



December 21, 2018

Via e-mail to Christine.Lawson@ncdenr.gov and Swinepermit.comments@ncdenr.gov

DWR Animal Operations
Attn: Swine General Permit
1636 Mail Service Center
Raleigh, NC. 27699-1636

Re: Draft Swine Waste Management System General Permit (AWG100000)

Dear DWR Animal Operations:

On behalf of the North Carolina Environmental Justice Network (“NCEJN”), the Rural Empowerment Association for Community Help (“REACH”), and Waterkeeper Alliance, Inc. (“Waterkeeper”), we are pleased to submit these comments on the draft Swine Waste Management System General Permit (AWG100000) (“Draft Permit”) circulated for stakeholder review by the North Carolina Department of Environmental Quality (“DEQ”).¹

I. Background

In 2013, during the public comment period for the existing Swine Waste Management System General Permit (“2014 Permit”), researchers from UNC’s Gillings School of Public Health called on DEQ to make significant changes in light of the “large body of evidence documenting the negative health impacts of industrial swine operations.”² These researchers urged DEQ “to reduce off-site pollution and increase transparency about animal production activities” and to prohibit “1) the management of swine waste using lagoons and sprayfields, 2) the non-therapeutic use of antibiotics in livestock production, and 3) the location of animal confinements and animal waste storage in flood plains.”³ These changes, the researchers explained, were “the *minimum* required to preserve the health and well-being of rural residents near swine operations.”⁴

¹ DEQ, Swine Waste Management System General Permit (Draft – Permit Number AWG100000) (Nov. 7, 2018), <https://files.nc.gov/ncdeq/Swine-General-Permit-11132018.docx.pdf>

² Comments of Steve Wing, Ginger T. Guidry, Sarah Hatcher and Jessica Pinsky to Christine Lawson Re: General Permit AWG100000, December 6, 2013, at 1.

³ *Id.* at 5.

⁴ *Id.*, emphasis added.

NCEJN, Waterkeeper, and others also submitted comments in 2013 urging DEQ to modify the 2014 Permit to comply with Title VI of the Civil Rights Act of 1964, 42 U.S.C. § 2000d, *et seq.* Title VI and its implementing regulations prohibit recipients of federal funds, including DEQ, from discriminating on the basis of race or ethnicity. NCEJN and Waterkeeper called on the Agency “to assess the racial and ethnic impact of the permitting program” before finalizing the 2014 Permit and to “adopt measures that protect communities from pollution from the swine facilities.”⁵

DEQ did not incorporate the changes requested by NCEJN, Waterkeeper, or the UNC researchers. As a result, NCEJN, REACH, and Waterkeeper filed a civil rights complaint under Title VI and its implementing regulations with the U.S. Environmental Protection Agency (“EPA”), alleging that the 2014 Permit and DEQ’s oversight of permitted operations have a discriminatory impact based on the race and ethnicity of the residents of communities in which these operations are concentrated.⁶ Complainants supported their allegations with substantial scientific evidence, including an analysis by Drs. Steve Wing and Jill Johnston demonstrating that African Americans, Latinos, and Native Americans in certain areas of North Carolina are respectively 1.4, 1.26, and 2.39 times more likely than non-Hispanic whites to live within 3 miles of one or more industrial swine facilities.⁷ In 2016, Complainants filed a second civil rights complaint, alleging that DEQ had failed to protect them from intimidation.⁸

In 2017, EPA issued a letter to DEQ expressing “deep concern about the possibility that African Americans, Latinos, and Native Americans have been subjected to discrimination as the result of NC DEQ’s operation of the Swine Waste General Permit program” and also expressed “grave concern” that Complainants had suffered intimidation.⁹ In May 2018, DEQ and the complainants reached an agreement to settle the civil rights complaint, which included DEQ’s commitment to comply with certain procedures and propose certain substantive changes to the 2014 Permit when the Agency released the next version of that permit for stakeholder review and comment.¹⁰ DEQ also committed to developing an Environmental Justice tool (“EJ tool”) --

⁵ See, Comments submitted by Catawba River Foundation et al. Re: General Permit AWG100000, December 6, 2013

⁶ See, Complaint by NCEJN, REACH, and Waterkeeper Alliance Against North Carolina DEQ (EP, A File No. 11R-14-R4), September 3, 2014.

⁷ Steve Wing & Jill Johnston, Dep’t of Epidemiology, Univ. of N.C. at Chapel Hill, Industrial Hog Operations in North Carolina Disproportionately Impact African-Americans, Hispanics and American Indians (rev. Oct. 19, 2015), submitted to EPA as Complaint Attachment 12.

⁸ See, Title VI Civil Rights Complaint and Petition for Relief or Sanction by NCEJN, REACH, and Waterkeeper Alliance Against North Carolina DEQ (EPA OCR File No. 11R-14-R4): Intimidation. July 11, 2016. Available upon request.

⁹ Letter from EPA to DEQ in Case-11R-14-R4, January 12, 2017.

¹⁰ See Settlement Agreement, Case-11R-14-R4.

ideally by April 1, 2019-- that will allow DEQ to conduct environmental justice analyses of regulated swine waste facilities.¹¹

II. The Draft Permit is Much Improved but Still Fails to Comply with Title VI.

Although more protective than the 2014 Permit, the Draft Permit continues to allow industrial hog operations to harm surrounding communities, including disproportionate numbers of African Americans, Latinos and Native Americans. In addition, the Draft Permit fails to require DEQ or any other entity to evaluate whether permitted operations are likely to adversely affect particularly vulnerable communities, also known as “communities of concern.” Indeed, the Draft Permit does not contemplate that such evaluations will occur at any point during the Draft Permit’s 5-year term, despite DEQ’s commitment to develop an EJ tool by April 2019.

The “lagoon and sprayfield” system of waste storage and disposal employed by many industrial hog operations, poses serious threats to surrounding communities. More than twenty years ago, the North Carolina General Assembly recognized the dangers of this system and directed the Department of Agriculture to “develop a plan to phase out the use of anaerobic lagoons and sprayfields as primary methods of disposing of animal waste at swine farms.” 1997 N.C. Sess. Laws 1997-458, § 12.4. The legislature also enacted a moratorium on the use of lagoons and sprayfields at any new or expanded hog operation. *See, id.* § 1.1. Although this moratorium was initially limited in duration, it was extended several times before 2007, at which point the moratorium became permanent. Pursuant to N.C. Gen. Stat. § 143-215.10I, any new or expanded swine waste management system must, in compliance with performance criteria described in 15A N.C. Admin. Code 2T.1307:

- (1) Eliminate the discharge of animal waste to surface water and groundwater through direct discharge, seepage, or runoff[;]
- (2) Substantially eliminate atmospheric emission of ammonia[;]
- (3) Substantially eliminate the emission of odor that is detectable beyond the boundaries of the parcel or tract of land on which the swine farm is located[;]
- (4) Substantially eliminate the release of disease-transmitting vectors and airborne pathogens[; and]
- (5) Substantially eliminate nutrient and heavy metal contamination of soil and groundwater.

DEQ should require implementation of technologies satisfying these statutory performance standards where necessary to comply with Title VI. Since at least 2013, DEQ has known that industrial hog operations are heavily concentrated near communities of concern that are disproportionately non-white, low-wealth, and otherwise vulnerable, in areas of North Carolina

¹¹ *Id.* at 6

that are over-burdened by industrial poultry operations and other undesirable and polluting facilities. DEQ should not allow another five years to go by without requiring permittees near communities of concern to convert their animal waste management systems to technologies that comply with 15A N.C. Admin. Code 2T.1307.

