern U.S., with Louisiana having the highest total number of freshwater and saltwater operations, as well as the most acres used for aquaculture (USDA 2006). Related to regionalized production and larger but fewer farms, in 2005, the top ten states alone accounted for 95% of the total U.S. aquaculture acreage (see Table 2-6), but less than 50% of the nation's aquaculture farms (refer to Appendix 1 for a complete table).

Catfish production was the dominant commodity in U.S. aquaculture in 2005, with nearly one-third of production occurring in Mississippi (USDA 2006). Trout were the second largest commodity – the majority of which were produced in Idaho (USDA 2006). Catfish are typically raised in ponds, while trout are often reared in flow-through raceways. As defined by the USDA's 2005 Aquaculture Census, flow-through raceways are long, narrow, confined structures in which the water flows into one end and exits the other (USDA 2006). Raceways can be closed systems, in which water flows through a series of ponds prior to discharging into a headwater pond that flows back into the system, or they can be directly linked with a river or stream, using the natural flow to flush water through the system and back into a stream.

Waste produced in aquaculture consists of feces, excess feed, dead fish and other aquatic organisms, nutrients, antibiotics, hormones, pesticides, anesthetics, minerals, vitamins, and pigments (Gullick et al. 2007, Cole et al. 2009). As reviewed by Amirkolaie (2011), up to 15% of feed may be uneaten or spilled, and between 60% and 80% of dietary dry matter may be excreted in intensive aquaculture operations. Aquaculture waste may be managed by removing solids from the water via a settling basin or filtration system, after which the solids may be composted or applied to cropland as fertilizer (Gullick et al. 2007).

6. Potential Manure-Related Impacts

Manure from livestock and poultry is a source of a number of contaminants including nutrients, pathogens, hormones, and antimicrobials (see Table 1-1). As reviewed in the previous chapters, these contaminants have been detected in manure and environmental media such as soil, sediment, and water resources near livestock and poultry operations. Manure can be viewed as a source of nutrients to water, and it may be related to the development of harmful algal blooms (HABs) in some cases. HABs can produce cyanotoxins – also contaminants of emerging concern. The purpose of this chapter is to review the potential and documented human health and ecological impacts associated with these contaminants. This is not a comprehensive discussion of human health issues related to manure and livestock and poultry operations. Additional health issues for people living in the vicinity of large animal feeding operations or working in livestock and poultry operations and handling manure are associated with air quality (see Donham et al. 2007, Merchant et al. 2005, Mirabelli et al. 2006, PCIFAP 2008).

6.1. Harmful Algal Blooms and Cyanotoxin Production

Nitrogen and phosphorus (nutrients) are perhaps the most widely researched pollutants from livestock and poultry manure. Nutrients from manure may reach surface water and ground water through runoff from pasture and cropland, infiltration through soil, or volatilization during manure decomposition leading to atmospheric deposition of nitrogen (Jordan and Weller 1996, Bouwman et al. 1997, Aneja et al. 2001). Nutrients are necessary for all biological growth, but excess nutrients may lead to eutrophication in aquatic ecosystems. Characterized in part by excessive algal growth and potentially harmful algae blooms (HABs), eutrophication can alter the biology, chemistry, and aesthetic quality of the waterbody. HABs can also produce toxins, which may be harmful to wild animals and aquatic life as well as to humans and pets when exposed to them from drinking water supplies or recreational waters (see Grand Lake St. Marys case study) (Lopez et al. 2008).

Manure-Related Harmful Algal Blooms in Grand Lake St. Marys, Ohio

Grand Lake St. Marys (GLSM) is a public drinking water supply in Ohio that has experienced recurring HABs since 2009 related to livestock manure runoff and nutrient loading (OEPA 2009). The watershed is 90% agricultural, with nearly 300,000 animal units of poultry, swine, and cattle. The HABs have caused fish kills, waterfowl and pet deaths, and have also been linked to over 20 cases of human illness. The state of Ohio has issued recreation, boating, and fish consumption advisories related to the blooms. The $150 million annual lake-based recreational and tourism industries have been compromised, park revenues have decreased by more than $250,000 per year, and several lakeside businesses have closed. To date, millions of state, federal, and local dollars had been leveraged toward lake restoration and watershed management projects. Technical assistance and funding programs have also been developed to minimize manure runoff to the lake. (References: OEPA 2007, OEPA 2009, OEPA 2011, Gibson 2011).

While livestock and poultry manure contributes nutrients to the environment, there have been limited cases where manure has been documented as the primary cause of HABs and associated formation of cyanotoxins. Additionally, livestock and poultry manure must be placed in context relative to all the nutrients used in agricultural production. The National Research Council (NRC) estimated nitrogen and phosphorus balances for croplands by USDA Region and for the U.S. The NRC reported that in the U.S., 45% of nitrogen and 79% of phosphorus inputs to cropland may be attributed to synthetic fertilizers, whereas 8% of nitrogen and 15% of phosphorus inputs are from livestock and poultry manure (NRC 1993). However, because manure production is more localized (refer to Chapter 2), associated nutrient contributions can be higher in particular watersheds. For example, a USGS study found that animal manure was the primary

source of nitrogen in several Mid-Atlantic and southern watersheds, contributing 54% and 56% of total nitrogen loads to the Susquehanna River in Pennsylvania and the White River in Arkansas, respectively (Puckett 1994).

The majority of HABs in freshwater in the U.S. and throughout the world are caused by cyanobacteria, commonly referred to as blue-green algae. USEPA's 2007 National Lakes Assessment found that microcystin, a hepatotoxin produced by cyanobacteria that is harmful to animals and humans, was detected in approximately one third of the lakes studied (USEPA 2010b). It is important to note that the presence of cyanobacteria is not necessarily an indication of cyanotoxins because not all cyanobacteria, and not all blooms produce toxins. Table 6-1 reviews the various types of nuisance and harmful algae, the toxins they can produce, and the associated adverse human health and aquatic life impacts.

Table 6-1. Types of harmful or nuisance inland algae, toxin production, and potential adverse impacts.

Algae Group	Genera/Taxa	Toxins	Potential Adverse Impacts
Cyanobacteria	Anabaena, Aphanocapsa, Hapalosiphon, Microcystis, Nostoc, Oscillatoria, Planktothrix, Nodularia spumigena, Aphanizomenon, Cylindrospermopsis, Lyngbya, Umezakia	Hepatotoxins, neurotoxins, cytotoxins, dermatoxins, endotoxins, respiratory and olfactory irritant toxins	• Human and animal health impacts (i.e., gastrointestinal disorders, liver inflammation/failure, tumor promotion, cardiac arrhythmia, skin irritation, respiratory paralysis, etc.) • Water discoloration • Unpleasant odors and aesthetics • Hypoxia from high biomass blooms • Taste and odor problems in drinking water and in farm-raised fish
Haptophytes	Prymnesium parvum, Chrysochromulina polylepis	Ichthyotoxins	• Fish mortalities
Chlorophytes, Microalgae	Volvox, Pandorina	--	• Water discoloration • Localized hypoxia
Macroalgae	Cladophora	--	• Unpleasant odors and aesthetics • Localized hypoxia • Clogged water intakes
Euglenophytes	Euglena sanguinea	Ichthyotoxins	• Water discoloration • Fish mortalities
Raphidophytes*	Chattonella	Ichthyotoxins	• Fish mortalities
Dinoflagellates	Peridinium polonicum	Ichthyotoxins	• Fish mortalities
Cryptophytes	Cryptomonas, Chilomonas, Rhodomonas, Chroomonas, Hemiselmis, Proteomonas, Teleaulax$^{\Omega}$	--	• Water discoloration • Localized hypoxia
Diatom	Didymosphenia geminata	--	• Produce large quantities of extracellular stalk material resulting in ecosystem and economic impacts

** Raphidophytes are a marine algae, but can bloom in inland saline waters*
Ω Information from Marin et al. (1998).
Adapted from Lopez et al. 2008.

6.2. Fish Kills

Manure discharges to surface waters have been implicated in fish kills nationwide (Mulla et al. 1999). Such discharges can be caused by rain events, equipment failures (e.g., lagoon ruptures/leaks), or the application of manure to frozen ground or to tile drained fields, and subsequent discharges to surface waters. Fish mortalities from runoff containing manure may be caused by ammonia toxicity and/or oxygen depletion with large loadings of manure.

In Minnesota, a top swine producing state, an estimated 20 manure spills occur annually, one of which involved 100,000 gallons of liquid hog manure washing into Beaver Creek, killing nearly 700,000 fish (DeVore 2002). Similarly, in Lewis County, New York, millions of gallons of manure from a dairy CAFO spilled from a lagoon in 2005, contaminating approximately 20 miles of the Black River and killing approximately 375,000 fish (NYSDEC 2007). In 1995, spills from poultry and swine lagoons entered Cape Fear River basin in North Carolina, causing fish kills, algal blooms, and microbial contamination (Mallin and Cahoon 2003). Osterburg and Wallinga (2004) reported over 300 manure spills within ten years in Iowa alone, 24% of which were caused by manure storage overflow and equipment failures. Large livestock and poultry operations often store large volumes of untreated manure in lagoons, which can rupture or overflow, leading to a greater potential for fish kills (Armstrong et al. 2010). Between 1995 and 1998 alone, there were an estimated 1,000 manure spills at animal feedlots in ten states and 200 manure-related fish kills in the U.S. (Marks 2001). Proper management and maintenance of lagoons and minimization of winter land application of manure will help prevent manure discharges to surface waters.

6.3. Antimicrobial Resistance

Antimicrobials are typically administered to livestock therapeutically for disease treatment, control, and prevention, as well as sub-therapeutically for growth promotion (refer to Chapter 3) (Kumar et al. 2005). The USFDA estimates that 29.2 million lbs. of antimicrobials were sold for livestock and poultry use in 2010 (USFDA 2011a). The use of antimicrobials in livestock and poultry has been increasing over the past four decades (Pérez and Barceló 2008). This increase is partly related to the shift towards fewer, larger confined animal facilities, which may increase disease susceptibility among livestock because the livestock are routinely in close contact (Pérez and Barceló 2008). The overuse and/or misuse of antimicrobials (in general) can facilitate the development and proliferation of antimicrobial resistance (i.e., when bacteria have the ability to survive exposure to certain types of antimicrobials) (Levy and Marshall 2004). Research conducted by the WHO and others suggest that antimicrobial use in livestock and poultry, which is typically administered at low doses for extended periods of time for sub-therapeutic purposes, has contributed to the prevalence of antimicrobial-resistant pathogens found in food animal operations and nearby environments (WHO 2000, Swartz 2002, Hayes et al. 2004, Levy and Marshall 2004, Nelson et al. 2007, USGAO 2011a). However, antimicrobial resistance can develop in a number of ways, and while resistant infections in humans have been linked to livestock and poultry production (Swartz 2002), the relationship between livestock and poultry antimicrobial use and resistant infections in humans is not well understood. This section focuses on antimicrobial resistance and the potential human health implications. Note that research also indicates that antimicrobials are toxic to aquatic life; this topic has been reviewed elsewhere (e.g., Sanderson et al. 2004, Kümmerer 2009a and 2009b) and is not the focus of this chapter.

Exhibit 5

Understanding Concentrated Animal Feeding Operations and Their Impact on Communities

(excerpted: cover page, pages 4–5, 8–9)

ENVIRONMENTAL HEALTH

Understanding Concentrated Animal Feeding Operations and Their Impact on Communities

NALBOH
National Association of Local Boards of Health

Whiting, 2007). Contaminated groundwater can move laterally and eventually enter surface water, such as rivers or streams.

When groundwater is contaminated by pathogenic organisms, a serious threat to drinking water can occur. Pathogens survive longer in groundwater than surface water due to lower temperatures and protection from the sun. Even if the contamination appears to be a single episode, viruses could become attached to sediment near groundwater and continue to leach slowly into groundwater. One pollution event by a CAFO could become a lingering source of viral contamination for groundwater (EPA, 2005).

Groundwater can still be at risk for contamination after a CAFO has closed and its lagoons are empty. When given increased air exposure, ammonia in soil transforms into nitrates. Nitrates are highly mobile in soil, and will reach groundwater quicker than ammonia. It can be dangerous to ignore contaminated soil. The amount of pollution found in groundwater after contamination depends on the proximity of the aquifer to the CAFO, the size of the CAFO, whether storage units or pits are lined, the type of subsoil, and the depth of the groundwater.

If a CAFO has contaminated a water system, community members should be concerned about nitrates and nitrate poisoning. Elevated nitrates in drinking water can be especially harmful to infants, leading to blue baby syndrome and possible death. Nitrates oxidize iron in hemoglobin in red blood cells to methemoglobin. Most people convert methemoglobin back to hemoglobin fairly quickly, but infants do not convert back as fast. This hinders the ability of the infant's blood to carry oxygen, leading to a blue or purple appearance in affected infants. However, infants are not the only ones who can be affected by excess nitrates in water. Low blood oxygen in adults can lead to birth defects, miscarriages, and poor general health. Nitrates have also been speculated to be linked to higher rates of stomach and esophageal cancer (Bowman, Mueller, & Smith, 2000). In general, private water wells are at higher risk of nitrate contamination than public water supplies.

Surface Water

The agriculture sector, including CAFOs, is the leading contributor of pollutants to lakes, rivers, and reservoirs. It has been found that states with high concentrations of CAFOs experience on average 20 to 30 serious water quality problems per year as a result of manure management problems (EPA, 2001). This pollution can be caused by surface discharges or other types of discharges. Surface discharges can be caused by heavy storms or floods that cause storage lagoons to overfill, running off into nearby bodies of water. Pollutants can also travel over land or through surface drainage systems to nearby bodies of water, be discharged through manmade ditches or flushing systems found in CAFOs, or come into contact with surface water that passes directly through the farming area. Soil erosion can contribute to water pollution, as some pollutants can bond to eroded soil and travel to watersheds (EPA, 2001). Other types of discharges occur when pollutants travel to surface water through other mediums, such as groundwater or air.

Contamination in surface water can cause nitrates and other nutrients to build up. Ammonia is often found in surface waters surrounding CAFOs. Ammonia causes oxygen depletion from water, which itself can kill aquatic life. Ammonia also converts into nitrates, which can cause nutrient overloads in surface waters (EPA, 1998). Excessive nutrient concentrations, such as nitrogen or phosphorus, can lead to eutrophication and make water inhabitable to fish or indigenous aquatic life (Sierra Club Michigan Chapter, n.d.). Nutrient over-enrichment causes algal blooms, or a rapid increase of algae growth in an aquatic environment (Science Daily, n.d.). Algal blooms can cause a spiral of environmental problems to an aquatic system. Large groups of algae can block sunlight from underwater plant life, which are

habitats for much aquatic life. When algae growth increases in surface water, it can also dominate other resources and cause plants to die. The dead plants provide fuel for bacteria to grow and increased bacteria use more of the water's oxygen supply. Oxygen depletion once again causes indigenous aquatic life to die. Some algal blooms can contain toxic algae and other microorganisms, including *Pfiesteria*, which has caused large fish kills in North Carolina, Maryland, and the Chesapeake Bay area (Spellman & Whiting, 2007). Eutrophication can cause serious problems in surface waters and disrupt the ecological balance.

