SOUTHERN ENVIRONMENTAL LAW CENTER

601 West Rosemary Street, Suite 220
Chapel Hill, NC 27516

Telephone 919-967-1450
Facsimile 919-929-9421

September 27, 2021

By Email and Certified Mail

Michael S. Regan
Administrator
U.S. Environmental Protection Agency
Mail Code 1102A
1200 Pennsylvania Avenue, NW
Washington, DC 20460
Regan.michael@epa.gov

Lilian Dorka
Director
U.S. Environmental Protection Agency
External Civil Rights Compliance Office
Mail Code 2310A
1200 Pennsylvania Avenue, NW
Washington, DC 20460
Dorka.lilian@epa.gov
Title_VI_Complaints@epa.gov

Re: Complaint under Title VI of the Civil Rights Act of 1964, 42 U.S.C. § 2000d, regarding the North Carolina Department of Environmental Quality's Issuance of Permit Nos. AWI310035, AWI301139, AWI230466, and AWS820005

Dear Administrator Regan and Director Dorka:

On behalf of the (b) (6) Privacy, (b) (7)(C) Personal Privacy [redacted] and the [redacted] (together, "Complainants"), the Southern Environmental Law Center submits this complaint against the North Carolina Department of Environmental Quality ("DEQ") for its issuance of four permits ("Permits") authorizing swine waste management systems that lack necessary protections against air and water pollution at four industrial hog operations (together the "Hog Operations") in (b) (6) Privacy, (b) (7)(C) Personal Privacy [redacted] Counties in rural eastern North Carolina.[1] A disproportionate share of the families who live around these operations are Black and Latinx.[2]

---

[1] *See* DEQ, (b) (6) Privacy, (b) (7)(C) Personal Privacy Farm Permit No. (b) (6) Privacy, (b) (7)(C) Personal Privacy https://files.nc.gov/ncdeq/afo/(b) (6) Privacy, (b) (7)(C) Personal Privacy (Exhibit 1); DEQ, [redacted] Permit No. [redacted] https://files.nc.gov/ncdeq/afo/(b) (6) Privacy, (b) (7)(C) Personal Privacy (Exhibit 2); DEQ, [redacted] 1, 2, 4, & 5, & [redacted] Farm Permit No. (b) (6) Privacy, (b) (7)(C) Personal Privacy https://files.nc.gov/ncdeq/afo/(b) (6) Privacy, (b) (7)(C) Personal Privacy (Exhibit 3); and DEQ, Farm [redacted] Permit No. [redacted] ([redacted] https://files.nc.gov/ncdeq/afo/(b) (6) Privacy, (b) (7)(C) Personal Privacy (Exhibit 4).

[2] DEQ, Draft Environmental Justice Report, 20 (Dec. 22, 2020), https://files.nc.gov/ncdeq/afo/Biogas-DWR-Draft-EJ-Report.pdf (hereinafter "DEQ EJ Report") (Exhibit 5) (explaining the findings of DEQ's environmental justice

The Permits authorize the Hog Operations to collect methane from hog waste lagoons for use as fuel ("biogas"), but they fail to address the longstanding, serious pollution problems of using open lagoons and sprayfields to store and dispose of hog waste—and in particular, they fail to address the *increases* in pollution that will result from the production of biogas at these operations under the new Permits.

Two local community groups, (b) (6) Privacy, (b) (7)(C) Personal Privacy and [redacted] challenged these permits in the N.C. Office of Administrative Hearings alleging violations of state law. *See* Prehearing Statement, [redacted] *v. N.C. Dep't of Env't Quality – Div. Water Res &* [redacted] Case Nos. (b) (6) Privacy, (b) (7)(C) Personal Privacy (consolidated) (Exhibit 7). [redacted] and [redacted] have not alleged violations of federal civil rights laws as part of the cases, which are currently pending.