Multiple recent events support immediate major revisions to the Draft Permit. These include:

- **Smithfield’s announcement that it plans to cover many of its open lagoons over the next ten years to capture methane, which will, in turn, be burned for energy.** Any such modification to an animal waste management system would trigger the requirements for superior technology contained in N.C. Gen. Stat. § 143-215.10I and 15A N. C. Admin. Code 02T .1307.
- **Increasingly frequent and severe storms and precipitation, particularly in eastern North Carolina.** Hurricanes Florence and Michael recently illustrated the lagoon and sprayfield system’s inability to withstand extreme weather—a problem that NCEJN, REACH, Waterkeeper, and many others have long recognized. Following Hurricane Florence, the North Carolina Pork Council claimed to have “prepared for the hurricane by lowering the levels of the lagoons to accommodate more rainwater, using the manure as fertilizer in nearby fields.”¹² However, that “preparation” guarantees that pollution will occur when the anticipated rain washes manure off fields and into surface water before it can be absorbed by crops.

During the stakeholder meeting on November 27, we were struck by comments from industry representatives and contract growers that demonstrated that remaining in compliance with this non-discharge permit is simply impossible, especially in light of increasingly severe storms hitting the region. Their comments demonstrated that these 20-25 year-old lagoons simply do not have the structural capacity to hold waste and meet freeboard limits under the updated 25-year/24-hour year storm event standard, especially when combined with the permit’s prohibition on spraying/land application of lagoon effluent in advance of a storm. The stakeholder meeting reaffirmed our belief that the only logical, sensible, and sustainable answer both to the conundrum that permittees find themselves in and the environmentally hazardous and racially discriminatory situation affecting impacted communities is to convert lagoons and sprayfields to superior technologies, most immediately in the 100 year floodplain and near communities of concern.

¹² Chris Megerian, *Environmentalists Worry that Florence Will Leave Behind a Toxic Mess in North Carolina*, L.A. Times (Sept. 18, 2018).

- **The publication of a growing body of scientific literature that demonstrates that industrial hog operations using the lagoon and sprayfield system threaten human health and the environment.** In September 2018, the North Carolina Medical Journal published research documenting the increased risk of serious health conditions suffered by residents living near industrial hog operations in North Carolina.¹³ The study compared communities with the highest concentration of hog operations to those without such operations (but similar in all other respects) and found there were 30% more deaths among patients with kidney disease, 50% more deaths among patients with anemia, and 130% more deaths among patients with a blood bacterial infection in communities near concentrated hog operations.¹⁴ These communities also experience greater risk of infant mortality and lower birth weights.¹⁵ The study reiterates what UNC’s public health scientists warned DEQ about almost 20 years ago: that a review of state and federal records shows that North Carolina’s swine CAFOs are disproportionately located in low-income communities of color, and that those populations are more susceptible to CAFO pollution because of older housing, less access to air conditioning, increased exposures to other environmental and occupational hazards, higher prevalence of medical conditions that can be exacerbated by exposure to CAFO pollution, and inadequate access to medical services.

To comply with Title VI, the Draft Permit must at least require industrial hog operations to evaluate their proximity to communities of concern. If that evaluation reveals an operation to be within a certain proximity to one or more such communities, then the permit should impose stronger provisions to help mitigate the operation’s offsite impacts, such as groundwater monitoring, more significant setbacks, or conversion of the swine waste management system to an environmentally superior technology. As REACH, NCEJN, and Waterkeeper commented during the stakeholder meeting on November 27, an EJ tool would help permittees evaluate the risk their operations pose to surrounding communities and the environment. Following the model set by the North Carolina Phosphorus Loss Assessment Tool, the permit should apply automatic consequences if the EJ tool demonstrates that an operation’s risk is unacceptably high. Because the EJ tool should be ready for use within the next two years, DEQ should limit the 2019 permit’s duration to 2 years. During that time DEQ can finalize and fully implement the EJ tool, consider its results, and work with stakeholders on a reasonable timeline for mitigation requirements.

¹³Julia Kravchenko et al, *Mortality and Health Outcomes in North Carolina Communities Located in Close Proximity to Hog Concentrated Animal Feeding Operations*, 79 N.C. Med. J. 278 (2018)

¹⁴ *Id.* at 282

¹⁵ *Id.* at 283-286.

III. Comments on Specific Draft Permit Provisions

Overall, we strongly endorse many of DEQ’s proposed modifications, which represent significant improvements to the 2014 Permit. As discussed above, however, recent events—including two devastating hurricanes—bear out community members’ longstanding concerns about swine waste management in eastern North Carolina. Increased oversight and stronger protections are necessary to protect public health and the environment. Our comments identify some of the key provisions to ensure, or could be modified to ensure, that DEQ is in fact carrying out its mission of “[p]roviding science-based environmental stewardship for the health and prosperity of ALL North Carolinians.”¹⁶

- **Capacity to withstand extreme rainfall events and definition of 25-year, 24-hour rainfall or storm events (Condition I.1, Definitions Section VII)**

The Draft Permit replaces the 2014 Permit’s decades-old definition of a 25-year, 24-hour rainfall or storm event with a more modern standard developed by the National Oceanic and Atmospheric Administration (“NOAA”). We support DEQ’s decision to update this definition as an important first step. Given the current frequency of 100- and even 500-year storms, DEQ should require that animal waste management systems be designed and operated to accommodate more severe weather.

Rain can carry nutrients and disease-causing agents from lagoons and sprayfields to nearby rivers and streams through surface and subsurface runoff.¹⁷ These pollutants (including phosphorous and nitrogen) already have caused significant damage to water bodies in eastern North Carolina.¹⁸ Experts anticipate that climate change will bring increasingly frequent and severe storms, including heavy precipitation nationwide.¹⁹ In New York City, floods that were once expected to occur every 100 years now occur every 3-20 years. Rivers and streams in North Carolina reached 100-year flood volumes during Hurricane Floyd and, more recently, during Hurricane Matthew. Extreme floods are expected to continue.²⁰

¹⁶ *Our Mission*, DEQ, <https://deq.nc.gov/about/history-of-deq> (last visited Dec. 18, 2018) (emphasis in original).

¹⁷ Robert Evans et al., *Subsurface Drainage Water Quality from Land Application of Swine Lagoon Effluent*, 27 *Transactions Am. Soc’y Agric. & Biological Eng’rs* 473 (1984); Phil Westerman et al., *Swine Manure and Lagoon Effluent Applied to a Temperate Forage Mixture: II. Rainfall Runoff and Soil Chemical Properties*, 16 *J. Env’tl. Quality* 106 (1987).

¹⁸ Kenneth Stone et al., *Water Quality Status of a USDA Water Quality Demonstration Project in the Eastern Coastal Plain*, 50 *J. Soil & Water Conservation* 567 (1995); James W. Gilliam et al., *Water Resources Res. Inst., Univ. of N.C., Rep. No. 306, Contamination of Surficial Aquifers with Nitrogen Applied to Agricultural Land* (1996).

¹⁹ Cynthia Rosenzweig et al., *Climate Change and Extreme Weather Events; Implications For Food Production, Plant Diseases, and Pests*, 2 *Glob. Change & Human Health* 90 (2001).