Water tests have also uncovered hormones in surface waters around CAFOs (Burkholder et al., 2007). Studies show that these hormones alter the reproductive habits of aquatic species living in these waters, including a significant decrease in the fertility of female fish. CAFO runoff can also lead to the presence of fecal bacteria or pathogens in surface water. One study showed that protozoa such as *Cryptosporidium parvum* and *Giardia* were found in over 80% of surface water sites tested (Spellman & Whiting, 2007). Fecal bacteria pollution in water from manure land application is also responsible for many beach closures and shellfish restrictions.

Air Quality

In addition to polluting ground and surface water, CAFOs also contribute to the reduction of air quality in areas surrounding industrial farms. Animal feeding operations produce several types of air emissions, including gaseous and particulate substances, and CAFOs produce even more emissions due to their size. The primary cause of gaseous emissions is the decomposition of animal manure, while particulate substances are caused by the movement of animals. The type, amount, and rate of emissions created depends on what state the manure is in (solid, slurry, or liquid), and how it is treated or contained after it is excreted. Sometimes manure is "stabilized" in anaerobic lagoons, which reduces volatile solids and controls odor before land application.

The most typical pollutants found in air surrounding CAFOs are ammonia, hydrogen sulfide, methane, and particulate matter, all of which have varying human health risks. Table 1 on page 6 provides information on these pollutants.

Most manure produced by CAFOs is applied to land eventually and this land application can result in air emissions (Merkel, 2002). The primary cause of emission through land application is the volatilization of ammonia when the manure is applied to land. However, nitrous oxide is also created when nitrogen that has been applied to land undergoes nitrification and denitrification. Emissions caused by land application occur in two phases: one immediately following land application and one that occurs later and over a longer period as substances in the soil break down. Land application is not the only way CAFOs can emit harmful air emissions—ventilation systems in CAFO buildings can also release dangerous contaminants. A study by Iowa State University, which was a result of a lawsuit settlement between the Sierra Club and Tyson Chicken, found that two chicken houses in western Kentucky emitted over 10 tons of ammonia in the year they were monitored (Burns et al., 2007).

Most studies that examine the health effects of CAFO air emissions focus on farm workers, however some have studied the effect on area schools and children. While all community members are at risk from lowered air quality, children take in 20-50% more air than adults, making them more susceptible to lung disease and health effects (Kleinman, 2000). Researchers in North Carolina found that the closer children live to a CAFO, the greater the risk of asthma symptoms (Barrett, 2006). Of the 226 schools that were included in the study, 26% stated that there were noticeable odors from CAFOs outdoors, while 8% stated

Because CAFOs typically produce malodors, many communities want to monitor emissions and odors. Quantifying odor from industrial farming can be challenging because it is a mixture of free and particle-bound compounds, which can make it hard to identify what specifically is causing the odor. Collecting data on specific gases, such as hydrogen sulfide, can be used as a proxy for odor levels.

CAFO odors can cause severe lifestyle changes for individuals in the surrounding communities and can alter many daily activities. When odors are severe, people may choose to keep their windows closed, even in high temperatures when there is no air conditioning. People also may choose to not let their children play outside and may even keep them home from school. Mental health deterioration and an increased sensitization to smells can also result from living in close proximity to odors from CAFOs. Odor can cause negative mood states, such as tension, depression, or anger, and possibly neurophysciatric abnormalities, such as impaired balance or memory. People who live close to factory farms can develop CAFO-related post traumatic stress disorder, including anxiety about declining quality of life (Donham et al., 2007).

Ten states use direct regulations to control odors emitted by CAFOs. They prohibit odor emissions greater than a set standard. States with direct regulations use scentometers, which measure how many times an odor has to be doused with clean air before the smell is undetectable. An additional 34 states have indirect methods to reduce CAFO odors. These include: setbacks, which specify how far CAFO structures have to be from other buildings; permits, which are the most typical way of regulating CAFOs; public comment or involvement periods; and operator or manure placement training.

Insect Vectors

CAFOs and their waste can be breeding grounds for insect vectors. Houseflies, stable flies, and mosquitoes are the most common insects associated with CAFOs. Houseflies breed in manure, while stable and other flies breed in decaying organic material, such as livestock bedding. Mosquitoes breed in standing water, and water on the edges of manure lagoons can cause mosquito infestations to rise. Flies can change from eggs to adults in only 10 days, which means that substances in which flies breed need to be cleaned up regularly.

Flies are typically considered only nuisances, although insects can agitate livestock and decrease animal health. The John Hopkins Bloomberg School of Public Health found evidence that houseflies near poultry operations may contribute to the dispersion of drug-resistant bacteria (Center for Livable Future, 2009). Since flies are attracted to and eat human food, there is a potential for spreading bacteria or pathogens to humans, including microbes that can cause dysentery and diarrhea (Bowman et al., 2000). Mosquitoes spread zoonotic diseases, such as West Nile virus, St. Louis encephalitis, and equine encephalitis.

Residences closest to the feeding operations experience a much higher fly population than average homes. To lower the rates of insects and any accompanying disease threats, standing water should we cleaned or emptied weekly, and manure or decaying organic matter should be removed twice weekly (Purdue Extension, 2007). For more specific insect vector information, please refer to NALBOH's vector guide (*Vector Control Strategies for Local Boards of Health*).

Pathogens

Pathogens are parasites, bacterium, or viruses that are capable of causing disease or infection in animals or humans. The major source of pathogens from CAFOs is in animal manure. There are over 150 pathogens in manure that could impact human health. Many of these pathogens are concerning because

they can cause severe diarrhea. Healthy people who are exposed to pathogens can generally recover quickly, but those who have weakened immune systems are at increased risk for severe illness or death. Those at higher risk include infants or young children, pregnant women, the elderly, and those who are immunosuppressed, HIV positive, or have had chemotherapy. This risk group now roughly compromises 20% of the U.S. population.

Table 2 Select pathogens found in animal manure.

Pathogen	Disease	Symptoms
Bacillus anthracis	Anthrax	Skin sores, headache, fever, chills, nausea, vomiting
Escherichia coli	Colibacilosis, Coliform mastitis-metris	Diarrhea, abdominal gas
Leptospira pomona	Leptospirosis	Abdominal pain, muscle pain, vomiting, fever
Listeria monocytogenes	Listerosis	Fever, fatigue, nausea, vomiting, diarrhea
Salmonella species	Salmonellosis	Abdominal pain, diarrhea, nausea, chills, fever, headache
Clostirdum tetani	Tetanus	Violent muscle spasms, lockjaw, difficulty breathing
Histoplasma capsulatum	Histoplasmosis	Fever, chills, muscle ache, cough rash, joint pain and stiffness
Microsporum and *Trichophyton*	Ringworm	Itching, rash
Giardia lamblia	Giardiasis	Diarrhea, abdominal pain, abdominal gas, nausea, vomiting, fever
Cryptosporidium species	Cryptosporidosis	Diarrhea, dehydration, weakness, abdominal cramping

Sources of infection from pathogens include fecal-oral transmission, inhalation, drinking water, or incidental water consumption during recreational water activities. The potential for transfer of pathogens among animals is higher in confinement, as there are more animals in a smaller amount of space. Healthy or asymptomatic animals may carry microbial agents that can infect humans, who can then spread that infection throughout a community, before the infection is discovered among animals.

Exhibit 6

EPA Legal Tools to Advance Environmental Justice

(excerpted: cover page, pages 74–75)

MAY 2022

EPA Legal Tools to Advance Environmental Justice

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- Ensure that information regarding regulated facility compliance status is publicly available and easily accessible (e.g., improve EPA Environmental Compliance History Online, "ECHO").

An example of how environmental justice factors could be considered in the NPDES permitting program is the memorandum entitled "Improving EPA Review of Appalachian Surface Coal Mining Operations under the Clean Water Act, National Environmental Policy Act, and the Environmental Justice Executive Order" (Surface Coal Mining Memorandum).[291] That memorandum, which was issued on July 21, 2011, provides guidance regarding how to apply the current regulatory and statutory requirements of the NPDES permitting program to surface coal mining projects in Appalachia. The guidance is intended to enhance the consideration of environmental justice when EPA Regional Offices are conducting oversight of the relevant authorized state NPDES programs. The guidance encourages States to evaluate whether an activity to be covered by a proposed NPDES permit would result in a disproportionate human health or environmental effect on low-income or minority populations and directs the Regions to ensure opportunities for meaningful engagement in the permitting process by nearby communities, including low-income and minority populations, by ensuring broad dissemination of permitting documents, EPA analyses and comment letters, and other materials.

IV. SECONDARY TREATMENT-THE TECHNOLOGY-BASED STANDARD APPLICABLE TO POTWs

If the Office of Water were to find that effluent from publicly owned treatment works, (POTWs) disproportionately affects communities of concern, EPA could consider revising the secondary treatment regulations applicable to POTWs. The CWA requires technology-based requirements as a minimum, and application of more stringent limits necessary to meet water quality standards.[292] For POTWs, under § 301(b)(1)(B), the Act requires effluent limitations "based on secondary treatment" as defined by the Administrator under § 304(d) of the Act.[293] Section 304(d) of the Act states that the Administrator, "after consultation with appropriate Federal and State agencies and other interested persons, shall publish within sixty days after October 18, 1972, (and from time to time thereafter) information, in terms of amounts of constituents and chemical, physical, and biological characteristics of pollutants, on the degree of effluent reduction attainable through application of secondary treatment."[294] The current secondary treatment requirements contain limits on Biochemical Oxygen Demand (BOD), Suspended Solids (SS), and pH but contain no limits on nutrients or pathogens /pathogen indicators.

V. ADDITIONAL REQUIREMENTS FOR CONCENTRATED ANIMAL FEEDING OPERATIONS

A CAFO is a "point source" under § 502(14) of the CWA.[295] Large AFOs above a certain

[291] https://www.epa.gov/sites/default/files/2016-09/documents/final_mtm_guidance_-_signed.pdf.
[292] 33 U.S.C. § 1311(b).
[293] 33 U.S.C. § 1311(b)(1)(B).
[294] Congress considered but removed a provision under § 301(b)(2)(B) that would have created a level of control analogous to BAT for POTWs; 33 U.S.C. § 1314(d).
[295] 33 U.S.C. § 1362(14).

size threshold are automatically deemed CAFOs.[296] Many CAFOs are not regulated and continue to discharge without NPDES permits because successive court decisions have severely limited EPA's ability to require CAFOs to obtain an NPDES permit.[297] While many waters are affected by pollutants from CAFOs, many CAFOs often claim that they do not discharge, and EPA and state permitting agencies lack the resources to regularly inspect these facilities to assess these claims, particularly since discharges often only occur during certain weather conditions. In addition, the regulations contain definitions, thresholds and limitations that make it difficult to compel permit coverage, limit the discharge of pollutants under certain circumstances, and enforce requirements even when discharges have been established. EPA is aware of a growing body of literature suggesting that the communities disproportionately impacted by CAFOs are communities of color and economically disadvantaged communities.

EPA could explore its authority to improve the effectiveness of the CAFO regulations in a number of ways, including: redefining animal feeding operations and concentrated animal feeding operation to be more inclusive; limiting the agricultural stormwater exemption such that it applies only after water quality-based requirements have been implemented; requiring specific mandatory BMPs that include treatment requirements as appropriate, for both production and land application areas; and requiring discharge monitoring.

EPA could also work within the existing CAFO regulatory framework to designate more AFOs as CAFOs. EPA regulations at 40 C.F.R. § 122.23(c) authorize the State Director or Regional Administrator in some circumstances to designate an AFO below the definitional size threshold as a CAFO upon a determination that it is a significant contributor of pollutants to waters of the United States.[298] The regulations list factors to be considered in designating CAFOs, including "[o]ther relevant factors."[299] Although EPA has not yet exercised its CAFO designation authority to a significant extent, EPA could focus its efforts to increase designations near communities with environmental justice concerns. Such designation currently requires an onsite inspection and, if the AFO contains fewer than a specified number of animals, a determination that pollutants are discharged to waters of the United States through a manmade ditch, flushing system, or other similar manmade device or that pollutants are discharged directly into waters of the United States that originate outside the facility and pass over, across or through the facility or otherwise come into contact with the animals confined in the operation.[300]

VI. WET WEATHER PROGRAMS AND REQUIREMENTS

Heavy precipitation and wet weather can have a big impact on communities with environmental justice concerns, especially in urban centers and even more so due to the effects of climate change. Combined sewer overflows (CSOs) are discharges from combined sewer systems that are designed to collect rainwater runoff, domestic sewage, and industrial wastewater in the same pipes. They are subject to NPDES permit requirements, including both technology-based and water quality-based requirements of the CWA.[301] Sanitary Sewer Overflows (SSOs) are discharges from sanitary sewer systems that collect and transport sewage

[296] 40 C.F.R. § 122.23(a)–(b).
[297] *See, e.g.*, *National Pork Producers' Council v. EPA*, 635 F.3d 738, 751 (5th Cir. 2011) (holding that EPA could only require CAFOs to apply for a permit that would "actually discharge.")
[298] 40 C.F.R. § 122.23(c).
[299] 40 C.F.R. § 122.23(c)(2)(v).
[300] 40 C.F.R. § 122.23(c)(3).
[301] 33 U.S.C. §§ 1311(b)(1)(A), (b)(2)(A); 33 U.S.C. §§ 1342(p), (q).

Exhibit 7

NPDES Permit Writers' Manual for Concentrated Animal Feeding Operations

(excerpted: cover page, pages 4-36, 5-30, 6-16)

United States
Environmental Protection
Agency

NPDES Permit Writers' Manual for Concentrated Animal Feeding Operations

EPA 833-F-12-001

February 2012

U.S. Environmental Protection Agency | Office of Water | Office of Wastewater Management

A water quality-based effluent limitation is designed to ensure that state or tribal water quality standards are met. Federal regulations require permit limitations to control all pollutants that could be discharged at a level that will cause, have the reasonable potential to cause, or contribute to an excursion above any state water quality standard. 40 CFR §§ 122.4(d), 122.44(d). That includes, where appropriate, water quality-based effluent limitations for the production area, land application area, and all other discharges covered by the permit.

Requirements for the Production Area of Large CAFOs

The permit writer may determine the need to establish more restrictive requirements for the production area. Even for CAFOs subject to a no-discharge, technology-based standard for the production area, situations could arise where the permitting authority needs to impose more stringent requirement for allowable discharges. Specifically, more stringent discharge limitations are necessary in instances where CAFOs discharge from a production area to a waterbody listed under CWA section 303(d) as impaired due to nutrients, dissolved oxygen or bacteria, or where an analysis of frequency, duration and magnitude of the anticipated discharge (consisting of potential overflows of manure, litter, or process wastewater) indicates the reasonable potential to violate applicable water quality standards.

The imposition of a water quality-based effluent limitation could necessitate a more stringent standard or the inclusion of additional management practices. Examples of such practices include additional storage capacity beyond that required by technology-based limits, monitoring the water quality of the waterbody and monitoring the extent of impairment where a discharge occurs, and installing an impermeable lining in a lagoon or storage pond.