DEQ's issuance of the Permits will put more harmful ammonia into the air nearby residents breathe, increasing fine particulate pollution associated with premature death and serious health problems. For example, a recent study by the National Academy of Sciences attributes an astounding 95 premature deaths in [redacted] County and 83 premature deaths in [redacted] County to the fine particulate pollution caused, in part, by ammonia emissions from hog operations every year.[3] The Permits will also increase the water pollution that results from ammonia settling in the surrounding area and more water-soluble pollutants being applied directly to crop fields.[4] These are unacceptable added harms for communities that have suffered from pollution and health problems from hog operations and other polluting industries for decades. DEQ's failure to address these added harms violates Title VI of the Civil Rights Act of 1964, 42 U.S.C. §§ 2000d to 2000d-7, as well as the Title VI implementing regulations of the U.S. Environmental Protection Agency ("EPA"), 40 C.F.R. Part 7.

Your office previously expressed "deep concern" about North Carolina's permitting program for industrial hog operations, which authorizes the storage of hog urine and feces in open cesspits and spraying of the waste on fields.[5] This harmful approach to waste management has been linked to severe environmental degradation and increased mortality and illness in nearby communities, and disproportionately burdens Black, Latinx, and Native American North Carolinians.[6] The Permits continue to rely on this primitive system, which EPA found may be

---

report including, "[t]he study area [for the project] displays higher percentages of African-American and Hispanic residents compared to the state, and in some cases, the county as well"); *see also* Demographics of Impacted Communities, So. Env't Law Ctr. (Sept. 21, 2021) (Exhibit 6).

[3] *See* Nina G.G. Domingo et al., *Air quality-related health damages of food*, 118 PROCEEDINGS OF THE NAT'L ACAD. SCIS. 1 (May 18, 2021), https://www.pnas.org/content/118/20/e2013637118 (Exhibit 8); *see also* County-Level Data (Exhibit 9).

[4] *See infra* Section III(C).

[5] Letter from Lilian Dorka, EPA, to William Ross, DEQ, 1, 5–6, 11 (Jan. 12, 2017) https://www.epa.gov/sites/production/files/2018-05/documents/letter_of_concern_to_william_g_ross_nc_deq_re_admin_complaint_11r-14-r4_.pdf (hereinafter "Dorka Letter") (Exhibit 10).

[6] *See, e.g.*, Julia Kravchenko et al., *Mortality and Health Outcomes in North Carolina Communities Located in Close Proximity to Hog Concentrated Animal Feeding Operations*, 79 N.C. MED. J. 278, 278 (2018), https://doi.org/10.18043/ncm.79.5.278 (finding higher mortality rates for people living near industrial hog operations) (Exhibit 11); *see also* Steve Wing, et al., *Environmental Injustice in North Carolina's Hog Industry*, 108

racially discriminatory and may provide "potential evidence of systemic concerns,"[7] and they make it worse by authorizing new waste systems that will increase the levels of harmful pollutants emitted from hog waste stored in open lagoons and sprayed into the environment.

The Permits issued by DEQ authorize not only the continued use of the discriminatory lagoon and sprayfield system, but also the use of anerobic digesters and uncovered "secondary" lagoons, which will exacerbate the underlying system's impacts on communities of color. DEQ's own Environmental Justice Report notes that this area has higher percentages of people of color as compared to the State, and in many cases, the county.[8] Yet drafting this report was merely a paper exercise; DEQ failed to address these impacts on nearby communities by including permit conditions that would protect nearby residents and the environment. For example, the Permits are ostensibly "non-discharge" permits that contain prohibitions against discharges of waste, yet they lack any groundwater and surface water monitoring to enforce these provisions. The Ninth Circuit Court of Appeals recently rejected this approach as arbitrary and capricious.[9]

The new waste treatment systems at the Hog Operations are nearly complete, and will shortly begin processing all of the hog waste at these operations through covered anaerobic digesters that change the chemical and biological processes to increase the amount of ammonium/ammonia and concentrate other harmful pollutants in the hog waste that remains after the biogas is removed; it is this waste that the Permits authorize to be dumped into polluting open cesspits and then sprayed on nearby fields.