²⁰ FEMA, “Hydrologic Analysis of Hurricane Matthew’s Impact on Dam Safety in North Carolina and South Carolina (August, 2018), https://www.fema.gov/media-library-data/1535042937481-11942dab7f7f79e5f561f3e0bc0a2d9c/NCSCDamsHydrologicSummary_FINAL_8-14-18_dz.pdf; Jerad D. Bales, et

Increased flooding is of particular concern in North Carolina, where many industrial hog operations are located on or near a 100-year floodplain.²¹ There are 926 operations, housing more than 3.8 million hogs, in areas of North Carolina where the National Weather Service (“NWS”) found that flooding was “occurring or imminent” after Hurricane Florence. More than a third of the collective 1,504 poultry and hog operations in these areas received an estimated 15 to 19 inches of rain, and more than one-fourth saw more than 20 inches.²²

We urge DEQ to ensure the phase-out of lagoons that are in or near the 100-year floodplain. One hundred twenty-three industrial hog operations in or within 500 feet of this floodplain received at least 15 inches of rain following Hurricane Florence—enough to swamp lagoons and flood confinement houses.²³ In those high flood risk areas identified by NWS, more than 1,000 waste pits received precipitation that exceeded the 25-year, 24-hour storm standard for that location, meaning they overfilled and likely sustained structural damage.²⁴ Of these, an estimated 35 pits are in the 100-year floodplain and received over 15 inches of rain.²⁵

- **Removal of amendments (Conditions I.4, Definitions Section VII)**

We strongly support the Draft Permit’s elimination of “amendments” to Certified Animal Waste Management Plans (“CAWMP”). We heard industry representatives oppose this change on November 27 because amendments (unlike major changes and revisions) did not have to be submitted to DWR for approval before being implemented as changes to CAWMPs, which gave operators more flexibility to adjust to circumstances onsite without having to wait for agency approval.

We understand that need for flexibility; however the Draft Permit must ensure transparency and accountability to the public—even if DEQ’s Division of Water Resources has limited personnel capacity to process requests for agency approval. It is critical that community members, especially those most directly harmed by industrial hog operations, have access to documents and information related to any changes in land application or other CAWMP-related activities. The CAWMP is one of the primary tools required under the general permit to ensure that permitted facilities do not contribute to surface or ground water pollution. Therefore, any

al., USGS, “Two Months of Flooding on Eastern North Carolina, September – October, 1999 (2000), <https://pubs.usgs.gov/wri/wri004093/flooding.html>.

²¹ John Walsh et al., U.S. Glob. Change Res. Program, *Appendix 3: Climate Science Supplement*, in *Climate Change Impacts in the United States: The Third National Climate Assessment* 735 (Jerry M. Melillo et al. eds., 2014), <http://nca2014.globalchange.gov/report/appendices/climate-science-supplement>.

²² EWG, *Map: Florence Drenched Thousands of North Carolina CAFOs and Animal Waste Pits*, <https://www.ewg.org/release/map-florence-drenched-thousands-north-carolina-cafos-and-animal-waste-pits> (last visited December 13, 2018).

²³ *Id.*

²⁴ *Id.*

²⁵ *Id.*

compromise on this provision must make all documents and information related to any changes in land application or other CAWMP-related activities available to the public.

- **Compliance with NRCS nutrient management standards (Condition I.9)**

Almost all of the proposed changes to Condition I.9 are important steps toward more meaningful assessment of compliance with agronomic rates. The change we do not support (and which is inconsistent with the draft permit agreed to in the Title VI Settlement) is the threshold of 400, for reasons set forth in December 21, 2018 comments submitted by the Southern Environmental Law Center. All facilities that land-apply animal waste should be required to assess the risk of phosphorus loss and mitigate it accordingly. PLAT is a tool—like the Environmental Justice mapping tool described above-- that should be used by every industrial hog operation to evaluate the risk it poses to surrounding communities and natural resources. As in the EJ Tool context, the Draft Permit should also contemplate automatic consequences if the PLAT analysis concludes the risk to be unacceptably high.

PLAT should therefore be run by all facilities that land-apply animal waste, and all such facilities should have to manage nutrients according to PLAT's guidance. PLAT was developed at great taxpayer expense to better evaluate and mitigate environmental risk. We know that the nutrient management consequences of running PLAT have been in the permit for years, so the changes we support should be made now.

- **Setbacks (Conditions I.12, I.13)**

The Draft Permit requires the same setbacks as the 2014 Permit: “Animal waste shall not be applied within 100 feet of any well with the exception of monitoring wells” and “swine . . . may not be confined within 100 feet of an adjacent surface water or a seasonally-flooded area.” Draft Permit at 3. We urge DEQ to strengthen those setbacks to at least 500 feet. Although a 100-foot setback is the national minimum setback from wells recommended by EPA,²⁶ that minimum fails to take into account state-specific conditions that require further setbacks to protect the integrity of well water.

The concentration and number of animal operations in North Carolina, combined with eastern North Carolina's soil type, warrants a greater setback distance. North Carolina is the “second highest swine producing state in the Nation.”²⁷ Most of the swine facilities are located in the

²⁶ Office of Wastewater Mgmt., EPA, EPA 821-R-03-010, Producers' Compliance Guide for CAFOs: Revised Clean Water Act Regulations for Concentrated Animal Feeding Operations (CAFOs) 33 (Nov. 2003), <https://www.epa.gov/sites/production/files/2015-06/documents/compliance-cafos.pdf>.

²⁷ Stephen L. Harden, S. Atlantic Water Sci. Ctr., *Surface-Water Quality in Agricultural Watersheds of the North Carolina Coastal Plain Associated with Concentrated Animal Feeding Operations*, U.S. Geological Survey, <https://www.usgs.gov/centers/sa-water/science/surface-water-quality-agricultural-watersheds-north-carolina-coastal-plain> (last visited Dec. 20, 2018).

eastern portion of the state, a region that is sensitive because of low-lying flood plains and high water tables. In addition, North Carolina has many different types of soil—including sand, loam, and clay—that differ widely in their capacity to absorb animal waste as it is applied to the land. One study of North Carolina swine waste sprayfields showed that only 62% of nitrogen in applied waste was absorbed by onsite soils. Of the remaining 38%, 22% was lost to “unintended offsite transport” and 16% remained unaccounted for in onsite soils. This research suggests that a significant amount of nitrogen that is applied to sprayfields in North Carolina could be transported through the porous land to nearby ground water resources, like wells. The Draft Permit should take into account this research and increase the setbacks from drinking water wells to at least 500 feet.

North Carolina would not be alone in requiring increased setbacks. Other states with comparably high densities of industrial animal operations have rejected the 100-foot minimum in favor of more protective setback distances. Alabama imposes a 500 foot setback from any occupied dwelling, school, church, hospital, or park.²⁸ South Dakota requires a 1,000-foot setback from a public water source, and a 250 foot setback from a private well.²⁹ In Illinois, the minimum setback distance is 150 feet.³⁰

Another common practice is for state authorities to modify setback distances for public or community wells, *i.e.* those serving several households. For example, Wisconsin requires a 1,000-foot setback from community wells.³¹ Our neighbor South Carolina requires at least a 200-foot setback from both public and private drinking wells.³²

- **Nutrient management plan (Condition II.4)**

Proposed condition II.4 remains unchanged from the 2014 Permit, requiring only that land application rates comply with the CAWMP. The Draft Permit omits clarifying language, agreed to during the Title VI settlement negotiations, which specified that analysis prior to land application consider all nutrient sources, including effluent, sludge, and commercial fertilizer. That provision is critical to ensure that land application occur at no greater than agronomic rates.