Requirements for the Land Application Area of Large CAFOs

As discussed in Section 4.1.7, all permitted CAFOs are required to develop and implement an NMP. When a permitted CAFO implements an NMP in accordance with its permit requirements, any remaining precipitation related discharges of manure are considered agricultural stormwater, as discussed in Section 4.1.8. For Large CAFOs subject to the ELG, that also means that the NMP must comply with permit requirements that implement the ELG, including technical standards established by the Director for nutrient management. For facilities not subject to the ELG, it means that the NMP must comply with permit requirements that implement 40 CFR part 122.42(e) and any additional nutrient management requirements developed by BPJ. As previously mentioned, by definition, the agricultural stormwater exemption applies only to precipitation-related discharges. Any other discharges from the land application area allowed by the permit may be subject to more stringent water-quality based requirements (unless they are exempted irrigation return flows), as appropriate, to protect water quality. Those may be included in the permit as water-quality based effluent limits. They might also be addressed through the development of more protective technical standards for land application.

conservation practices at 40 CFR part 122.42(e)(1)(viii) specifically identifies setbacks and buffers as conservation practices that are expected be included in an NMP. In addition to not applying manure in the required setback, CAFOs should also not apply manure in the following areas or under the following conditions:

- Near or in wetlands, riparian buffer areas, water resources, wells, drinking water supplies, high slope areas, and high erosion areas.
- Within concentrated water flow areas (vegetated or non-vegetated) such as ditches, waterways, gullies, swales, and intermittent streams.
- When the hydraulic load/irrigation water exceeds the infiltration rate of the soil.
- When crops are not being grown.
- When the ground is frozen or snow-covered.
- When measurable precipitation is occurring on the day of application.

The permit authority may include these types of requirements as technology-based standards.

Any other conservation practice included in the NMP should be identified as a site-specific permit term if the practice is necessary to meet any of the requirements associated with 40 CFR part 122.42(e)(1) or if the practice influences the *outcome of the field-specific risk assessment of the potential for nitrogen and phosphorus transport from each field* and, consequently, the application rate (for a detailed discussion on the *outcome of the field-specific risk assessment of the potential for nitrogen and phosphorus transport from each field,* see Chapter 6.5.1). If the NMP includes other conservation practices that do not control the risk of nutrient runoff and do not affect nutrient runoff, permit writers should not include those conservation practices as a term of the permit. In general, non-nutrient control practices should be considered enhancements, rather than provisions required for compliance with the applicable regulations, unless they actually do affect nutrient runoff. Conversely, such practices should not be allowed if they impermissibly facilitate runoff that is not accounted for in the NMP. Other types of conservation practices that might be included in a CAFO's NMP are discussed in Section 5.8.3 below.

Site-specific permit terms for this requirement should include the identification of the specific practice(s) that are used and the location in the production area and/or land application area (as identified in the NMP map(s) or other sources) where the conservation practice(s) are implemented to control nutrient runoff. Where applicable, O&M should also be included as part of the site-specific terms. Specific O&M procedures are often required for a practice to function efficiently throughout its expected life span. NRCS conservation practice standards may include specific O&M requirements for certain practices. For example, O&M requirements for filter strips (code 393) include harvesting, weed control, inspection and repair after storm events, and other procedures to maintain species composition, stand density, and functionality of the filter strip. Where the NRCS standard does not include specific O&M requirements, the permit writer should add these as permit terms where appropriate to do so.

The ELG does not establish national requirements prohibiting manure application to frozen, snow-covered, or saturated ground, or before forecasted rain. Runoff associated with such application could depend on a number of site-specific variables, including soil type, topographic variability (i.e., slope of the land), and distance to waters of the U.S. States are better able to tailor their technical standards to reflect the site-specific conditions that warrant prohibitions or limitations on manure applications to frozen, snow-covered, or saturated ground, or before forecasted rain. In general, EPA strongly encourages states to prohibit application to frozen, snow-covered, or saturated ground, and when the forecast calls for rain in an amount that is likely to produce runoff because crops are unable to utilize the nutrients during such conditions and, therefore, typically results in runoff of nutrients. For additional guidance on addressing winter spreading, see Appendix G, Winter Spreading Technical Guidance and Appendix E, Minimum Depth of Rain at Which Runoff Begins.

If technical standards for nutrient management do not prohibit manure application on frozen, saturated, or snow covered ground, the *protocols for land application* under those circumstances should account for the form of the manure to be applied (e.g., liquid, semi-solid, or dry manure), the time at which the manure would be applied relative to periods when runoff may occur, the fraction of precipitation that runs off the land in melt water and in response to winter rains (as affected, in part, by whether soil is frozen), the time it takes runoff to travel to waters of the U.S. (as affected by the slope of the land, distance to waters, roughness of the land surface, and whether runoff is in contact with land surface), and other relevant factors, as appropriate.

Flexibility to Implement Nutrient Management Practices

Technical standards for nutrient management can allow certain flexibilities for implementing nutrient management practices. 40 CFR § 412.4(c)(2)(i). The CAFO regulations specifically allow for the *consideration of multi-year phosphorus application* on fields that do not have a high risk for phosphorus runoff to waters of the U.S. Id. Multi-year phosphorus application is an approach that allows a single application of manure phosphorus to be applied at a rate equal to the recommended phosphorus application rate or phosphorus removal in harvested plant biomass for the crop rotation for multiple years in the crop sequence. However, under any multi-year phosphorus application, the rate at which manure nutrients are applied cannot exceed the annual nitrogen recommendation of the year of application. 68 FR 7,210 (Feb. 12, 2003). The field must also not receive additional phosphorus until the amount applied in the single year has been removed through plant uptake and harvest. 40 CFR § 412.4(b)(3).

Additional Standards

While the state's technical standards need to be detailed in addressing the form, source, amount, timing and method of application for the use of each form of manure nutrients, they may also contain additional requirements that the state chooses to address. Those could include specific requirements that address animal feed management, additional soil testing (i.e., nitrogen testing requirements), implementing specific BMPs (i.e., cover crops), or any other practices the state

Exhibit 8

Nutrient Management Planning: Is it the Answer to Better Management?

(excerpted: pages 171 and 176)

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Nutrient management planning: Is it the answer to better management?

R. Shepard

ABSTRACT: Agricultural nutrient management is an important part of water resources protection strategies, especially in the upper Midwest. In Wisconsin, nutrient management plans are thought to reduce the excess application of agrichemicals, such as nitrogen and phosphorus, on cropland. A survey of 127 farmers, representing 90 percent of the farmers in two northeastern Wisconsin watersheds where nutrient management plans had been extensively promoted documented the application of nitrogen (N) and phosphorus (as P_2O_5) and the extent to which those farmers follow nutrient management plans. Results indicate that farmers with nutrient management plans do apply lower rates of total N and P_2O_5 compared to farmers without plans, however, the existence of a plan does not necessarily lead to the elimination of excess nutrient applications. Furthermore, there is minimal difference between public agency plans and those supported by the private sector in Wisconsin. Results from this study are useful in developing more effective public policy, and especially conservation programs that encourage the adoption of nutrient management plans.

Keywords: Farmer adoption, fertilizers, nitrogen, nutrient management planning, phosphorus, water quality

Nonpoint source pollution is the primary cause of reduced water quality in the United States (USEPA, 1996, 2000; USGS, 1999). Agriculture is recognized as the leading source of water quality degradation, causing 59 percent of the impaired river and stream miles, and 31 percent of the impaired lake acreage (USEPA, 2000). The greatest impacts may be from excessive nitrogen and phosphorus inputs (USEPA, 1993, 2000; USDA-ERS, 2000; USGS, 1999). These nutrients can increase algae and macrophyte growth, which can create anoxic conditions as these organisms ultimately decompose (USEPA, 1993; 2000).

In the United States, producers apply approximately 19 million tons of nitrogen and four million tons of phosphorus each year in the form of commercial fertilizers and livestock manure (USGS, 1999). From 1990 to 1995, more than half the acres for specific crops (cotton, corn, potato, and wheat) in chief agricultural states had high nitrogen mass balances, where the nitrogen inputs were more than 25 percent greater than the nitrogen outputs (USDA-ERS, 2000). Similarly, estimated phosphorus inputs (fertilizers and feed) exceed the outputs (crop and livestock) by 70 percent (cited in Sharpley, et al., 1999).

In 1987, Congress amended the Clean Water Act to provide the states with additional federal support for nonpoint source pollution initiatives under the section 319 Nonpoint Source Management Program. Proposed national policies include USDA and USEPA's Unified National Strategy for Animal Feeding Operations and USEPA's Strategy for Addressing Environmental Public Health Impacts from Concentrated Animal Feeding Operations (USDA and USEPA, 1999). In addition, all permitted livestock operations are required to have a comprehensive nutrient management plan (CNMP) by 2009 (USEPA, 2000, 2002; USDA and USEPA, 1999).

In Wisconsin, nonpoint source pollution has been identified as a major cause of water

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on merely writing them, but also on helping farmers overcome the barriers to their implementation.

Study results show implementation of current nutrient management plans is far from fully achieved, and the evolution to phosphorus (P)-based CNMPs would require even more follow up assistance to farmers. The complexity of P-based plans, and because so few farmers currently credit on-farm sources of P_2O_5, will make widespread success difficult, possibly unrealistic. Given the information and education needs associated with implementing a plan, it may be more effective to work extensively with a few farmers in targeted areas that are determined to be more susceptible to nutrient loss (Eghball and Power, 1999; Heathwaite, et al., 2000; Nowak and Cabot, 2004).

Although tremendous effort has gone into federal and state programs to protect water resources from nonpoint sources of pollution by promoting and/or requiring a nutrient management plan, just having a NMP does not reduce excess nutrient application nor does it guarantee improvements in water quality. Only half of the farmers with a nutrient management plan in the studied watershed actually credit on-farm manure nitrogen and only three-fourths implement their nutrient management plans on the majority of the acres it covers. Therefore, support beyond the development of the nutrient management plan should include on-farm follow-up by providing assistance aimed at long-term implementation, plan maintenance, and plan modifications due to changes in the farming operation over time. This study shows that nutrient management plans can influence N and P_2O_5 application rates and reduce the threat of nonpoint sources of pollution. However, if the agencies that promote nutrient management plans assume that each plan is fully implemented, the intended widespread environmental benefits will not be fully realized.

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Exhibit 9

Addressing Externalities From Swine Production to Reduce Public Health and Environmental Impacts

(excerpted: pages 1703–1704)

Addressing Externalities From Swine Production to Reduce Public Health and Environmental Impacts

Animal agriculture in the United States for the most part has industrialized, with negative consequences for air and water quality and antibiotic use. We consider health and environmental impacts of current US swine production and give an overview of current federal, state, and local strategies being used to address them. (*Am J Public Health.* 2004;94:1703–1708)

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ONE OUTCOME OF THE industrialization and concentration of animal agriculture is that the vast majority of animals now raised for food in the United States live within concentrated animal feeding operations (CAFOs). This change has imposed costs on society, the full dimensions of which are only beginning to be appreciated. In this article, we consider some of the health and environmental impacts as economic "externalities" and give an overview of current federal, state, and local strategies being used to address them.

ECONOMIC EXTERNALITIES AND ANIMAL AGRICULTURE

Today's livestock and poultry facilities produce more animals, in more specialized buildings, on less acreage per animal than ever before. In 1966, 57 million hogs lived on 1 million American farms; by 2001, roughly the same number of hogs were on just over 80 000 farms, and fewer than 5000 farms accounted for more than half of all hogs produced in the United States.[1,2] The largest hog operations average 16.7 hogs per acre, the smallest just 1.4 hogs per acre.[2]

CAFO operations have also become more specialized. In Iowa, the largest producer state, 70% of farms had hogs as part of their farming operations in the 1960s, compared with approximately 12% in 2000.[3] Until the late 1980s, a typical hog farm raised fewer than 1000 animals from farrow (birth) to finish (ready for slaughter), and feed was from crops largely grown on-farm. Now it is common to have 4000 sows within a single breeding facility, each sow producing litter after litter. After early weaning, "feeder" piglets by the thousands are moved to "finisher" barns, where in 6 months as many as 12 000 pigs grow from about 50 to 250 pounds before being slaughtered. Industrialization also means that food animals have been largely brought indoors, and grain and other feedstuffs must be imported by the ton to serve them.

Manure waste must be disposed of, also by the ton. Manure from confined animal operations is 3 times the nation's volume of human waste.[4] Because it is uneconomical to transport for any distance, manure typically is stored in pits under buildings, or in lagoons adjacent to buildings, and later is applied to nearby fields. However, the largest CAFO facilities typically lack sufficient acreage to absorb manure nutrients. According to a survey by the US Department of Agriculture (USDA), "Large operations tend to view manure as a waste rather than a resource and dispose of it on land closest to the facility. For example, the 6% of farms larger than 1000 animal units [approximately 2500 market hogs] were estimated to generate 65% of the excess nitrogen and 68% of excess phosphorus in 1997."[2] Excess nutrients are those that exceed the nutritional needs of cropland.

The Environmental Protection Agency (EPA) reserves the term CAFO for animal feeding operations of at least 1000 animal

units, for example, 2500 large pigs or 100 000 chickens. We use CAFO to describe any concentrated animal feeding operation. Manure excess is an important public health issue. Excess nitrogen in drinking water may contribute to human disease. Manure contains pathogens that can cause severe gastrointestinal disease and complications, even death. Concentrations of manure can lead to elevated levels of toxic gases, like hydrogen sulfide and ammonia, resulting from manure degradation. Finally, manure can contain arsenic and other heavy metal compounds, as well as antibiotics, that are routinely added to animal feeds. Manure and manure-related contaminants readily move off-site in water and air.

In economic terms, air and water pollutants from CAFOs are classic externalities. Reservoirs of antibiotic resistance, to which CAFOs using antibiotic feeds clearly contribute, also are an externality. Each externality entails costs that are not directly borne (i.e., not internalized) by food animal producers and signals a market distortion or inefficiency.

Welfare economics theory assumes that markets would improve if these costs or externalities were more explicitly incorporated into a CAFO owner's decisions. Theoretically, producers could be forced to reduce pollution or to pay others to directly compensate for the external costs imposed on them.[5] Alternatively, those harmed by pollution could pay producers to take steps to avoid or reduce the pollution. In real life, the former typically occurs via government regulation under threat of fines or court action, whereas the latter might occur through subsidies offered by government agencies (such as the USDA) assumed to be acting on behalf of members of society who bear the brunt of the costs. Three kinds of externalities are described below, along with possible policy responses.