²⁸ ALA. ADMIN. CODE r.335-6-7-.26(2)(p).

²⁹ South Dakota Department of Environment and Natural Resources, General Water Pollution Control Permit for Concentrated Animal Feeding Operations, SDG-100000 (April 15, 2017) at 1.1.26.

³⁰ Illinois Livestock Management Facility Regulations, Section 900.803, <ftp://www.ilga.gov/jcar/admincode/008/008009000H08030R.html>

³¹ Wisconsin Administrative Code Chapter N243.15 https://docs.legis.wisconsin.gov/code/admin_code/nr/200/243/II/11

³² S.C. Reg. 61-43 Part 100 <https://www.clemson.edu/extension/camm/regulations/r61-43.pdf>;

<https://www.scdhec.gov/environment/water-quality/water-quality-agriculture-permits-and-compliance/agricultural-permits-3>

- **Runoff and ponding from land application (Condition II.5)**

We strongly support proposed condition II.5, which clarifies that land application shall not result in “excessive ponding or any runoff during any given application event.” As modified, this condition is easier to assess by visual inspection. Runoff from over-applied nutrients can pollute surface and ground water. Groundwater contamination is of particular concern in North Carolina, where a significant number of people rely on well water.

- **Time limits for waste incorporation (Condition II.7)**

Although the Draft Permit’s requirement that permittees incorporate manure or sludges into the soil within one day is an improvement, it does not go far enough. An even shorter time limit for waste incorporation is necessary to further reduce the adverse impacts on air and water quality and limit exposure to intense odors. Studies have determined that “solid livestock manure [should] be incorporated into the soil within 12 hours of broadcasting in order to maximize the nutritional benefits to the soil and minimize odors and possible environmental effects the manure may have.”³³ We support the clarification that application may not result in “excessive ponding or any runoff during any given application event,” including on no-till fields, pastures, or fields where crops are actively growing.

- **Disposal of mortalities (Condition II.10)**

We applaud DEQ’s decision to impose clear constraints on the management of dead animals, which is necessary to protect human health and the environment. In addition, we urge DEQ to require groundwater monitoring near burial sites and for facilities to submit plans for catastrophic mortality events. While on-farm burial of animal bodies has been preferred by some animal production facilities due to the limited infrastructure requirements and economic benefits,³⁴ burial has been proven to impair groundwater quality.³⁵ Livestock burial pits release environmental contaminants and these pollutants include nutrients (such as nitrogen and phosphorus), chloride, disease-causing agents found in animal waste, and ammonia and nitrates that can enter groundwater.³⁶ Complete decay in burial trenches with well-drained soils can take

³³ Lawrence Papworth et al., Agtech Ctr., Investigation into Manure Incorporation of Various Tillage Methods (2001). <https://www.pdfFiller.com/jsfiller-desk5/?projectId=246161309&expId=4287&expBranch=3#fe20b29aed3c4306813e0a26f955bd4a>

³⁴ Ceri L. Gwyther et al, *The Environmental and Biosecurity Characteristics of Livestock Carcass Disposal Methods: A Review*, 31 Waste Mgmt. 767 (2011), <http://oro.open.ac.uk/50909/3/50909.pdf>.

³⁵ Qi Yuan et al., *Potential Water Quality Impacts Originating from Land Burial of Cattle Carcasses*, 456 Sci. Total Env’t 246 (2013), <https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1510&context=natrespapers>.

³⁶Hilda Hatzell, U.S. Geological Survey, Water-Resources Investigations Rep. 95-4064, Effects of Waste-Disposal Practices on Ground-Water Quality at Five Poultry (Broiler) Farms in North-Central Florida, 1992-93 (1995); Lee M. Myers et al., *Impact of Poultry Mortality Pits on Farm Groundwater Quality*, in *Proceedings of the 1999 Georgia Water Resources Conference* (Mar. 31, 1999); William Ritter & A. E. M. Chirnside, *Impact of Dead Bird Disposal Pits on Ground-Water Quality on the Delmarva Peninsula*, 53 Bioresource Tech. 105 (1995).

upwards of two years,³⁷ thus exposing the surrounding ecosystem to disease-causing agents and contaminants for extended periods of time. As a result, careful location planning is essential. Operators can reduce risk by taking into account geologic topography, rainfall data, and groundwater maps.

Leachate from burial pits (*e.g.*, water that has passed through animal carcasses) is dangerous to local communities. Burial-pit leachate can be highly acidic, and high acidity harms aquatic ecosystems. The contaminants present in burial pit leachate are found in amounts that are much higher than those in municipal and industrial sewage plants' effluent streams, which are considered to be a major source of endocrine disrupting compounds in aquatic ecosystems.³⁸ Given the increase in extreme weather events due to climate change,³⁹ additional protections are necessary to protect public health. .

- **Erosion prevention (Condition II.12)**

The Draft Permit clarifies that that the protective cover must be designed and maintained to prevent berms and embankments from eroding. This condition should comply with DEQ Certification Training Manual standards.

- **Flow meters (Condition II.18)**

We support the new provisions but encourage DEQ to require the use of flow meters in all circumstances, regardless of a facility's compliance history. Flow meters can help prevent overapplication of waste and offer other benefits as well. Their use can improve the accuracy and effectiveness of land application, providing the simplest and least labor-intensive method for estimating the volume of lagoon water applied. They can greatly simplify recordkeeping and calculations required to maintain compliance.⁴⁰ Permittees may also be eligible for financial support for installing flow meters through the Environmental Quality Incentives Program (EQIP).⁴¹

³⁷ Yuan et al., *supra* note 35.

³⁸ Anja Coors et al., *Removal of Estrogenic Activity from Municipal Waste Landfill Leachate Assessed with a Bioassay Based on Reporter Gene Expression*, 37 *Envtl. Sci. & Tech.* 3430 (2003); C. Desbrow et al., *Identification of Estrogenic Chemicals in STW Effluent: 1. Chemical Fractionation and In Vitro Biological Screening*, 32 *Envtl. Sci. & Tech.* 1,549 (1998); Wolfgang Körner et al., *Substances with Estrogenic Activity in Effluents of Sewage Treatment Plants in Southwestern Germany: 2. Biological Analysis*, 20 *Envtl. Toxicology & Chemistry* 2,142 (2001).

³⁹ Cynthia Rosenzweig et al., *Climate Change and Extreme Weather Events; Implications For Food Production, Plant Diseases, and Pests*, 2 *Global Change & Human Health* 90 (2001).

⁴⁰ Marsha C. Mathews & Carol Frate, U.C. Coop. Extension, *Flow Meters for Measuring Dairy Liquid Manure Applications* (Sept. 2010), <http://manure.ucdavis.edu/files/52489.pdf>.

⁴¹ Karen Bernick, *5 Rules to Maximize Manure's Value*, *Nat'l Hog Farmer* (Sept. 15, 2009), <https://www.nationalhogfarmer.com/environmental-stewardship/manure-management/0915-maximize-manures-value>.

- **Application of waste in in wind conditions (Condition II.19)**

We applaud DEQ’s decision to prohibit facilities from applying waste in wind conditions that cause or might reasonably be expected to cause mist to reach surface waters or wetlands or cross boundary lines or field boundaries. The Draft Permit provides an objective standard for land application and clarifies that operators are responsible for ensuring that mist does not in fact reach surface waters or wetlands or cross property lines or field boundaries.

- **Land application after precipitation (Condition II.23)**

While we generally support the changes made to this provision, it should be strengthened to ensure that waste will have proper time to incorporate into the land and not exposed to become part of storm runoff. We ask that the 4-hour window also apply to any “watch” issued for hurricanes, tropical storms and surges.⁴² Land application should cease at least twenty hours before hurricanes, tropical storms, or tropical depressions to allow for better management and monitoring for compliance.

- **Devices to stop irrigation during precipitation (Condition II.24)**

We support requiring facilities to “install, operate, and maintain devices on all irrigation pumps/equipment designed to automatically stop irrigation activities during precipitation within 12 months of the issuance of the Certificate of Coverage for this General Permit.” Draft Permit at 6. These devices are generally inexpensive and their use, maintenance, and utility are straightforward.⁴³

- **Testing and calibration of waste application equipment (Condition II.26)**

We support the new language that requires annual testing and calibration of waste application equipment. EPA’s CAFO regulations require operators of large CAFOs to “periodically inspect equipment used for land application of manure, litter, or process wastewater.”⁴⁴ Though the regulations do not specify the frequency of the inspections, EPA recommends inspections every time the equipment is used in order to prevent any potential adverse environmental impacts resulting from the use of the equipment.⁴⁵ Although the standards set forth in ANSI Good Environmental Livestock Production Practices (GELPP): Concentrated Livestock Operations –

⁴² *Watch/Warning/Advisory Definitions*, Nat’l Weather Serv., <https://www.weather.gov/lwx/warningsdefined#Flood%20Watch> (last visited Dec. 20, 2018).

⁴³ Michael D. Dukes & Dorota Z. Haman, *Irrigation System Rainfall Shutoff Devices*, All. for Water Efficiency, http://www.allianceforwaterefficiency.org/Rainfall_Shutoff_Devices.aspx (last visited Dec. 20, 2018).

⁴⁴ 40 C.F.R. 412.4(c)(4).

⁴⁵ Office of Water, EPA, EPA-821-C-04-009, *Managing Manure Nutrients at Concentrated Animal Feeding Operations 4-17* (Dec. 2004), https://www.epa.gov/sites/production/files/2015-08/documents/cafo_manure_guidance.pdf.

Manure Utilization 0004-2002, recommend annual calibration of manure application equipment,⁴⁶ we believe DEQ should require inspection and calibration every time the equipment is used to ensure that waste application equipment is working properly and that accurate measurements are being taken.

- **Crop removal (Condition II.28)**

We agree with the direction of changes made to this provision, which help to clarify the requirement for crop removal. However the provision does not provide sufficient clarity on what it means for crops to be “properly managed and utilized.” We urge DEQ to provide more specificity and clearer limits – for example, by requiring that “Hay should be removed from the harvested area within one year,” as suggested by the North Carolina Animal Waste Management Manual.⁴⁷ Otherwise, if stored for more than one year, hay or silage should be covered entirely so that any decomposing matter cannot escape to re-enter the soil or pollute nearby surface waters.

DEQ should also specify whether crops should be stored outdoors or indoors, whether they should be wrapped or unwrapped, and whether they should be on a platform or stored in some other way. Given that exposure to the elements – including precipitation, soil microbes (and other saprophytic organisms), insects, and heat from the sun - increase the rate of decomposition, failing to mitigate these exposures by leaving crops outdoors, unwrapped, and in contact with the soil would increase the rate of decomposition and allow for nutrients – including phosphorous and nitrogen – to leach back into the soil within a two-year time period.⁴⁸

- **Lowering lagoon levels (Condition II.29)**

We strongly oppose DEQ’s decision to leave Condition II.29 unchanged from the previous permit, which fails to provide necessary oversight for temporary lowering of lagoon levels. This provision should explicitly require permittees to obtain DEQ approval prior to lowering lagoons. As written, the condition could give facilities the impression that they may lower their lagoons through excess land application, in anticipation of the hurricane season or in times of drought if the permittee thinks the decision complies with NRCS standards. Stronger DEQ oversight is needed to prevent facilities from spraying excessive manure from lagoons without ensuring that

⁴⁶ *Id.* at 4-18.

⁴⁷ Ron Sheffield, N.C. State Univ., *Lesson 32: Land Application Best Management Practices*, in *Livestock and Poultry Environmental Stewardship Curriculum* (2001), https://articles.extension.org/sites/default/files/w/2/28/LES_32.pdf.

⁴⁸ “Nutrients in plants that are left in the field will partially resupply nutrient reserves in the soil as they decompose... Estimates of nutrient depletion, therefore, should take into account only the nutrients removed with the harvest portion of the plant.” Deanna L. Osmond & Jihoon Kang, N.C. Coop. Ext.Serv., *Soil Facts: Nutrient Removal by Crops in North Carolina* (Jan. 1, 2008), <https://content.ces.ncsu.edu/nutrient-removal-by-crops-in-north-carolina>.

the land can incorporate the additional waste. Such oversight has never been more urgent, as most lagoons are not designed to handle the extreme storm events that are battering North Carolina with increasing frequency and severity. During Hurricane Florence, rainfall exceeded the amount defined for 24-hour/25-year rain events in large swathes of the state, resulting in hundreds of waste pits receiving more rain than they were designed to withstand.⁴⁹ Facilities often lower lagoons in inappropriate and environmentally harmful ways in an effort to prevent flooding. After Hurricane Florence, multiple facilities were observed spraying untreated waste from lagoons onto saturated fields.⁵⁰ In addition, in advance of a Flash Flood Watch issued in 2016, hog facilities in Duplin County were seen spraying waste onto saturated fields and in other inappropriate areas.⁵¹ The application of waste in excess of land's capacity to absorb it leads to runoff and impaired water quality, and also produces more odorous mists that impair the quality of life for neighboring communities.

DEQ should also clarify that nothing in Condition II.29 overrides Condition II.23, which, as proposed, requires land application to cease within four hours of certain storm warnings.

- **Criteria for monitoring and recording of freeboard levels and for inspections of waste collection, treatment and storage structures (Condition III.2)**

We support the Draft Permit's requirement for weekly monitoring of the waste level gauges on lagoons (II.2.a), and believe that requirement should be extended to weekly monitoring of other collection, treatment and storage structures, e.g. stormwater diversion devices, runoff diversion structures, and devices channeling contaminated stormwater to wastewater and manure storage and containment structures. This would be consistent with other states; Minnesota and New York require weekly visual inspections of all liquid and solid manure storage areas, basins, and other facility structures.⁵² It is also critical that the permit require these inspections be documented in records provided to DEQ so that they can be made available to the public.

⁴⁹ Env'tl. Working Grp., *Map: Florence Drenched Thousands of North Carolina CAFOs and Animal Waste Pits* (Oct. 4, 2018), <https://www.ewg.org/release/map-florence-drenched-thousands-north-carolina-cafos-and-animal-waste-pits>.