Water Quality and CAFOs

Current farming practices are responsible for 70% of the pollution in the nation's rivers and streams.[6] Although sediment, nutrients, and pesticides make up much of this water contamination, manure is a large contributor because there is so much of it. An EPA inventory of water pollution problems finds that "improperly managed manure has caused serious acute and chronic water quality problems throughout the United States."[4(p7176)]

Microbes break down the nitrogen in manure into nitrate, and studies have found both waste lagoons and cropland application of manure correlate with groundwater nitrate levels.[7] Infants and others drinking nitrate-contaminated water can develop methemoglobinemia, or "blue-baby syndrome," a potentially fatal condition. An estimated 4.5 million Americans drink water from wells containing nitrates above the 10 mg/L standard set by the EPA to prevent this disease.[8]

Three microbes commonly found in livestock—*Escherichia coli, Campylobacter,* and *Cryptosporidium*—have caused serious disease outbreaks via contaminated drinking water. In 1993, manure runoff from dairy feedlots along rivers contributing to Milwaukee's water supply was implicated in a *Cryptosporidium* outbreak in that city, the nation's largest waterborne disease event to date. Over 400 000 persons fell ill with diarrhea, cramps, fever, and vomiting, and at least 54 died.[9,10]

CAFO-related water pollution can stem from manure lagoon spills or leaks, from direct runoff from buildings, and from fields where manure has been applied. Rare lagoon breaches capture brief public attention: in 1995, after hurricane rains, 2 lagoons burst in North Carolina, releasing 34 million gallons of animal waste into nearby water bodies.[11] But manure spills and leaks are commonplace; indeed, the latter are expected. State laws in Iowa, for example, authorize a legal leakage rate for a 7-acre manure lagoon of up to 16 million gallons annually. Moreover, one Iowa study found that more than half of the manure storage structures tested leaked at rates above the legal limit.[12] There are approximately 5600 such structures in the state. The Environmental Integrity Project report documented 329 manure spills in Iowa between 1992 and 2002. For 307 spills for which the cause was known, failure or overflow of manure storage structures accounted for 24% of the spills (Table 1). Other important causes were uncontrolled runoff from open feedlots, improper manure application on cropland, and equipment failures. Surprisingly, 18 spills, or 6%, were from deliberate actions such as pumping manure onto the ground or deliberate breeches in storage lagoons.[13]

Besides effects on local water bodies, the nitrogen and phosphorus from spills and other nonpoint loadings can exert downstream impacts. Hypoxia is one consequence of Midwest nutrient application. In this context, hypoxia is used to mean the lowering of dissolved oxygen in a water body to levels that cannot support most animal life. Hypoxia occurs each summer in the Northern Gulf of Mexico, when decomposing organic material consumes more oxygen than the system generates through photosynthesis. As oxygen levels drop, marine organisms grow more slowly. As levels drop further, mobile organisms leave the area, and finally those that remain die. Fishers who harvest shrimp in the Gulf have

TABLE 1—Determined Causes of 307 Major Iowa Manure Spills: 1992–2002

Identified Causes	No. Spills	Percentage of Total
Failure or overflow of manure storage structures	74	24
Uncontrolled runoff from open feedlots	56	18
Improper application to cropland	43	14
Equipment failure	73	24
Deliberate spills (pumping manure to the ground; deliberate breaches in storage lagoons, etc.)	18	6
Other (e.g., transportation accidents)	43	14
Total	307	100

Source. Merkel M.[13] Data are from 3 Iowa Department of Natural Resources (IDNR) databases: IDNR Fish Kill Database; IDNR Enforcement Database, and IDNR Emergency Response Database.

Exhibit 10

Air Quality Issues and Animal Agriculture: A Primer

(excerpted: page 8)

standards established by states, limits on effluent discharges, and permits.[11] The regulatory structure of the CWA distinguishes between point sources (e.g., manufacturing and other industrial facilities which are regulated by discharge permits) and nonpoint sources (pollution that occurs in conjunction with surface erosion of soil by water and surface runoff of rainfall or snowmelt from diffuse areas such as farm and ranch land). Most agricultural activities are considered to be nonpoint sources, since they do not discharge wastes from pipes, outfalls, or similar conveyances. Pollution from nonpoint sources is generally governed by state water quality planning provisions of the act.

However, the CWA defines large animal feeding operations that meet a specific regulatory threshold number of animals (termed concentrated animal feeding operations (or CAFO); they are a small percentage of all animal feeding operations) as point sources and treats CAFOs in a manner similar to other industrial sources of pollution. They are subject to the act's prohibition against discharging pollutants into waters of the United States without a permit. In 2003, EPA revised regulations that were first promulgated in the 1970s defining the term CAFO for purposes of permit requirements and specifying effluent limitations on pollutant discharges from regulated feedlots. The 2003 rules were challenged in federal court, and parts of the regulations were remanded to EPA for revision and clarification. As a result, EPA issued revised regulations in 2008.[12]

These regulations are intended to address the concern that animal waste, if not properly managed, can adversely impact the environment through several possible pathways, including surface runoff and erosion, direct discharges to surface waters, spills and other dry-weather discharges, leaching into soil and groundwater, and releases to air (including subsequent deposition back to land and surface waters). The primary pollutants associated with animal wastes are nutrients (particularly nitrogen and phosphorus), organic matter, solids, pathogens, and odorous/volatile compounds. Data collected for the EPA's 2004 National Water Quality Inventory identify agriculture as the leading contributor to water quality impairments in rivers and lakes and the third leading contributor to impaired lakes (after atmospheric deposition and "other"). Animal feeding operations are only a subset of the agriculture category, but states identified animal feeding operations and grazing as significant contributors to water quality impairment.[13]

The CWA CAFO rule applies to approximately 15,300 of the largest animal feeding operations that confine cattle, dairy cows, swine, sheep, chickens, laying hens, and turkeys, or less than 10% of all animal confinement facilities in the United States. The rule details requirements for permits, annual reports, and development of plans for handling manure and wastewater. The rule contains a performance standard which prohibits discharges from regulated CAFOs except in the event of wastewater or manure overflows or runoff from an exceptional 25-year, 24-hour rainfall event. Parts of the rule are intended to control land application of animal manure and wastewater.

Scientists recognize that actions taken to mitigate harmful water quality impacts of managing animal waste can have implications for air quality, in complex ways that are not perfectly

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[11] For additional information on the Clean Water Act, see CRS Report RL30798, *Environmental Laws: Summaries of Major Statutes Administered by the Environmental Protection Agency*, coordinated by David M. Bearden.

[12] For additional information, see CRS Report RL33656, *Animal Waste and Water Quality: EPA's Response to the Waterkeeper Alliance Court Decision on Regulation of CAFOs*, by Claudia Copeland.

[13] U.S. Environmental Protection Agency, *National Water Quality Inventory, 2004 Report*, January 2009, EPA-841-R-08-001, 1 vol.

Exhibit 11

Iowa Department of Natural Resources
Manure Discharge Chart

Iowa Department of Natural Resources

Manure Discharge Chart

Facility Name	Facility Number	Spill Number	City	Type of Facility	Animal Unit Type	Animal Unit Number	Date of Discharge	Water Impacted	Restitution/Investigative Amount	Restitution Paid	Enforcement	Penalty Amount	Penalty Paid	Remedy
Vernon Van Beek	66251		Inwood	Open Feedlot	Cattle	990	6/1/12	Dry Run Creek	N/A	N/A	Attorney General 5/22/14	$12,000	6/17/14	Facility had a NPDES Permit at the time of the discharge.
Darwin Reick	56695		Blairstown	Open Feedlot	Cattle	700	10/24/12	Prairie Creek	$4,719.02	5/30/14	ACO 1/31/14	$4,750	5/30/14	Grassed water waterway reseed and new monitoring for the basin. No NPDES permit required.
City View Farms	60334		Sutherland	Combined	Dairy Cattle	15,500	May-13	Waterman Creek	N/A	N/A	ACO 1/28/14	$10,000	1/6/14	Facility had a NPDES Permit at the time of the discharge. Required to plug pipe and remove buried culvert.
Dry Creek Farms	64489		Rock Valley	Combined	Dairy Cattle	1,575	5/28/13	Dry Creek	N/A	N/A	ACO 2/28/14	$5,000	3/4/14	Required to apply for an NPDES permit. Application has been received and draft permit on review
K&D Farmyards	60404		Sioux Center	Combined	Cattle	14,000	5/30/13	Unnamed Tributary of Six Mile Creek	N/A	N/A	ACO 7/1/14	$9,000	6/30/14	Facility had a NPDES Permit at the time of the discharge. Facility was required to ensure runoff control structures were constructed properly.
Douglas Reimer	62815		Guttenberg	Confinement	Swine	805	6/28/13	South Cedar Creek	N/A	N/A	ACO 2/4/14	$6,000	2/12/14	Correction Action Plan followed. No NPDES permit required.
John Fluit Jr.	56833		Inwood	Open Feedlot	Cattle	4,000	8/29/13	Unnamed Creek and Stock Pond	N/A	N/A	ACO 5/19/14	$9,000	6/9/04	Facility had a NPDES Permit at the time of the discharge.
James Koedam	56658		Doon	Open Feedlot	Cattle	450	9/2/13	Little Rock River	$1,775.85	3/13/14	ACO 3/17/14	$5,000	3/13/14	Install new tile and a pumping system. No NPDES permit required.
Marvin VanMaanen	57034		Doon	Open Feedlot	Cattle	800	9/2/13	Little Rock River	$1,775.85	3/19/14	ACO 3/24/14	$5,000	3/19/14	Install new pump system and berm improvements. No NPDES permit required.
Grant Wells	N/A		Fonda	Confinement	Swine	300	9/16/13	Big Cedar Creek	$22,149.09	Payment Plan - On Schedule	ACO 6/22/14	$1,500.00	Payment Plan - on Schedule	Facility repaired basin. No NPDES permit required.
High Plains Dairy	60531		Sanborn	Confinement	Dairy Cattle	3,920	9/30/13	No water - dry creek bed	N/A	N/A	ACO 3/10/14	$5,000	3/17/14	Facility improvements including lights and dialer. Increased size of berm. No NPDES permit required.
Roanoke L.L.C.	6211		Audubon	Confinement	Swine	1,665	10/30/13	Unnamed Tributary of Beaver Creek	N/A	N/A	Notice of Violation Issued	N/A	N/A	Dam was constructed to prevent discharge downstream and then manure was removed . No NPDES Permit required.
The Maschoffs	60129		Keosauqua	Confinement	Swine	2,996	11/4/13	No water - dry creek bed	N/A	N/A	ACO 2/6/14	$10,000	3/12/14	Hire consultant and repair piping and connections. No NPDES permit required.
Windy Ridge LLC	64470		North English	Confinement	Swine	992	11/11/13	Unnamed Dry Creek Bed	N/A	N/A	Notice of Violation issued	N/A	N/A	Containment dam constructed, flushed water out of for land application, cut off septic drain pipe and raised the PVC riser to a level higher than the pit. No NPDES Permit required
Dairy Venture	63902		Central City	Confinement	Dairy Cattle	910	12/3/13	Unnamed Tributary of Wapsipinicon River	$1,294.58	2/10/14	ACO 4/18/14	$3,000	4/14/14	Improve the sand lane with new control and monitoring. No NPDES permit required
Iowa Select 3	60688		Dows	Confinement		1,600	1/21/14	Drainage Ditch #213	N/A	N/A	Notice of Violation issued	N/A	N/A	Contaminated water was pumped and the tile was flushed. No NPDES permit required
Roger Schwieger	56551		Armstrong	Combined	Cattle	900	3/11/14	Silage stockpile discharge to tributary of Iowa Lake	N/A	N/A	Notice of Violation Issued	N/A	N/A	Stockpile was removed eliminating the possibility of future discharges. No NPDES permit required
Brenneman Pork	58768		Washington	Confinement	Swine	3,719	3/19/14	Entered Tile Intake, but did not reach water of the state	N/A	N/A	N/A	N/A	N/A	Small amount of manure entered tile intake; tile was bermed and the manure was removed. The manure did not go anywhere but the tile intake. No NPDES Permit required
E&M Farms	66910		Ossian	Confinement	Dairy Cattle	600	3/18/14	Dry Branch Creek	N/A	N/A	EPA Enforcment	$7,500		EPA established Remedy, contact EPA for document
Galen Wagner	68186		Osage	Open Feedlot	Cattle	580	4/30/14	Spring Creek	N/A	N/A	ACO 12/23/14	$6,500	1/21/15	Reduced number of animals below 300. Constructed additional earthen basins and raised height of concrete walls in exisiting basins. No NPDES permit required.
Johannes Boehlen	64879		Brooklyn	Confinement	Dairy Cattle	2,320	5/4/14	Big Bear Creek	N/A	N/A	Notice of Violation issued	N/A	N/A	Submitted engineering work plan. Created emergency spillway, improved storage, and added more concrete areas from stockpile and drain sand. No NPDES permit required.
Brian Peterson	57143		Sioux City	Combined	Cattle	24,950	6/16/14	Big Whisky Creek	N/A	N/A	AO 12/1/14	$10,000	2/3/15	Facility had a NPDES Permit at the time of the discharge.
Morris Feedyards	56383		Wesley	Open Feedlot	Cattle	2,500	6/17/14	Tile Intake, but no impact to a water of the state	N/A	N/A	Notice of Violation Issued	N/A	N/A	Construct runoff controls to eliminate the discharge. No NPDES permit required.
Farm Nurients LLC	N/A		Titonka	Chicken Manure Stockpile	N/A	N/A	7/25/14	Buffalo Creek	N/A	N/A	ACO 6/2/15	$5,000	6/23/15	Remove all remaining stockpile and discontinue the use of the stockpile. No NPDES permit required
Summit Dairy (John Westra)	64241	081614-BMM-1600	Primghar	Combined	Dairy Cattle	1,671	8/16/14	Mill Creek	$162,495.46	Payment Plan - On Schedule	AO 9/14/15	$10,000	Payment Plan - on Schedule	Settlement 6/1/16

Iowa Department of Natural Resources

Manure Discharge Chart

Jeff Pottebaum	67608	no spill report	Alton	Combined	Cattle and Swine	1,060	8/16/14	Willow Creek	N/A	N/A	ACO 1/7/15	$4,000	1/12/15	Improved buffer and added an additional berm. No NPDES permit required
Nathan Tentinger	63496	082214-KAH-1200	Cleghorn	Combined	Cattle	4,500	8/22/14	Unnamed Dry Creek Bed	N/A	N/A	Notice of Violation issued	N/A	N/A	Facility had a NPDES Permit at time of the discharge
MLS Legacy, LLLP	62098	082714-DJA-1100	Laurel	Confinement	Swine	1,600	8/27/14	Unnamed Tributary of Alloway Creek	$348.28	5/5/15	ACO 3/30/15	$7,850	5/5/15	Record manure levels weekly; remove all fans; and develop and implement employee SOP for manure releases. No NPDES permit required.
Adams Dairy	N/A	090314-SJM-1300	Garnavillo	Combined	Dairy Cattle	260	9/3/14	Buck Creek	$28,267.49	Payment Plan - On Schedule	ACO 5/20/15	$6,000	Payment Plan - on Schedule	Converted half of free stall barn to dry bedded to reduce the liquid manure. Reduced the number of animals at the facility and provided more area for manure to be applied. No NPDES permit required
Daniel Muhlbauer	66277	no spill report	Manilla	Open Feedlot	Cattle	999	9/5/14	Unnamed Tributary of West Nishnabotna River	N/A	N/A	AO 9/29/15	$7,000	6/13/16	Settlement 6/8/16
Brian Roorda	59250	091414-ADW-1000	Maurice	Combined	Dairy Cattle	2,810	9/14/14	Orange City Slogh Creek and West Branch of the Floyd River	$35,000	7/28/15	ACO 7/2/15	$5,500	7/28/15	Develop Plan of Action tp prevent future discharges. No NPDES permit required
William and Jeff Lawler	68362	no spill report	Peosta	Combined	Dairy Cattle	390	9/15/14	Unnamed Tributary of Little Maquoketa River	$1.118.31	3/24/16	AO 9/14/15	$6,000	3/24/16	Settlement 2/9/16
Van Meter Feedyard	56251	100214-ETO-1545	Guthrie Center	Open Feedlot	Cattle	14,000	10/2/14	Unnamed Tributary	N/A	N/A	ACO 9/22/15	$1,000	9/29/15	Facility already has a NPDES Permit
Andy Nagel	68333	102714-WCG-1542	Allerton	Open Feedlot	Dairy Cattle	83	10/27/14	Unnamed Tributary of Medicine Creek	N/A	N/A	ACO 10/14/15	$1,000	1/12/16	Construct containment and second berm around existing lagoon. No NPDES permit required
Smith Ag, Inc.	1253CMS	103114-CMG-2301	Osage	Certifed Manure Applicator	N/A	N/A	10/27/14	Unnamed Tributary of Little Cedar River	$4,075.37	6/12/15	ACO 6/17/15	$1,500	6/12/15	Develop and Implement SOP for employees for manure handling. No NPDES Permit required
LDR Ranch	61679	111214-JPR-1834	Harper	Confinement	Swine	670	11/12/14	Clear Creek	N/A	N/A	ACO 2/25/15	$4,100	2/25/15	Develop and Implement SOP for employees for manure handling. No NPDES Permit required
Hand Nutrient Management	N/A	111214-DHB-1030	Williams	Certified Manure Applicator	N/A	N/A	11/12/14	Entered Tile Line, but did not reach drainage ditch	N/A	N/A	Notice of Violation issued	N/A	N/A	Maure was immediately removed from tile line and was land applied before contamination went to drainage ditch. No NDPES permit required
Mark Porter	62630	112014-JLK-1230	Fairfield	Confinement	Swine	960	11/20/14	Tributary of Cedar Creek	N/A	N/A	ACO 6/2/15	$1,000	7/2/15	Develop and Implement SOP for employees for manure handling. No NPDES Permit required
Steve Boevers and Dresden, LLC	64497		Fredericka	Confinement	Swine	996	4/14/15	Tributary of Wapsipinicon River	N/A	N/A	ACO 8/11/15	$6,000	Payment Plan - on Schedule	Develop and Implement SOP for employees for manure handling. No NPDES Permit required
Lindoah, LLC	59895	042815-DJW-0850	Red Oak	Confinement	Swine	1,280	4/28/15	Tributary of East Nishnabotna River	N/A	N/A	ACO 9/8/15	$1,000	8/27/15	Develop and implement SOP for preventative maintenance program. No NPDES permit required
Jason Kies	64383	Evidence of a discharge at an inspection	Wall Lake	Combined	Cattle and Swine	928	4/28/15	Tributary of Black Hawk Marsh	N/A	N/A	Notice of Violation Issued	N/A	N/A	Cattle pens and settling structures have been removed. Nursery barn and west finisher barn have been discontinued and all manure has been removed. Waterway has been regraded and seeded.
D&L Swine,LLC	58896	050515-DAK-1802	Melvin	Confinement	Swine	720	5/6/15	Tributary of Floyd River	N/A	N/A	ACO 9/16/15	$500	9/14/15	Repaired tile riser and constructed a cover for the tile intake structure. No NPDES permit required.
Kirk Snitker	N/A	N/A	Waukon	Open Feedlot	Cattle	65	5/9/16	Unnamed Tributary of Coon Creek						
Einicks Dairy	64237	052915-jsp-0900	Fort Atkinson	Confinement	Cattle	1,146	5/29/15	Dry Run Branch	N/A	N/A	ACO 11/23/15	$4,000	11/16/15	Develop and implement SOP for handling of manure and preventative maintenance for eqipment
Lavern Van Loon	60341	060315-KAH-1500	Hartley	Confinement	Swine	503	6/3/15	Tributary of Sewer Creek	$3,000	Payment Plan - On Schedule	ACO 3/21/16	$500	Payment Plan - on Schedule	Repair basin, find and plug all tiles
Plymouth Dairy	59964	070115-CAM-1130	LeMars	Combined	Dairy Cattle	5,460	7/1/15	Tributary of Plymouth Creek	N/A	N/A	ACO 11/3/15	$1,000	11/6/15	Construction of additional containment berms
The Good Egg	67800	071515-BAL-1135	Hampton	Confinement	Chicken	9,000	7/16/15	Maynes Creek	$4,579	2/9/16	ACO 1/15/2016	$5,000	2/9/16	Note: Discharge of Egg washwater, not manure (waste water) Installed upgraded float alarms
New Fashion Pork	61292	073015-DPO-1616	Nodaway	61292	Swine	2,931	7/30/15	Middle Nodaway River	N/A	N/A	ACO 11/29/16	$500	12/1/16	Implement quarterly routine serive for discharge lines and ensure personnel are on site when manure is being transferred.

Iowa Department of Natural Resources

Manure Discharge Chart

Rick Shumaker	62810	080515-JJS-1430	Tipton	Confinement	Swine	1,080	8/5/15	Sugar Creek	$9,563.30	Oct-15	ACO 10/21/15	$4,000	10/20/15	Develop and implement SOP for preventative maintenance for equipment. No NPDES Permit required
Brian Crees	63434	081015-BJB-1030	Winterset	Confinement	Swine	SAFO	8/10/15	Howerdon Creek			Enforcment Pending			
Paul Sealine	61087		Stratford	Confinement	Swine	2,880	8/15/15	Squaw Creek	N/A	N/A	ACO 1/25/2016	$500	1/21/16	Increase height of concrete storage tanks
Brad Van Gelder/Prescision Applicators			Lorimor	Certified Manure Applicator	N/A	N/A	8/22/15	Tributary of Thompson River			Enforcement Pending			
NMC Holdings, LLC	62972		Holstein	Confinement	Swine	4,525	9/16/15	Tributary of Ashton Creek	N/A	N/A	ACO 2/15/16	$2,750	3/10/16	Install alarms to prevent future release and develop a Standard Operating Procedure for employees
Sunrise Farms			May City	Confinement	Chicken		9/28/15	Stony Creek	N/A	N/A	Referred to the Attorney General's Office 2/16/16	N/A	N/A	**Note: Discharge of Egg washing liquid, not manure (waste water)**
James Frye	59314	092815-SJM-1019	Stanly	Confinement	Swine	3,600	9/28/15	Pine Creek	N/A	N/A	Attorney General Settlement	$15,000	8/24/16	Attorney General Settlement
Krauskopf Pumping Services	N/A	101215-ABCM-1500	New Albin	Certified Manure Applicator	N/A	N/A	10/12/15	Clark Creek	N/A	N/A	ACO 4/13/16	$2,000.00	7/28/16	Develop and Implement a Standard Operating Porceduer for Employee Training.
John Ryken/Ring Valley, LLC	N/A	100715-WDG-1505	New Sharon	Certified Manure Applicator	N/A	NA	10/7/15	Tributary to South Skunk Creek	N/A	N/A	ACO 9/9/16	$1,000	9/30/16	Develop and Implement a Standard Operating Porceduer for Employee Training.
S&K Custom	N/A	102015-SJW-2030	Hubbard	Certified Manure Applicator	N/A	N/A	10/20/15	Unnamed Creek	N/A	N/A	ACO 2/29/16	$1,000	3/1/16	Cover all tiles prior to future applications
C&D Services	N/A	103015-LLB-1415	LeMars	Certified Manure Applicator	N/A	N/A	10/30/15	Unnamed tributary	N/A	N/A	ACO 3/14/15	$1,000	3/22/16	Develop and implement SOP for preventative maintenance program. No NPDES permit required
D&D Dairy	68704	112415-JFP-0900	Charlotte	Confinement	Dairy Cattle	352	11/4/15	Unnamed tributary	N/A	N/A	ACO 2/29/16	$4,000	3/30/16	Develop and implement Corrective Plan of Action to prevent future discharges
Patricia Jorgensen	57986	111415-HJV-0753	Denison	Confinement	Swine	3,300	11/14/16	Unnamed tributary	N/A	N/A	ACO 8/22/16	$500	8/24/16	Maintain lock on slurry store lid, Maintain new dike; and Repairs to system
Sleister Brothers Dairy	68703		Clayton County	Combined	Dairy Cattle	180	11/4/15	Unnamed tributary to Bloody Run	N/A	N/A	ACO 12/5/16	$6,000	On a Payment Plan	Develop Plan of Actionfor proper management and manintenance. No NPDES Permit required.
Brian Kruse	65410		Osceola County	Open Feedlot	Cattle	999	11/17/15	Unnamed tributary of Little Rock River	N/A	N/A	ACO 10/26/16	$1,000	11/14/16	Installed secondary containment and purchased new pump. No NPDES permit required
Kenneth Kline	60969		Harrison County	Open Feedlot	Cattle	950	11/18/15	Unnamed tributary of Euclid Creek			Enforcement Pending			
Steve Kerns	N/A	123115-DPO-1203	Taylor County	Confinement	Swine	300	12/31/15	Unamed tributary of One Hundred and Two River			Enforcment Pending			
Swine Graphics Enterprises (Dave Jones)	50595	012416-ETO-1405	Union County	Confinement	Swine	1,536	1/24/16	Farm Pond	N/A	N/A	ACO 11/23/16	$1,000	11/11/16	Install timers and automatic shutoffs. No NPDES permit required.
Carroll Farms	59711		Lee County	Confinement	Swine	800	2/1/16	Rogers Ditch	N/A	N/A	ACO 6/1/16	$7,000	5/26/16	Develop and implement SOP for inspections and emergency action plans. No NPDES permit required.
Cyclone Cattle		022816-HJV-1036	Pottawattamie County	Open Feedlot	Cattle	3,500	2/28/16	Unnamed tributary of W. Nishnabotna River	N/A	N/A	Combine with 4/20/16 Cyclone Cattle ACO 10/14/16	$10,000	11/10/16	Facility has a NPDES permit. Upgrade SOFEBs and application changes

Exhibit 12

David Jackson and Gary Marx, *Spills of Pig Waste Kill Hundreds of Thousands of Fish in Illinois*, Chicago Tribune, Aug. 5, 2016

INVESTIGATIONS

Spills of pig waste kill hundreds of thousands of fish in Illinois

By David Jackson and Gary Marx
Chicago Tribune • Aug 05, 2016 at 4:57 am

Hopkins Ridge Farms is a hog confinement operation in Iroquois County where more than 8,000 pigs are raised to market weight. A July 2012 pig waste spill tied to Hopkins Ridge polluted more than 20 miles of Beaver Creek, state officials allege. (Stacey Wescott / Chicago Tribune) (Stacey Wescott / Chicago Tribune/Chicago Tribune)

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Ponton was nearly brought to his knees by the stench of Beaver Creek.

"It looked like ink, the water. It had fish all over the place, dead. It wasn't fit for nothing. Not even a wild animal could drink out of it," said the 75-year-old retired farmer.

Government officials quickly assigned culpability for the deadly discharge: a waste spill from Hopkins Ridge Farms, a hog confinement operation where more than 8,000 pigs are raised to market weight before being trucked to slaughter.

THE PRICE OF PORK

Cheap meat comes at high cost in rural Illinois

ANIMAL ABUSE

Workers describe pigs being beaten, kicked

POLLUTION

Spills of pig waste damage Illinois waterways

THE JOB

Farmer tells what it's like to raise hogs on contract

The July 2012 spill polluted more than 20 miles of Beaver Creek, wiping out 148,283 fish and 17,563 freshwater mussels, according to reports from state biologists. Four years later, the creek's aquatic life has only begun to recover.

Authorities also have yet to collect penalties and cleanup costs from the confinement's influential owners — agribusiness executives who operate facilities in Illinois and Indiana that house tens of thousands of pigs. They deny responsibility.

As hog confinements like Hopkins Ridge spring up across Illinois, producing massive amounts of manure, a new pollution threat has emerged: spills that blacken creeks and destroy fish, damaging the quality of life in rural communities.

The lagoons that hold pig manure until farms can use it as fertilizer sometimes crumble or overflow. Leaks gush from the hoses and pipes that carry waste to the fields. And in some instances, state investigators found polluting was simply "willful" as confinement operators dumped thousands of gallons of manure they

Protection Agency, the Department of Natural Resources and the attorney general's office, the Tribune found that pollution incidents from hog confinements killed at least 492,000 fish from 2005 through 2014 — nearly half of the 1 million fish killed in water pollution incidents statewide during that period. Pig waste impaired 67 miles of the state's rivers, creeks and waterways over that time.

An animated tour of a hog confinement. (Jemal R. Brinson / Chicago Tribune) (Jemal R. Brinson/Chicago Tribune)

Using either measure, no other industry came close to causing the same amount of damage.

Fish kills are an imperfect measure of the damage caused by businesses, as some Illinois waterways already are so contaminated that little if any aquatic life remains, and some pollution sources degrade rivers without sending multiple fish to their deaths on a single day. Still, the fish kills do provide a gauge of the environmental impact of the modern pig-raising facilities that helped make Illinois the fourth-largest pork producer in the U.S.

thousand dollars in fines after causing massive fish kills. Many went to court to challenge authorities; since 2005, the state attorney general has filed or resolved at least 26 pollution lawsuits against swine confinements. Some operators

polluted repeatedly. And the multistate pork producers who supply the pigs and profit from the confinements were rarely held accountable, the Tribune found.

The state agencies responsible for protecting waterways and aquatic life — the EPA and DNR — play limited roles in determining where new confinements can be located or assessing their potential pollution risks.

Instead, Illinois livestock confinements are granted permits solely by the Illinois Department of Agriculture, whose mission is to promote livestock agriculture as well as regulate it.

Under state law, the department cannot consider a confinement owner's environmental record when reviewing an application to build a new site, and officials have issued numerous new permits to operators with multiple infractions.

Illinois has only recently required hog confinements to register with the state EPA, and that agency knows where only a fraction of them actually are located, records and interviews show. In most other top pork-producing states, environmental regulators maintain detailed inventories.

With swine confinements growing in number and size across the state, the count of facilities inspected by the state EPA dropped from an annual average of 115 per year from 1999 to 2004 to 71 during the next six years, the most recent period for which the agency could provide data.

"The hog facilities are run and designed much, much better than 10 years ago, and education is the way to ensure rules are fully followed," said Sanjay Sofat, who oversees confinement regulation as manager of the state EPA's Division of Water Pollution Control.

In 2010, Illinois' failure to monitor or regulate livestock confinements prompted the U.S. EPA to threaten funding cuts and decertification of the state EPA. Since then, Illinois has bolstered its inspections staff as well as documented and visited 236 of the largest swine facilities. That is fewer than half of the estimated 527 in the state and includes none of the additional 427 hog confinements with up to 2,500 animals.

Top producers accused

State officials initially withheld records that would name the companies responsible for polluting Illinois waterways, citing privacy concerns. But the Tribune identified them by reviewing state investigative files, as well as copies of the checks that companies submitted to reimburse the state for restocking fish.

Those files revealed that influential producers like Hopkins Ridge Farms are among Illinois' alleged polluters.