⁵⁰ *Waterkeeper Alliance and North Carolina Riverkeepers Conduct Aerial Patrols, Document Hog Waste Contamination and Flooded Coal Ash Ponds*, Waterkeeper All. (Oct. 14, 2016), <https://waterkeeper.org/waterkeeper-alliance-and-north-carolina-riverkeepers-conduct-aerial-patrols-document-hog-waste-contamination-and-flooded-coal-ash-ponds/>

⁵¹ Christian Breen, *North Carolina Hog CAFOs Dumping Waste in Advance of Tropical Storm Hermine*. Waterkeeper All. (Sept. 2, 2016), <https://waterkeeper.org/north-carolina-hog-cafos-dumping-waste-in-advance-of-tropical-storm-hermine/>

⁵² Minn. Pollution Control Agency, *Minnesota Animal Feedlot Permit No. MNG450000 24* (2015), <https://www.pca.state.mn.us/sites/default/files/wq-f3-52.pdf>; N.Y. Dep't of Env'tl. Conservation, *ECL SPDES General Permit for Concentrated Animal Feeding Operations (CAFOs) Permit No. GP-0-16-001 25* (2017), [https://www.dec.ny.gov/docs/water_pdf/eclcafopermit\(1\).pdf](https://www.dec.ny.gov/docs/water_pdf/eclcafopermit(1).pdf).

We also support the draft language making clear that inspection of waste collection, treatment and storage structures will be conducted according to Best Management Practices (BMP) criteria. At the Nov. 27th stakeholder meeting, we heard a comment that BMP's were not defined, and should be. We agree, and suggest this provision (or the BMP definition section VII) reference Chapter 15 of EPA's [NPDES Compliance Inspection Manual](#), including Chapter 15's reference to Appendix AD, "Animal Industry Overview," which contains details on sector-specific confinement facilities, as well as typical manure and mortality management practices.

While we appreciate that the Draft Permit clarifies criteria by which DEQ *may* require facilities to use automated lagoon/storage pond waste-level monitors and recorders, it should go further and make automated monitoring/recording mandatory for all facilities that meet those criteria. Again, given the increase in extreme weather events due to climate change, the accuracy and precision of waste levels are increasingly important and time-sensitive. Automatic monitors make information available when it matters most, especially during storm events when the already understaffed Division is spread thin. They are also more accurate and can store data, which can simplify the permittee's job and provide an accurate record for DEQ.

- **Automatic waste gauges (III.2.c)**

We support Condition III.2.c's provisions for requiring automated lagoon/storage pond waste-level monitors and recorders. This change reinforces the expectation that permittees will accurately and consistently monitor and record lagoon waste levels. We ask that DEQ require *all* facilities to have automatic waste-level gauges, so as to prevent the problems that arise with manual self-monitoring and self-reporting. Requiring automatic waste monitors would increase the accuracy of monitoring and recordkeeping for all facilities, save time, and decrease human error for both DEQ and permittees.

- **Rain gauges and recorders (Condition III.3)**

We support the requirement of automatic rain gauges and recorders, but are concerned about the omission of the additional provision agreed to in the Title VI Settlement Agreement which stated that automatic rain gauges *must* be installed "if the Division determines that the existing rainfall recordkeeping methods/equipment are not adequate to track rainfall events."⁵³

We urge DEQ not only to re-insert the agreed upon language but to require automatic rain gauges across the board. Notably, automatic rain gauges are relatively inexpensive (available for less than \$100)⁵⁴ and they decrease the time needed to record precipitation events.

⁵³ See, *supra*, note 10.

⁵⁴ See, e.g., *Rain Gauges*, Scientific Sales Inc., <http://www.scientificsales.com/Rain-Gauges-s/3.htm?searching=Y&sort=1&cat=3&show=30&page=1> (last visited Dec. 20, 2018).

- **Testing of animal waste (Conditions III.4 and 5)**

We encourage DEQ to require sampling and testing annually instead of “at least once every three years,” (draft Condition III.4) and *prior to* application (III.5). The EPA requires that waste be tested at least once annually. *See* 40 C.F.R. § 412.4(c)(3) (“Manure must be analyzed a minimum of once annually for nitrogen and phosphorus content, and soil analyzed a minimum of once every five years for phosphorus content.”), and encourages that “[s]ampling the manure as close to the time of application as practical provides the CAFO with a better measure of the nutrient content (especially nitrogen) of the manure.”⁵⁵ Permitting facilities to test after application allows waste with potentially excessive nitrogen, phosphorous, zinc, or copper to be applied. Not only does the draft language fail to adequately protect the environment and surrounding communities, it also eliminates the incentive to test animal waste before it is applied and causes potential harm.

A November 2003 publication from the Iowa State University Extension describes best practices for manure sampling in terms of both timing and frequency. Timing should be as close to the time of application as possible—during application is best: “For best results, manure should be sampled at the time of application or as close as possible to application. Sampling during application will help to ensure that samples are well-mixed and representative of the manure being applied.”⁵⁶ The publication recommends such sampling “annually for three years for new facilities, followed with samples every three to five years, unless animal management practices, feed rations, or manure handling and storage methods change drastically from present methods.”⁵⁷ That said, the publication also notes that “if storages are emptied twice a year, it may be necessary to sample in both spring and fall since the different storage temperatures in summer versus winter will affect manure nutrient levels.”⁵⁸

- **Facility record keeping (Condition III.12)**

This provision, lengthening the record retention period from 3 to 5 years, is consistent with terms of the Title VI settlement. This change is necessary to improve accountability and transparency, so that DEQ can have a more complete and longitudinal history to evaluate permit compliance, and is consistent with practices in other states. In Missouri, records must be kept for 5 years, and in Minnesota, records must be kept for a minimum of 6 years, extended further in some legal or administrative circumstances.⁵⁹ DEQ should also facilitate more online record-keeping and allow

⁵⁵ Managing Manure Nutrients at Concentrated Animal Feeding Operations, EPA, (Dec. 2004) https://www.epa.gov/sites/production/files/2015-08/documents/cafo_manure_guidance_fs.pdf

⁵⁶ Angela Rieck-Hinz et al., Iowa State Univ., *How to Sample Manure for Nutrient Analysis* (Nov. 2003).

⁵⁷ *Id.*

⁵⁸ *Id.*

⁵⁹ Mo. Dep’t of Nat. Res., Missouri State Operating Permit No. MOGS10000 5 (2018), <https://dnr.mo.gov/env/wpp/permits/issued/docs/GS10000.pdf>; Minn. Pollution Control Agency, Minnesota Animal Feedlot Permit No. MNG450000 29 (2015), <https://www.pca.state.mn.us/sites/default/files/wq-f3-52.pdf>.

permittees to convert these records from paper to digital, which would greatly improve transparency and public access to information that impacts the environment and public health.

- **Timeframes for waste samples following discharges (Conditions III.14, 15–18)**

While the change requiring facilities to take waste samples within 48 hours after first knowledge of a discharge from a lagoon is an improvement, it needs to go further. We believe that sampling should take place within 24 hours, because levels of bacteria and nutrients vary over time and may be affected by weather conditions.

- **Annual certification (Condition III.15)**

We support this change, but for the sake of increased transparency and public accountability ask that DEQ require facilities to provide additional information, and identify:

- (a) each manure hauler by name and address;
- (b) which and how much additional nutrient loads were added (including but not limited to, sludges, unused feedstuff, leachate, milk waste, septage, and commercial fertilizer);
- (c) the number of animal mortalities at each facility;
- (d) quantities of nitrate, nitrite, ammonia, and TKN.