Near the Indiana border in downstate Illinois, the Hopkins Ridge hog sheds are tucked between expansive corn and bean fields and a preserve of woods and marshlands called the Iroquois County State Wildlife Area.

The pig waste lagoon at Hopkins Ridge Farms in Iroquois County, a hog confinement operation where 8,000 pigs are raised for market each year. A July 2012 spill there polluted more than 20 miles of Beaver Creek, wiping out 148,283 fish and 17,563 freshwater mussels, according to reports from state biologists. (Stacey Wescott / Chicago Tribune)

For nearly three days in July 2012, facility operators used an irrigation pivot to spray 300 gallons of wastewater per minute onto a field, according to state government reports. The fluid coursed off the soaked earth into ditches and then into Beaver Creek until carp, pike, bass and catfish began floating belly up, state officials allege

and "fish were both dead and dying," Snow reported in a call to the Illinois Conservation Police, a division of the Department of Natural Resources.

Farmer Donald Savoie, 81, was tending to his yard when a neighbor alerted him that sludge and dead fish were floating down a nearby stretch of the creek.

"I walked over there and he was right. There was carp, there was bass, there was bullheads, there was catfish — it was amazing how many — and the creek was black," Savoie told the Tribune. "You could smell it. It was rank."

The spill had a lasting impact.

In October 2014, state biologists compared four surveys of the creek before the spill to three post-discharge surveys and found that nine fish species had not been detected since the fish kill and 18 others had not returned to previous levels, according to a pending lawsuit by the state attorney general.

Two of 18 species of mussels wiped out by the discharge were on the state's threatened list, the lawsuit said.

Ponton, the retired farmer, told the Tribune he only recently has noted improvement in the water.

"We are just now seeing fish move around a little bit," he said. "I believe in things that's right, and that was wrong. I'm upset because we take and we take and we take from nature, and we never bother to put back."

In December, the state attorney general filed a civil lawsuit to collect penalties in the incident. The amount is unstated, but state officials say the value of the lost fish and mussels is estimated at well over $250,000.

One part-owner of the Hopkins Ridge facility, Iroquois County farmer and

lawsuit. Family attorneys are fighting back, saying they never received written notice of the attorney general's claim.

Another part-owner is Malcolm DeKryger, who has served on the board of the Indiana Pork Producers Association and been president of that state's Pork

Advocacy Coalition, an industry leadership group.

He also runs a company that owns and manages the Pig Adventure at Fair Oaks Farms, a northwest Indiana visitor center that promotes confinement facilities as safe for the environment and nurturing for pigs. It is billed as the nation's premier agritourism destination.

DeKryger told the Tribune in a letter that he did not believe the facility was responsible for any pollution and would respond to the attorney general in court, presenting "appropriate facts and expert testimony in front of a jury of our peers."

He criticized the attorney general for taking three years before filing a court claim, saying that has hampered his ability to address the allegations. "I certainly want to operate (our facilities) in an environmentally responsible manner," DeKryger wrote. "Be assured that I wish to be a responsible pork producer and am committed to that mission."

Hopkins Ridge is only one of the alleged polluters to be run by top industry executives.

The high price of cheap pork

The explosive growth of Illinois hog farming has taken a heavy toll on rural communities, a Tribune investigation finds.

Read the story

When a 4,500-pig operation in Iroquois County called R3E LLC pumped manure onto fields using leaky pipes in 2003, the resulting spill destroyed all aquatic life in a 1-mile stretch of Spring Creek some 40 miles northeast of Champaign. It killed 2,911 fish, state reports said.

Then in 2009, some 200,000 gallons of swine waste drained from a breach below the surface of one of the facility's massive earthen holding ponds. State biologists counted 110,436 dead fish along 19 miles of Spring Creek.

"Live bullheads were observed gasping at the surface," said a report from the Department of Natural Resources. "The slug of manure was still moving downstream."

For the 2003 spill, a facility partner paid the state $649 to cover fish restocking costs. In 2014, five years after the bigger spill, R3E agreed to pay restocking and investigative costs of $71,757 — without admitting wrongdoing.

going on down there. We weren't negligent in our operation and didn't deliberately dump."

Frase added: "I hope you find the sincerity most of us have for the work we do every day and our ability to raise a wholesome product."

The pigs came from Lehmann Bros Farm LLC, whose co-owner Art Lehmann is a former president of the state pork association. Lehmann said he had nothing to do with the spills but praised Frase and R3E for working quickly to correct problems.

"It's not a willful situation," Lehmann said. "The industry has worked quite hard to have a good environmental track record. We live out here in the country too. We drink the water, and our families do."

'Willful' dumping

When Donald Irlam's central Illinois pig barns were overflowing with manure in the rainy summer of 2009, he made what he would later call "a bad decision," government records show.

Irlam pumped 3,100 gallons from the facility's underground waste-storage pits into a rusted metal irrigation tank, hitched that tank to a tractor and wheeled it to the top of a nearby slope. Then he loosened a valve and let the slime gush down a ravine, into his neighbor's cattle-watering pond and Henry Creek.

Irlam unloaded the tank at least nine more times over the following weeks, releasing more than 27,000 gallons of pig manure and killing an estimated 1,650 pounds of fish — mostly largemouth bass and bluegill — according to government reports and Irlam's admissions in Morgan County court.

Still, like many other hog producers who fouled Illinois rivers and streams, Irlam

Irlam, 64, declined to comment. "I'm not going to talk to any reporter," he said before quickly shutting the front door of his Springfield home.

A "contract grower," Irlam was paid to raise pigs for a larger operator. Such companies own the animals, supply their feed and medicine, and typically dictate production practices, but the local confinement operators like Irlam are the ones usually held liable for poisonous spills.

> *The water was black and (reeked) of manure and dead fish.*
>
> — Dan Stephenson, Illinois assistant fisheries director

In the quiet farming town of Murrayville about 40 miles west of the state capital, Irlam worked in his four long hog sheds for about a half-hour in the mornings before heading to his second job as a tax collector for the state Department of Revenue.

But by July 2009, Irlam's operation was in trouble, according to hundreds of pages of court and government records examined by the Tribune. With his 600 hogs producing an estimated 262,800 gallons of manure a year, he had failed to arrange with neighboring farmers to spread the waste on their fields as fertilizer or pay for disposal firms or fellow confinement operators to take it.

Instead, Irlam let hog muck fill the 8-foot-deep pits beneath his slotted concrete floors until it rose up and soaked the pigs' hoofs and bellies. Then he loaded the portable manure tank farmers often call a "honey wagon" and began dumping waste downhill.

Illinois' growing pork industry

Alerted by Irlam's neighbor, farmer Steve Suttles, government officials hustled to the scene and found that a trail of manure had burned a path 25 yards wide and 85 yards long down the grassy ravine.

Henry Creek "was full and was running black, frothy waste," Morgan County sheriff's Deputy Tom Keegan wrote in his report. "You could see how the wagon was backed up and dumped so that the waste would run down the hill."

Dan Stephenson, assistant fisheries director for the state DNR, reported "hundreds, possibly thousands of dead, decaying fish" in Suttles' cattle-watering pond. "The water was black and (reeked) of manure and dead fish," he wrote.

The Illinois attorney general filed a civil lawsuit to collect penalties and cleanup costs from Irlam but abandoned the case in 2012 after Irlam filed for bankruptcy, saying he was unable to pay numerous mortgage and credit card debts. That decision surprised bankruptcy experts, who said the state could easily have pursued Irlam's $64,000 state salary.

"I don't know why the state wouldn't have gone forward with that. It does make one scratch their head and wonder, doesn't it?" said James Inghram, the court-appointed trustee in Irlam's bankruptcy case.

The attorney general's office told the Tribune in a written statement that Irlam's Revenue Department job did not earn him special treatment. "Our primary focus was stopping the pollution, getting the land cleaned up and ensuring this couldn't happen again. His employment had no bearing on that outcome," the statement said.

In a court deposition for his ongoing civil lawsuit, Suttles said two dozen of his

pathogens. "My whole place is contaminated," Suttles' deposition said.

Suttles' suit also alleges that Iowa hog supplier Robin Hewer had control over Irlam's operation because he determined the selection and number of pigs in the

facility, owned the animals and also dealt with a feed company to control their husbandry.

Hewer sought to be dismissed from the case, but Morgan County Circuit Judge Christopher Reif refused to allow it, saying in an order: "He wants to profit without risk of liability. Send more hogs to a facility (than) it could possibly handle, collect your payments, and pass on liability to the property owner."

No state government authority has publicly attempted to hold Hewer accountable. He did not respond to requests for comment.

'We are trying'

Pork industry leaders say pollution events are relatively rare. Housing pigs in confinements, they add, protects waterways more effectively than the old-fashioned method of raising livestock on pastures and letting the manure wash off into ditches and creeks during rainstorms.

Modern facilities store the muck in underground cesspits before pumping it into outdoor holding tanks or earthen lagoons and then spreading it as fertilizer once or twice a year on nearby crop fields. Ideally, this system creates a "virtuous cycle" of untreated waste that never touches a river or stream.

But when a facility produces hundreds of thousands of gallons of waste each year, the cycle can easily break down.

In 2005 and 2006, state EPA officials cited Fehr and his sons in separate incidents for overapplying swine manure on cropland and for creating a water pollution hazard.

Five years later, in February 2011, the state EPA reported that tributaries of Panther Creek were coated in foam and darkened by swine waste. The agency alleged that Fehr Brothers had stockpiled at least 65 semitrailer loads of manure — an estimated 400,000 gallons — and then applied it on a frozen, 92-acre field. When the field thawed, swine waste poured into a tributary of the creek, according to state EPA reports.

"When asked why they hauled the manure (one of Fehr's sons) stated that they had no choice because the manure pits were full and about to run over," a state EPA report said.

Also in 2011, the state attorney general alleged that waste was overflowing from a second Fehr hog operation because an underground plumbing system was plugged and "has historically proven unreliable." A state inspector observed a foamy discharge smelling of swine waste in a tributary of Panther Creek about a quarter-mile away. The inspector also noted numerous dead hogs disintegrating in a field, some of them partially eaten by scavengers. "It was obvious ... that the animals had been dead for weeks," the state attorney general alleged.

And in a third incident that year, a kink caused a hose fitting to rupture and release 6,000 gallons of Fehr Brothers pig manure onto a field, where some of it drained into a tributary of Panther Creek's west branch, according to the state.

The state attorney general's 2011 civil lawsuit asks that Fehr Brothers obtain a

In a Tribune interview, Fehr denied that his facilities ever polluted any local creeks. He and his family made mistakes in years past, he said, but have invested in safe and up-to-date manure-handling equipment and practices.

"We have become better farmers because we are trying harder than most," Fehr said.

By contrast, some of his neighbors still apply their hog manure to frozen fields, Fehr said, or simply spray the effluent rather than knifing it into the earth to reduce odors and the chance of runoff. "We look at manure as a nutrient that's got a value. We do not want to waste it," he said.

Shaded by clumps of trees as it threads through corn and grain fields, Panther Creek is special to environmentalists who petitioned state officials years ago to protect it as a key tributary of the Mackinaw River and the Mississippi River Basin.

Following two serious discharges from swine confinements that killed fish, a local Sierra Club group in 2003 organized volunteers to collect water samples from streams and drainage ditches near the facilities and the crop fields where swine manure was applied as fertilizer.

The Sierra Club sent the state EPA lab results — prepared by a commercial testing firm in Peoria — that indicated high levels of contamination from fecal coliform bacteria near the Fehr facilities.

But there was no official response to the club's expensive yearlong effort, and the team disbanded.

Fehr said he was aware of the Sierra Club's sampling but believes those streams could have been damaged by cattle operations, commercial fertilizer and aging farmhouse septic systems. He said he felt unfairly targeted by the club's unproven allegations and the state attorney general's unresolved lawsuit.

"Hog farmers, we are given a bad name when we're not the source of the pollution," he said.

In 2013, another nearby hog confinement had a massive manure spill that contaminated more than 4 miles of Panther Creek's west branch.

Records show family members at the 7,200-hog Meadow Lane Farms had unknowingly sprayed about 84,000 gallons of waste onto a cornfield from one fixed position for about four hours. The facility operators discovered the accident that day but did not report the discharge as required or take immediate steps to remediate it, according to state officials.

The repeated abuse of Panther Creek has dismayed local residents, who looked at the string of discharges as "an environmental catastrophe," said area fisherman Ed Mayhall Jr.

Fehr was once in a livestock trucking business with the owner of Meadow Lane, but they parted ways a couple of years before the spill. Meadow Lane paid state penalties and fees of about $25,000 and built a new $160,000 concrete waste storage tank.

"We felt very bad for this whole situation," Meadow Lane owner Mark Schmidgall told the Tribune. For six days following the spill, his family, friends and neighbors worked almost nonstop to clean up the mess, and his facility subsequently overhauled its waste management practices. "We took 100 percent of the blame,"

Twenty students from Northwestern University's Medill journalism school assisted Tribune reporter David Jackson with this project as part of an investigative reporting class.

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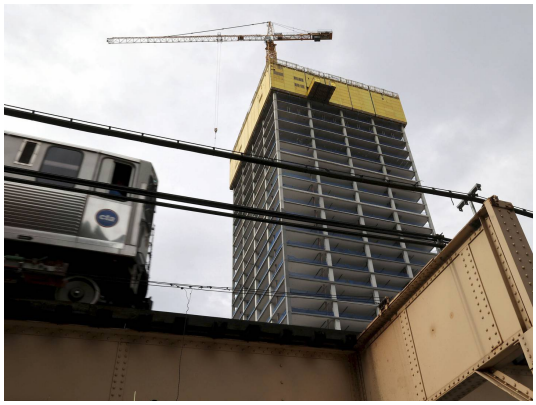

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Chicago Tribune

Exhibit 13

Lee Bergquist and Kevin Crowe, *Manure Spills in 2013 the Highest in Seven Years Statewide*, Journal Sentinel, Dec. 05, 2013

Manure spills in 2013 the highest in seven years statewide

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By Lee Bergquist and Kevin Crowe of the Journal Sentinel

Dec. 05, 2013

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Wisconsin farms this year generated the largest volume of manure spills since 2007, including an accident by the University of Wisconsin-Madison's flagship research farm in Columbia County that produced a mile-long trail of animal waste.

Livestock operations have spilled more than 1 million gallons of manure in 2013, according to the state Department of Natural Resources' records.

Records don't show a clear trend in the frequency or size of the spills, but officials say there is a growing practice by farmers and their neighbors of reporting mishaps. Officials also say that regardless of the precautions taken, accidents are not uncommon.

Manure contains an array of contaminants, including E. coli, phosphorus and nitrogen, that can harm public waterways and drinking water.

A Milwaukee Journal Sentinel analysis shows that after this year, the second largest volume in spills took place in 2008 when 905,505 gallons were released. The Journal Sentinel asked for records from 2007-'13. Last year, spills totaled 191,132 gallons.

Kevin Erb, a manure specialist with the University of Wisconsin Extension, said that the volume is minute, compared to the amount of manure cows produce. The spill total for 2013 is less than 1% of all the waste produced by dairy cattle in Wisconsin, he said.

Still, manure handling is a volatile issue in Wisconsin as dairy farms grow larger.

Attorney Drew Nicholas of Midwest Environmental Advocates said animal waste is the chief concern of residents his firm represents. Thecases focus on opposing new farms or expansions at the state's largest dairies, known as concentrated animal feeding operations, or CAFOs.

CAFOs are farms with the equivalent of 700 or more milking or dry cows.

"It's the same issue: The fear manure will get into waterways," Nicholas said.

According to the Journal Sentinel analysis, about one-third of the spills since 2007 came from CAFOs. There are currently 196 dairy CAFOs in Wisconsin.

In the latest spill, 300,000 gallons of manure escaped from a ruptured pipe on Nov. 24 from a facility in Dane County that takes waste from farms to generate electricity.

The $13 million Dane County digester, which received a $3.3 million state grant, generates enough electricity to power 2,500 homes. It began operating in 2011. The ruptured pipe was not discovered until Nov. 25. The break sent liquid manure into nearby Six Mile Creek.

The DNR is still assessing the extent of the damage. DNR spokesman Bob Manwell said the spill doesn't appear to have killed fish in the creek, but because portions of the creek are covered with ice, the agency is still monitoring the situation.

Another big spill was an accident in February at the Arlington Agricultural Research Station that also released 300,000 gallons of manure after a pipe broke.

The 2,000-acre farm is UW's showplace for agriculture research. The manure handling system was constructed about five years ago to accommodate about 500 cows.

"It was a mechanical failure," said Richard J. Straub, senior associate dean of the UW College of Agriculture and Life Sciences, in explaining the break in a pipe that recirculated the cleanest water from a manure lagoon to wash manure off the barn's floor.

DNR records show that Arlington has reported five spills since 2007. That includes three spills in 2009 for a combined 50,000 gallons.

"What can I say, 'manure happens,'" said Straub, who holds a doctorate in agricultural engineering.

"We take these things seriously, but there is no system that is absolutely safe."

The farm has instituted several changes, including new berms to contain waste if another accident occurs and an automatic shut-off of equipment that pumps manure if a change in pressure is detected, Straub said.

DNR officials said they haven't analyzed the data on spills, and haven't examined the data to learn whether there were cases where farms or manure haulers are repeat violators. Some farmers and haulers have been required to pay fines for contaminating public waterways or groundwater, the DNR said, but the figure was not available on Thursday.

"Spills are going to happen, and what we are telling people is to report them and mitigate the problem — these are the things that we are focusing on," said Tom Bauman, coordinator of agricultural runoff for the DNR.

Officials said a string of manure spills in 2004 prompted the state to become more proactive.

The agency has personnel in all regions of the state who work on spills. On nights and weekends, a DNR employee is on call in the event an accident is reported.

The DNR also has a system that warns farmers when weather conditions, such as heavy rains and fast snow melt, would be poor for spreading waste.

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Exhibit 14

Sarah Peach, *What to Do About Pig Poop? North Carolina Fight a Rising Tide*, National Geographic, Oct. 30, 2014

What to Do About Pig Poop? North Carolina Fights a Rising Tide

The pork-loving state faces challenges in protecting water from contaminat

SEE A FARM CONVERT PIG POOP TO ELECTRICITY

A few concerned hog farmers are exploring solutions to reduce the environmental impact of their farm waste and even produce electricity. Video.

BY **SARA PEACH**, FOR NATIONAL GEOGRAPHIC

PUBLISHED OCTOBER 30, 2014 • 14 MIN READ

From the air, the place where bacon comes from is a quilt of fields and woods crossed by roads and winding creeks.

On an overcast day in September, I was buzzing over eastern North Carolina's flat coastal plain in a single-prop Piper Arrow with retired

riverkeeper Rick Dove and pilot Bob Epting. From an altitude of 1,200 feet (366 meters), we gazed down at the land of hogs: fields in every direction dotted with long, metal-roofed barns housing thousands of animals—and, shimmering in the faint sunlight, the pink ponds that held their waste.

The animals were destined to become honey-cured ham, bologna, smoked sausage, pulled pork, pork chops, bacon bits, and more. The meat would be shipped all over the world.

But before the hogs left the state, they would poop, a lot.

That waste is a lingering, stinky problem for North Carolina and other hog-heavy states like Iowa, Minnesota, Illinois, and Indiana. Those states are the leading suppliers of meat to a nation—and increasingly, a world—with an abiding love of cheap pork. But residents must contend with waste from millions of hogs, which fouls the air near large operations and can contaminate local water supplies with germs and excess nutrients.

The dilemma is particularly acute for the barbecue-obsessed Tar Heel state, where swine sales totaled $2.9 billion in 2012. North Carolina gained national attention in 1999 when drenching rains from Hurricane Floyd caused waste ponds to rupture and flood, contaminating local water supplies. (Read "Carnivore's Dilemma" in National Geographic Magazine.)

Fifteen years after the disaster, the state remains the home of 8.9 million hogs—nearly as many as its human population of 9.8 million—making it the second largest pork producer in the nation. And despite a $17.1 million research project on waste options, it seems no one, in this state or elsewhere, quite knows what to do with all that poop.

Pigs from a farm near Trenton, North Carolina, wait for rescue from floods.

Swollen Lagoons

Until recently, people who raised hogs kept small numbers of animals that roamed in outdoor pens or fields, where their droppings fertilized crops.

In North Carolina, that started changing with industry consolidation in the 1980s. The number of small, diversified farms fell precipitously. Most of the farms that survived did so by going big—raising thousands of animals that spend their entire lives inside barns. Today, Duplin County, North Carolina, the top swine producer in the country, is home to 530 hog operations with a collective capacity of 2.35 million animals. According to a 2008 GAO estimate, hogs in five eastern North Carolina counties produced 15.5 million tons of manure in one year.

To handle all that waste, farmers in North Carolina use a standard practice called the lagoon and spray field system. They flush feces and urine from barns into open-air pits called lagoons, which turn the color of Pepto-Bismol when pink-colored bacteria colonize the waste. To keep the lagoons from overflowing, farmers spray liquid manure on their fields nearby.

The result, says Steve Wing, an epidemiologist at the University of North Carolina at Chapel Hill, is this: "The eastern part of North Carolina is covered with shit."

The Neuse River Air Force

Since 1999, to avoid a repeat of Hurricane Floyd, the state has bought out dozens of hog farms and closed more than 50 waste lagoons located in flood-prone areas.

In addition, hog farmers in North Carolina must follow state permit rules to avoid polluting streams and rivers with lagoon waste. They are not allowed to spray waste on fields when it's raining, for example, or on windy days when the mist could blow into nearby water bodies.

But as the Piper Arrow cruised over hog country recently, Rick Dove said the industry routinely breaks those rules. Peering at the ground below the plane, Dove suddenly spotted something.

"That's illegal," he said, pointing toward a field where an industrial-size sprayer was spouting a stream of pink-tinged waste on a field near a hog farm. Nearby, water from the previous night's rain lay puddled on the ground. As the plane banked to circle the farm, Dove explained that hog operations are not permitted to spray animal waste on fields with standing water.

Dove estimates that he has made more than a thousand flights like this one over eastern North Carolina. He and other volunteer observers and pilots—the self-styled Neuse River Air Force—photograph violations and report them to the state.

Doesn't the state have enough inspectors to do that job?

"No," Dove says. "The problem in North Carolina has always been that there's no enforcement."

Christine Lawson, program manager for animal feeding operations at the North Carolina Department of Environment and Natural Resources, says the hog industry is the subject of much more regulation and oversight than in the 1990s. The state's 16 inspectors visit every hog facility at least once a year to make sure they're following the rules set out in their permits. "We see a very high level of compliance," she says.

But hog farmer Tom Butler says state scrutiny has declined under the current governor, Republican Pat McCrory. He says his most recent inspection amounted to little more than a courtesy call.

"We're surely not inspected like we used to be," he says. "I should be happy about that, but I'm not."

Regulations, he says, keep him on his toes: "We're always busy on a farm. We always have more than we can do. And the first thing we're not going to do is waste management. But if we know that inspector's coming in six months, or unannounced, what are we going to do? We're going to do good waste management."

Flooding from Hurricane Floyd engulfed this hog farm in eastern North Carolina in 1999.

A Threat to Water and Air

Just as in North Carolina, the hog industry in the Midwest has seen an explosion in the number of large hog operations, says Ted Genoways, author of a new book on the industry called The Chain: Farm, Factory, and

the Fate of Our Food. Iowa's hog population, for example, has swelled from 15.3 million in 2000 to 20.7 million this year. "It's just gone crazy in the last 30 years," he says.

U.S. pork exports have doubled over the past decade to more than two million tons a year, about 20 percent of total production. The leading buyers are Mexico, Japan, and, increasingly China, which has the world's largest per capita consumption of pork. (See interactive graphic, "What the World Eats")

But the growth in hog populations comes at a cost to the water around them, as scientists have shown in dozens of studies.

They have found evidence that nutrients wash into creeks and rivers from the fields where farmers spray manure or inject it into the soil, as is common in the Midwest. Hog waste is rich in nitrogen and phosphorus, which plants need to grow. But when too many nutrients flow from fields into waterways, they can contribute to harmful algal blooms and fish kills.

Nearby water can also be contaminated by parasites, viruses, hormones, pharmaceuticals, and antibiotic-resistant bacteria in hog waste, studies show.

In just the past two years, waste has spilled on hog farms in Iowa, Georgia, and Illinois. In October, a hog farm in Callaway County, Missouri, spilled 10,000 gallons (37,854 liters) of waste into a stream. In the same month, a lagoon spilled 100,000 gallons (378,541 liters) at a farm in Greene County, North Carolina.

Despite risks to waterways, many large livestock farms go unscrutinized by government inspectors, says Jon Devine, senior attorney for the water program at the Natural Resources Defense Council, an environmental advocacy group. Among the nation's 20,000 large livestock facilities, he

says only about 40 percent are regulated under the Clean Water Act, the federal law that governs water pollution.

New regulations could cut pollution, he says, but the livestock industry fiercely resists attempts by the Environmental Protection Agency to monitor it. "It's a tough thing to move on, and so I have seen very little appetite at the federal level or at the EPA to move reasonable regulations forward," he says.

The Neighbors Notice

Then there's the matter of the stench.

Elsie Herring lives on land in Duplin County, North Carolina, purchased by her grandfather, a freed slave, in the late 1800s. Sixty thousand people live in this county, where hogs outnumber humans roughly 39 to one.

In the 1980s, a hog farmer moved in next door to Herring's family and installed two hog barns, a lagoon, and a spray field. The edge of the spray field is just eight feet from her home.

When the farmer sprays hog waste on his field, the wind carries it to Herring's land. The terrible, raw odor, she says, sneaks into her home even when she closes her doors and windows. It gives her a cough and makes her eyes burn.

"It's very, very offensive," she says. "I don't feel comfortable even having people over, because it's embarrassing and humiliating that, you know, you're trying to entertain someone and there's someone eight feet away spraying animal waste on you."

Steve Wing, the UNC-Chapel Hill epidemiologist, says hog operations give off ammonia, methane—a potent greenhouse gas—and hydrogen sulfide, which causes headaches and eye irritation. They also release endotoxin, an

allergen, and at least a hundred volatile organic compounds, many of which contribute to the odor of hog farms.

In a study that began in 2003, Wing and a team of researchers set up air pollution monitors to measure hydrogen sulfide, endotoxin, and small particles in neighborhoods in eastern North Carolina within 1.5 miles of hog farms. They recruited 101 volunteers to record their physical symptoms and measure their own blood pressure and lung function.

When the researchers crunched the data, they found that when air pollution worsened in a given site as winds shifted, so did people's symptoms, including eye irritation, wheezing, nausea, and elevated blood pressure.

A pig stands on the roof of a car to escape Floyd's floodwaters near Burgaw, North Carolina.

The Farm of the Future?

Hog farmer Tom Butler says he knew nothing about how his operation could affect the environment when he began raising the animals 20 years ago.

In late September, rain was falling steadily on Butler's operation, a 130-acre farm in Lillington, North Carolina, that holds 7,500 hogs. The odor of animals, musky but not overpowering, hung in the air.

When farm manager Dave Hull opened the door of one of the operation's ten barns, hundreds of hogs—which had been sitting nose-to-tail in their pens—abruptly stood up and unleashed a cacophony of grunts and squeals.

Undeterred by the noise, Hull pointed to slats on the floor of the barn. When the hogs defecate, he explained, it falls through the slats. From beneath the barn, the waste is flushed to a one-million-gallon manure digester, where bacteria decompose it for 21 days, producing methane in the process.

The gas flows through skinny yellow pipes to a nearby generator building, where it's burned to create electricity that the farm sells to a local cooperative. The remaining waste is piped to two overflow lagoons that—unlike most lagoons in the state—are topped with green plastic coverings.

The result? The covers trap odors, making the operation less smelly. Rain falling on the farm isn't contaminated by lagoon waste. And the farm is transforming waste into electricity-generating enough to power 90 refrigerators.

The only trouble with the setup, Butler says, is the price tag: more than one million dollars. Grants from the USDA, North Carolina Green Business Fund, Natural Resources Conservation Service, and North Carolina Farm Bureau covered about three-quarters of the cost, with the rest coming out of Butler's pocket. He hopes to recoup the total investment by 2022.

"A lot of people think this is foolishness, and so far they've been right," Butler says.

Across the United States, only 29 U.S. swine operations use digesters like the one at Butler Farms.

Mike Williams, director of the Animal & Poultry Waste Management Center at North Carolina State University, led a $17.1 million research project to examine ways to cut air and water pollution from hog waste.

As Williams sees them, hog farms in North Carolina are better managed than they were in the 1990s. But he says in the long run, the lagoon and spray field system isn't sustainable, because nearby fields simply can't absorb the volume of nutrients large hog farms produce.

He says technological solutions—like the anaerobic digester at Butler Farms—could address environmental concerns. So could burning the poop or putting it through a treatment system the way municipalities clean human waste.

But though prices for those technologies have fallen, the industry won't adopt them until the cost is equal to or less than that of the current system. "I am cautiously optimistic that we're going to get there," he says. "I'm frustrated that there hasn't been more progress."