While we appreciate the annual form requirement, we believe that the public should also be able to access facility records that directly relate to chemicals and other substances which may be entering the air or water. Land application records, removal of solids, waste & soil analyses, cropping records, manure hauler records, stocking records, and lagoon waste level records should all be available to the public, as they directly relate to the environmental and health impacts these comments are most concerned with. Scanning and sending records can now be easily done by mobile devices, and these records can also be digitized or otherwise incorporated into an online platform.

- **Public notice after discharges of at least 1,000 gallons (Condition III.16)**

We support the draft's notice requirements in the event of discharges of 1,000, 15,000 and 1,000,000 gallons of waste, especially the clarification that the larger discharges trigger all the requirements of lesser discharges. However, DEQ should require facilities to contact DWR within 12 hours of a discharge of 5,000 gallons or more. Other states have even stricter requirements for reporting dangerous events. In Ohio, permittees must report potentially dangerous spills and discharges within 30 minutes of discovery, and in Illinois, permittees must report discharges into the waters of the state to a hotline "immediately upon discovery."⁶⁰ Given

⁶⁰ https://www.epa.state.oh.us/portals/35/cafo/CAFO_GeneralPermit_final_feb05_s.pdf ; <https://www2.illinois.gov/epa/Documents/epa.state.il.us/water/permits/cafo/general-npdes-permit.pdf>

that the heaviest concentration of swine operations are in eastern North Carolina, where drainage conditions and other access to surface waters substantially increase the contamination risks in the event of a lagoon breach, overflow, or spill, and given the high number of lagoons and sprayfields in the floodplain, these changes to the public notice provisions are critical for DEQ to ensure transparency, accountability, and safety.

We heard one industry representative comment on Nov. 27th that DEQ lacks statutory authority to require disclosure of the information listed in the draft second paragraph of III.16. We find no support for that position in either federal or state law. The statute referenced in this draft provision, states:

The owner or operator of an animal waste management system *shall*:

- (1) In the event of a discharge of *1,000 gallons or more* of animal waste to the surface waters of the State, issue a press release to all print and electronic news media that provide general coverage in the county where the discharge occurred *setting out the details of the discharge*.
- (2) In the event of a discharge of 15,000 gallons or more of animal waste to the surface waters of the State, publish a notice of the discharge in a newspaper having general circulation in the county in which the discharge occurs and in each county downstream from the point of discharge that is significantly affected by the discharge. The Secretary shall determine, at the Secretary's sole discretion, which counties are significantly affected by the discharge and shall approve the form and content of the notice and the newspapers in which the notice is to be published. The notice shall be captioned "NOTICE OF DISCHARGE OF ANIMAL WASTE". The owner or operator shall publish the notice within 10 days after the Secretary has determined the counties that are significantly affected by the discharge and approved the form and content of the notice and the newspapers in which the notice is to be published. The owner or operator shall file a copy of the notice and proof of publication with the Department within 30 days after the notice is published. Publication of a notice of discharge under this subdivision is in addition to the requirement to issue a press release under subdivision (1) of this subsection.

N.C. Gen. Stat. § 143-215.10C(h) (emphasis added).

15A N.C. Admin. Code 2T .0108(c), also referenced in this draft provision, states:

The Division *may require* monitoring and *reporting requirements*, including of groundwater, surface water or wetlands, waste, wastewater, residuals, soil, treatment processes, lagoon or storage ponds, and plant tissue, *if necessary to determine the source, quantity, and quality of the waste and its effect upon the*

surface water, ground waters, or wetlands. All reports shall be submitted on Division-supplied forms or forms approved by the Division as providing the same information as required by the Division's forms.

15A N.C. Admin. Code 2T .0108(c) (emphasis added).

- **Groundwater monitoring (Condition III.10-11)**

While these changes are significant and welcome developments, they fall short of what is needed to protect the drinking water of communities neighboring swine facilities. Without regular monitoring, the discovery of evidence of impacts to public or private wells offsite, migration of contamination off-site, or impacts on surface water via groundwater will be extremely difficult, if not impossible. In its current form, Condition III.11 may be rendered meaningless, since the evidence needed to initiate groundwater monitoring may itself rely on monitoring. DEQ should require groundwater monitoring downgradient from all lagoons to ensure that migration and impacts are tracked in a comprehensive manner. Permittees should be required to test for evidence of seepage at 3-month intervals at 100 feet downgradient of each of the facility's lagoons.⁶¹

In North Carolina, groundwater monitoring is crucial to ensuring safe drinking water in areas with lagoons and sprayfields. A robust body of research stretching back decades has established that contaminants from animal waste lagoons can travel into groundwater.⁶² Studies specific to North Carolina have demonstrated that lagoons can pollute groundwater with a range of contaminants, including nitrates,⁶³ ammonia,⁶⁴ fecal coliform,⁶⁵ and antibiotic-resistant

⁶¹ At the very least, DEQ should require groundwater monitoring for all lagoons in or in proximity to floodplains, at facilities with violations related to lagoons, at facilities with signature surface water pollution, in the presence of particular soil types with heightened risk of leakage, and at facilities that dispose of mortalities through burial.

⁶² See, e.g., William F. Ritter & Anastasia E. M. Chirnside, *Impact of Animal Waste Lagoons on Ground-Water Quality*, 34 *Biological Wastes* 39 (1990); Robert Evans et al., *Subsurface Drainage Water Quality from Land Application of Swine Lagoon Effluent*, 27 *Transactions Am. Soc'y Agric. & Biological Eng'rs* 473 (1984); Michael A. Mallin et al., *Industrial Swine and Poultry Production Causes Chronic Nutrient and Fecal Microbial Stream Pollution*, 226 *Water, Air & Soil Pollution* 407 (2015).

⁶³ Melva Okun, *Env'tl. Res. Program, UNC School of Public Health, Human Health Issues Associated with the Hog Industry* (1999); Wendee Nicole, *CAFOs and Environmental Justice: The Case of North Carolina*, 121 *Env'tl. Health Persp.* A182, A186 (2013); Kyle P. Messier et al., *Nitrate Variability in Groundwater of North Carolina Using Monitoring and Private Well Data Models*, 48 *Env'tl. Sci. & Tech.* 10,804 (2014).

⁶⁴ Rodney L. Huffman & Phillip W. Westerman, *Estimated Seepage Losses from Established Swine Waste Lagoons in the Lower Coastal Plain of North Carolina*, 38 *Transactions Am. Soc'y Agric. Eng'rs* 449 (1995); Phillip W. Westerman et al., *Swine-Lagoon Seepage in Sandy Soil*, 38 *Transactions Am. Soc'y Agric. Eng'rs* 1749 (1995); Jay M. Ham & Tom M. DeSutter, *Toward Site-Specific Design Standards for Animal-Waste Lagoons: Protecting Groundwater Quality*, 29 *J. Env'tl. Quality* 1,721, 1,721-32 (2000).