Exhibit 15

Community Health and Socioeconomic Issues Surrounding Concentrated Animal Feeding Operations

(excerpted: pages 317–318)

Community Health and Socioeconomic Issues Surrounding Concentrated Animal Feeding Operations

Kelley J. Donham,[1] Steven Wing,[2] David Osterberg,[1] Jan L. Flora,[3] Carol Hodne,[1] Kendall M. Thu,[4] and Peter S. Thorne[1]

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A consensus of the Workgroup on Community and Socioeconomic Issues was that improving and sustaining healthy rural communities depends on integrating socioeconomic development and environmental protection. The workgroup agreed that the World Health Organization's definition of health, "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity," applies to rural communities. These principles are embodied in the following main points agreed upon by this workgroup. Healthy rural communities ensure *a*) the physical and mental health of individuals, *b*) financial security for individuals and the greater community, *c*) social well-being, *d*) social and environmental justice, and *e*) political equity and access. This workgroup evaluated impacts of the proliferation of concentrated animal feeding operations (CAFOs) on sustaining the health of rural communities. Recommended policy changes include a more stringent process for issuing permits for CAFOs, considering bonding for manure storage basins, limiting animal density per watershed, enhancing local control, and mandating environmental impact statements. *Key words:* **animal confinements, environmental impact, livestock, mental health, odor, poultry, right-to-farm legislation, swine.** *Environ Health Perspect* **115:317–320 (2007). doi:10.1289/ehp.8836 available via *http://dx.doi.org/* [Online 14 November 2006]**

Background and Recent Developments

The agricultural community in areas of large-scale livestock production. The rural and agricultural community has changed dramatically over the past half century. The trends include an overall reduction in the number of farms, an increase in size of the farms, and economic concentration in the industries that supply inputs and purchase commodities from farms. The structure of the pork industry has also changed dramatically during the past three decades. The number of hog producers in the United States was more than 1 million in the 1960s but fell to about 67,000 by 2005 [U.S. Department of Agriculture (USDA) 2005]. Although the total inventory of hogs has changed little over the years, the structural shift toward concentration has been dramatic with the 110 largest hog operations in the country, each of which has over 50,000 hogs, now constituting 55% of the total national inventory (USDA 2005). The swine industry includes the following types of producers: small independent "niche" operators who often market organic pork to local markets, traditional independent operators, and large family or unaffiliated corporations. Former independent operators are increasingly raising livestock on contract for larger corporations. According to the U.S. Government Accountability Office, in 1999 contract production constituted more than 60% of total hog output and 35% of the cattle market (U.S. Government Accountability Office 2005), while poultry is produced almost entirely via contracts. Corporate producers or incorporated family-based operations employ from a few individuals to several hundred. Most often upper management and many of the workers in such operations do not come from or live in the vicinity of concentrated animal feeding operations (CAFOs).

The community of people living in the region of large-scale livestock production consists of residents of small family farms (that may or may not produce pork), workers at the production facilities, rural nonfarm residents, and the residents of neighboring towns. The challenges CAFOs place on neighbors were extensively reviewed in 1996 (Thu 1996) and again in a 2002 report accompanied by a number of consensus recommendations for the future of the hog industry in Iowa (Iowa State University and University of Iowa 2002). A number of additional scientific reviews and symposia summaries have been issued (Centers for Disease Control and Prevention 1998; Cole et al. 2000; Donham 2000; National Academy of Sciences 2002; Schiffman et al. 2000; Thu 2002).

Economic health. Economic concentration of agricultural operations tends to remove a higher percentage of money from rural communities than when the industry is dominated by smaller farm operations, which tend to circulate money within the community. Goldschmidt (1978) documented this as early as 1946 in California, one of the first states where industrialized agriculture developed. Specifically, he compared two agricultural communities, one dominated by larger industrialized farms with absentee ownership and a high percentage of hired farm labor, and the other community was dominated by smaller owner-operated farms. The latter community was found to have a richer civic and social fabric with more retail purchases made locally and with income more equitably distributed. A similar study by MacCannell (1988) of comparable types of communities found that the concentration and industrialization of agriculture were associated with economic and community decline locally and regionally. Studies in Illinois (Gomez and Zhang 2000), Iowa (Durrenberger and Thu 1996), Michigan (Abeles-Allison and Conner 1990), and Wisconsin (Foltz et al. 2002) demonstrated decreased tax receipts and declining local purchases with larger operations. A Minnesota study (Chism and Levins 1994) found that the local spending decline was related to enlargement in scale of individual livestock operations rather than crop production. These findings consistently show that the social and economic well-being of local rural communities benefits from increasing the number of farmers, not simply increasing the volume of commodity produced (Osterberg and Wallinga 2004).

Physical health. There have been more than 70 papers published on the adverse health effects of the confinement environment on swine producers by authors in the United States, Canada, most European countries, and Australia (Cormier et al. 1997; Donham 2000; Donham et al. 1977, 1982, 1986, 1990, 2002; Kirkhorn and Schenker 2002; Kline et al. 2004; Preller et al. 1995; Reynolds et al. 1996; Rylander et al. 1989; Schiffman

This article is part of the mini-monograph "Environmental Health Impacts of Concentrated Animal Feeding Operations: Anticipating Hazards—Searching for Solutions."

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et al. 1995; Schwartz et al. 1992; Thu et al. 1997; Wing and Wolf 2000). It is clear that at least 25% of confinement workers suffer from respiratory diseases including bronchitis, mucus membrane irritation, asthmalike syndrome, and acute respiratory distress syndrome. Recent findings substantiate anecdotal observations that a small proportion of workers experience acute respiratory symptoms early in their work history that may be sufficiently severe to cause immediate withdrawal from the work place (Dosman et. al. 2004). An additional acute respiratory condition, organic dust toxic syndrome, related to high concentrations of bioaerosols in livestock buildings occurs episodically in more than 30% of swine workers.

Environmental assessments of air quality inside livestock buildings reveal unhealthful concentrations of hydrogen sulfide, ammonia, inhalable particulate matter, and endotoxin (Iowa State University and University of Iowa 2002; Schenker et al. 1998). While there is less information on adverse effects among residents living in the vicinity of swine operations, that body of literature has been growing in recent years (Avery et al. 2004; Bullers 2005; Centers for Disease Control and Prevention 1998; Kilburn 1997; Merchant et al. 2005; Mirabelli et al. 2006a; Reynolds et al. 1997; Schiffman et al. 1995, 2000; Thu 2002; Thu et al. 1997; Wing and Wolf 2000).

Thu et al. (1997) documented excessive respiratory symptoms in neighbors of large-scale CAFOs, relative to comparison populations in low-density livestock-producing areas. The pattern of these symptoms was similar to those experienced by CAFO workers. Wing and Wolf (2000) and Bullers (2005) found similar differences in North Carolina. A case report associated with hydrogen sulfide exposure from a livestock processing facility in South Sioux City, Nebraska, revealed excessive diagnoses of respiratory and digestive disturbances in people living nearby (Campagna et al. 2004). Schiffman and colleagues reported that neighbors of confinement facilities experienced increased levels of mood disorders including anxiety, depression, and sleep disturbances attributable to exposures to malodorous compounds (Schiffman et al. 1995, 2000). Avery et al. (2004) found lower concentration and secretion of salivary immunoglobulin A among swine CAFO neighbors during times of moderate to high odor compared with times of low or no odor, suggesting a stress-mediated physiologic response to malodor (Shusterman 1992).

Community environmental air quality assessments have shown concentrations of hydrogen sulfide and ammonia that exceed U.S. Environmental Protection Agency (U.S. EPA) and Agency for Toxic Substances and Disease Registry recommendations (Reynolds et al. 1997). A recent study revealed that children living on farms raising swine have an increased risk for asthma, with increasing prevalence of asthma outcomes associated with the increased size of the swine operation (Merchant et. al. 2005). Children in North Carolina attending middle schools within 3 miles of one or more swine CAFOs and children attending schools where school staff report CAFO odors in school buildings were found to have a higher prevalence of wheezing compared with other middle school children (Mirabelli et al. 2006a, 2006b). It should be noted that these studies (although controlled) lack contemporaneous exposure assessment and health outcomes ascertainment. Additional research to include environmental exposure data related to biomarkers of response is needed.

Mental health. Living in proximity to large-scale CAFOs has been linked to symptoms of impaired mental health, as assessed by epidemiologic measures. Greater self-reported depression and anxiety were found among North Carolina residents living near CAFOs (Bullers 2005; Schiffman et al. 1995). This finding was not corroborated in a small study by Thu et al. (1997) of depression among people living near to or far from CAFOs. However, it should be noted that the study of Thu et al. differed in that residents were not asked to report on their mental state during an actual odor episode as was the case in the study by Schiffman et al. (1995).

Greater CAFO-related posttraumatic stress disorder (PTSD) cognitions have been reported among Iowans living in an area of CAFO concentration compared with Iowans living in an area of a low concentration of livestock production (Hodne CJ, unpublished data). PTSD cognitions were consistent with interviewees' multiple concerns about the decline in the quality of life and socioeconomic vitality caused by CAFOs, in areas of CAFO concentration with declining traditional family farm production.

Social health. One of the most significant social impacts of CAFOs is the disruption of quality of life for neighboring residents. More than an unpleasant odor, the smell can have dramatic consequences for rural communities where lives are rooted in enjoying the outdoors (Thu 2002). The encroachment of a large-scale livestock facility near homes is significantly disruptive of rural living. The highly cherished values of freedom and independence associated with life oriented toward the outdoors gives way to feelings of violation and infringement. Social gatherings when family and friends come together are affected either in practice or through disruption of routines that normally provide a sense of belonging and identity—backyard barbecues and visits by friends and family. Homes are no longer an extension of or a means for enjoying the outdoors. Rather, homes become a barrier against the outdoors that must be escaped.

Studies evaluating the impacts of CAFOs on communities suggest that CAFOs generally attract controversy and often threaten community social capital (Kleiner AM, Rikoon JS, Seipel M, unpublished data; 2000; Ryan VD, Terry Al, Besser TL, unpublished data; Thu 1996). The rifts that develop among community members can be deep and long-standing (DeLind 1998). Wright et al. (2001), in an in-depth six-county study in southern Minnesota, identified three patterns that reflect the decline of social capital that resulted from the siting of CAFOs in all six rural communities they studied: *a*) widening gaps between CAFO and non-CAFO producers; *b*) harassment of vocal opponents of CAFOs; and *c*) perceptions by both CAFO supporters and CAFO opponents of hostility, neglect, or inattention by public institutions that resulted in perpetuation of an adversarial and inequitable community climate. Threats to CAFO neighbors have also been reported in North Carolina (Wing 2002). Clearly, community conflict often follows the siting of a CAFO in a community. What is not known is if community conflict resulting from the siting or presence of CAFOs has an impact on the ability of communities to act on other issues.

Environmental injustice. Disproportionate location of CAFOs in areas populated by people of color or people with low incomes is a form of environmental injustice that can have negative impacts on community health (Wing et al. 2000). Several studies have shown that a disproportionate number of swine CAFOs are located in low-income and nonwhite areas (Ladd and Edwards 2002; Wilson et al. 2002; Wing et al. 2000) and near low-income and nonwhite schools (Mirabelli et al. 2006a, 2006b). These facilities and the hazardous agents associated with them are generally unwanted in local communities and are often thrust upon those sectors with the lowest levels of political influence. CAFOs are locally unwanted because of their emissions of malodor, nutrients, and toxicants that negatively affect community health and quality of life. Low-income communities and populations that experience institutional discrimination based on race have higher susceptibilities to CAFO impacts due to poor housing, low income, poor health status, and lack of access to medical care.

Failure of the political process. In 2005 the U.S. Government Accountability Office issued a report on the effectiveness of U.S. EPA efforts in meeting its obligations to regulate concentrated animal feeding operations (U.S. Government Accountability Office 2005). The report identified two major flaws:

Exhibit 16

Off. of Water, EPA, Analysis under E.O. 12898 re 74 Fed. Reg. 65431 (Oct. 3, 2011).

(excerpted: cover page, page 4)

National Pollutant Discharge Elimination System (NPDES) Concentrated Animal Feeding Operation (CAFO) Reporting Rule

Analysis under Executive Order 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations

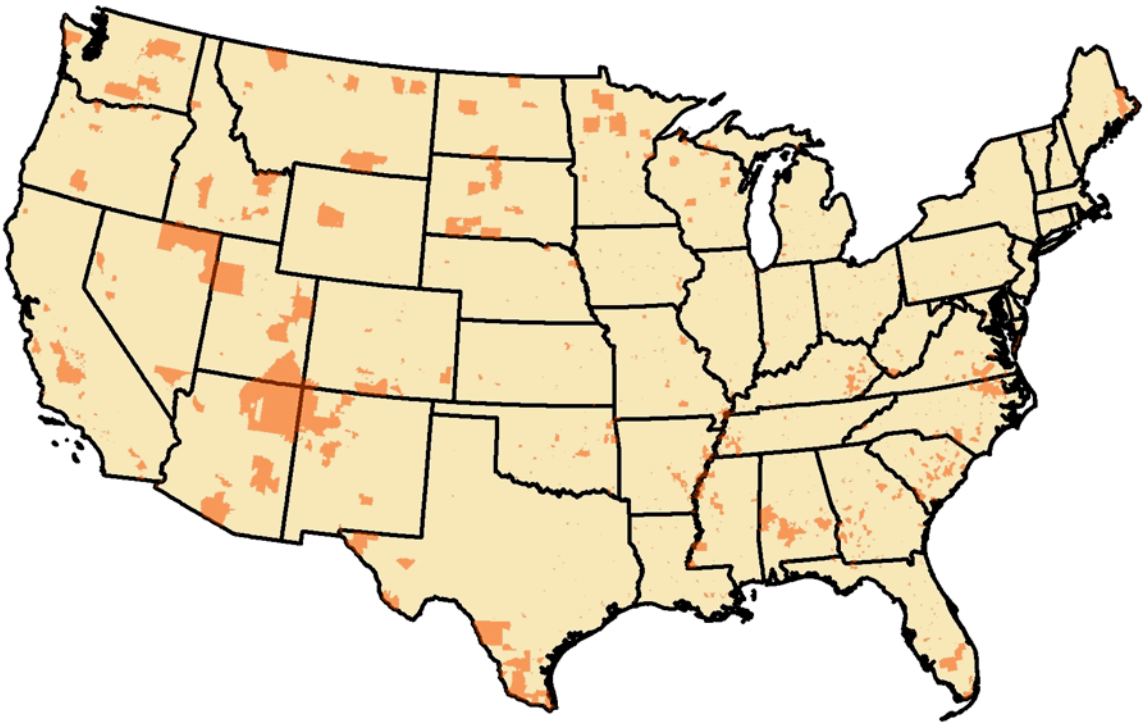
October 3, 2011

U.S. Environmental Protection Agency
Office of Water

Office of Wastewater Permits
Water Permits Division

Office of Wetlands, Oceans, and Watersheds
Assessment and Watershed Protection Division

Figure 2: GIS data layer showing rural census tracts with high densities of populations of concern



6. Analysis of Mapping Showing Areas with High CAFO Densities and Populations of Concern

As a final step in the analysis, EPA then overlaid the maps of CAFO densities with the maps of high densities of potentially impacted populations. This new map then revealed geographic regions in the U.S. where the Agency needs to target its rulemaking outreach to address potential environmental justice concerns based on the fact that these rural areas have both large numbers of CAFOs and large numbers of minority and low-income populations. This map, as shown in Figure 3, reveals that EPA should concentrate its outreach for the new 308 rulemaking to communities in four key regions of the U.S.:

1. The Delmarva peninsula, in particular Dorchester, Wicomico, Somerset, and Accomack counties
2. The Minnesota-Iowa border area, in particular Martin, Watonwan, Blue Earth, Freeborn, Steele and Mower counties
3. The Carolina lowlands, in particular Wayne, Lenoir, Duplin, Sampson, Bladen, Robeson, Dillon, Scotland, Richmond, and Anson counties
4. The California central valley, in particular San Joaquin, Stanislaus, Merced, Kings, and Tulare counties.

EPA looks forward to working with these communities as the rulemaking is finalized.