⁶⁵ Amy R. Sapkota et al., *Antibiotic-Resistant Enterococci and Fecal Indicators in Surface Water and Groundwater Impacted by a Concentrated Swine Feeding Operation*, 115 *Env'tl. Health Persp.* 1,040 (2007).

bacteria.⁶⁶ Polluted groundwater can, in turn, impair drinking water sources, including wells. One North Carolina study published this year found a statistically significant positive correlation between the density of hogs in the area and nitrate concentrations in private well water.⁶⁷ Consuming nitrates in drinking water is associated with elevated risks of cancer, thyroid disease, and blue baby syndrome, a sometimes fatal condition affecting infants.⁶⁸ Groundwater contamination is of particular concern in North Carolina, where over 3 million people rely on groundwater as their primary source of drinking water.⁶⁹ This number includes many people living near swine CAFOs, which are disproportionately located in areas with populations highly dependent on well water.⁷⁰ In 2000, nearly half of North Carolina's hog CAFOs were located in block groups where more than 85 percent of the households used well water.⁷¹

The high-water tables and sandy soils that characterize the eastern coastal plain, where swine CAFOs are concentrated, increase the risks of groundwater contamination.⁷² Wastewater can enter groundwater in several ways, including through leaching out of lagoons, seeping into groundwater after being applied to sprayfields, and unintentional releases from lagoons caused by rain. In recent years, major storms have resulted in flood waters mixing with millions of gallons of fecal waste, posing severe threats to groundwater.⁷³ During Hurricane Florence and the rains that followed, 33 lagoons overtopped and six sustained structural damage, according to DEQ data. Twenty more flooded to the point where discharges were likely.⁷⁴

Due to the urgent need to protect groundwater in North Carolina, particularly given the increasing frequency and severity of heavy rainfall events, we strongly support new language in the Draft Permit that could lead to an increase in the use of groundwater monitoring.

⁶⁶ *Id.*; M.E. Anderson & Mark D. Sobsey, *Detection and Occurrence of Antimicrobially Resistant E. Coli in Groundwater on or Near Swine Farms in Eastern North Carolina*, 54 *Water Sci. & Tech.* 211, 217 (2006)

⁶⁷ Emily Naylor et al., *Evaluation of Nitrate Concentrations and Potential Sources of Nitrate in Private Water Supply Wells in North Carolina*. 80 *J. Env'tl. Health* 9 (2018).

⁶⁸ Mary H. Ward et al., *Drinking Water Nitrate and Human Health: An Updated Review*, 15 *Int'l J. Env'tl. Res. & Pub. Health* 1,557 (2018).

⁶⁹ *Well Water and Health: Facts & Figures*, N.C. Dep't of Health & Human Servs. (Aug. 1, 2018), <https://epi.publichealth.nc.gov/oe/wellwater/figures.html>. See also, Emily Naylor et al, *Evaluation of Nitrate Concentrations and Potential Sources of Nitrate in Private Water Supply Wells in North Carolina*; Kyle Messier et al, *Nitrate Variability in Groundwater of North Carolina using Monitoring and Private Well Data Models*; and Michael A. Mallin et al, *Industrial Swine and Poultry Production Causes Chronic Nutrient and Fecal Microbial Stream Pollution*, (submitted with these comments and incorporated by reference as exhibits A, B, and C).

⁷⁰ Steve Wing et al., *Environmental Injustice in North Carolina's Hog Industry*, 108 *Env'tl. Health Persp.* 225, 228 (2000).

⁷¹ *Id.*

⁷² Virginia T. Guidry et al., *Connecting Environmental Justice and Community Health*, 79 *N.C. Med. J.* 324 (2018), <http://www.ncmedicaljournal.com/content/79/5/324.full>.

⁷³ *Id.*

⁷⁴ *DEQ Dashboard: Animal Operations - Swine Lagoon Facilities*, DEQ (Oct. 9, 2018), <https://deq.nc.gov/news/deq-dashboard#animal-operations---swine-lagoon-facilities>.

Groundwater monitoring can now be carried out at lower cost with the use of direct push technologies.⁷⁵ According to a study by the Department of Defense, direct push well installations can cost up to 68% less than drilled wells.⁷⁶ Direct push wells are less labor intensive to install and may be easier and less time consuming to use. They are also appropriate to use in a range of geologic conditions and for a variety of contaminants.⁷⁷

Groundwater monitoring is especially critical for higher risk facilities and those operating in areas where groundwater is more vulnerable to contamination, including those that lie in the 100-year floodplain, that have been cited for violations related to lagoons in the past, and/or are located upgradient of drinking water sources. Facilities that are large in size, located near other facilities, and are older and using unlined lagoons also pose greater risks.

DEQ has authority to require groundwater monitoring under existing regulations. Under 15A N.C. Admin. Code 2T.0108, DEQ “may require any monitoring and reporting requirements, including groundwater... necessary to determine the source, quantity and quality of the waste and its effect upon the surface water, ground waters or wetlands.” Funding to assist with installing monitoring equipment could be established by regulation or by grants given out through the Agriculture Cost Share Program.

- **Unannounced inspections (Condition IV.1)**

This is another important change agreed to in the Title VI settlement, and it clarifies DEQ’s existing authority. There was resistance to this change from some industry representatives at the stakeholder meeting who said that DEQ has “always provided advance notice” of inspections. However, a policy or practice of announced-only inspections could incentivize facilities to wait to address issues until right before inspections. Other states, including Indiana and Oklahoma, use unannounced inspections; Oklahoma even requires every facility to receive at least one unannounced inspection each year.⁷⁸

⁷⁵ Office of Solid Waste & Emergency Response, EPA, EPA 540-R-04-005, Groundwater Sampling and Monitoring with Direct Push Technologies (Aug. 2005), <https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=20017GL0.TXT>.

⁷⁶ U.S. Dep’t of Def., ESTCP Cost and Performance Report ER-0011, Demonstration/Validation of Long-Term Monitoring Using Wells Installed by Direct Push Technologies (Mar. 2008), https://ftr.gov/costperformance/pdf/monitoring/Char_Long-Term_Monitoring_ESTCP.pdf.

⁷⁷ *Id.*

⁷⁸ See Ind. Dep’t of Env’tl. Mgmt., Guidance Manual for Indiana’s Confined Feeding Program at 93 (Dec. 2014), Department of Environmental Management Guidance Manual for Indiana’s Confined Feeding Program at 93, available here: https://www.in.gov/idem/cfo/files/guidance_manual_cfo_program.pdf; Okla. Stat. tit. 2, § 20-14(A) (2018) (providing that the State Board of Agriculture “shall make at least one unannounced inspection per year of every swine feeding operations licensed pursuant to the Oklahoma Swine Feeding Operations Feeding Act”).

Thank you for your consideration.

Sincerely,

The image shows two handwritten signatures in black ink. The top signature is cursive and appears to read 'Elizabeth Haddix'. The bottom signature is also cursive and appears to read 'Mark Dorosin'.

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On behalf of:
North Carolina Environmental Justice Network
Rural Empowerment Association for Community Help
Waterkeeper Alliance, Inc.

Exhibits (submitted contemporaneously and expressly incorporated by reference):
Emily Naylor et al, *Evaluation of Nitrate Concentrations and Potential Sources of Nitrate in Private Water Supply Wells in North Carolina* (Ex. A)
Kyle Messier et al, *Nitrate Variability in Groundwater of North Carolina using Monitoring and Private Well Data Models* (Ex. B)
Michael A. Mallin et al, *Industrial Swine and Poultry Production Causes Chronic Nutrient and Fecal Microbial Stream Pollution* (Ex. C)

C: North Carolina Environmental Justice Network
The Rural Empowerment Association for Community Help
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