Further adding to the urgency of this complaint is the passage of the North Carolina Farm Act in July 2021, N.C. Sess. L. 2021-78, which gives DEQ until July 2022 to develop a new general permit for biogas production at North Carolina's industrial hog operations.[10] The law creates a one-size-fits-all approach to permitting, limits community input and agency review of proposed projects, weakens long-standing siting restrictions, and removes tax incentives for the installation of cleaner waste management technology.[11] Further, it automatically approves coverage under the proposed general permit ninety days after DEQ receives applications for such coverage, all but guaranteeing a lack of adequate consideration of the concerns of neighboring residents or the local impacts on the environment or public health.[12] Smithfield Foods, the largest hog producer in North Carolina, estimates 90 percent of its industrial hog finishing operations will be producing biogas within the next decade.[13]

Env't Health Perspectives 225 (2000), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1637958/ (hereinafter Wing 2000 study) (documenting that hog operations are concentrated in areas with higher populations of people of color and low-wealth communities) (Exhibit 12).

[7] Dorka Letter, *supra* note 5, at 11 (explaining that EPA's External Civil Rights Compliance Office (ECRCO) "continues to be concerned about possible discriminatory impacts" from the lagoon and sprayfield system because the findings of its investigation "indicates that the [ ] adverse impacts described [in the investigation report] are being felt by large segments of the communities of color and are potential evidence of systemic concerns, not purely anecdotal claims").

[8] *See* DEQ EJ Report, *supra* note 2, at 7, Table 3b.

[9] *See Food & Water Watch, et. al. v. U.S. EPA*, No. 20-71554 (9th Cir. Sept. 16, 2021) (Exhibit 13).

[10] N.C. Sess. L. 2021-78 § 11 (Exhibit 14).

[11] *Id.* § 11(b), (g), (h).

[12] *Id.* § 11(b).

[13] Press Release, *Smithfield Foods Announces Landmark Investment to Reduce Greenhouse Gas Emissions*, SMITHFIELD FOODS (Oct. 25, 2018), https://www.smithfieldfoods.com/press-room/2018-10-25-Smithfield-Foods-

As (b) (6) Privacy, (b) (7)(C) Personal Privacy in (b) (6) Privacy, (b) (7)(C) County recently explained, "[b]lanket permission will just add more to the backs of people like our parishioners, who have worshipped in our church for generations and also borne so much of the environmental burden of industrial agriculture."[14] Complainants request that EPA act quickly to protect communities of color living in eastern North Carolina.

The (b) (6) Privacy, (b) (7)(C) Personal Privacy request that the External Civil Rights Compliance Office ("ECRCO") enforce Title VI of the Civil Rights Act of 1964 and EPA's implementing regulations, and respond to this complaint with the full force of the law to protect communities of color who live and work near hog operations whose biogas production and animal waste management systems will unsafely dispose of waste, exacerbating the ongoing public health and pollution burden on these families unless DEQ changes its current permitting policy of ignoring these pollution problems and the disparate impacts they create.

I. COMPLAINANTS

The (b) (6) Privacy, (b) (7)(C) Personal Privacy is non-profit public interest organization with members in (b) (6) Privacy, (b) (7)(C) Personal Privac, where two of the Hog Operations are located. The (b) (6) Privacy, (b) (7)(C) Personal Privacy was founded in (b) (6) Privacy, (b) and is a (b) (6) Privacy, (b) (7)(C) Personal Privacy organization whose mission is to ensure the political, educational, social, and economic equality of rights of all persons and to eliminate racial hatred and discrimination. The (b) (6) Privacy, (b) (7)(C) Personal Privacy works to promote this mission by engaging in local issues across the state and in (b) (6) Privacy, (b) (7)(C) Personal Privac. The (b) (6) Privacy, (b) (7)(C) has also long been involved in seeking environmental justice for low income communities and for people of color.

The (b) (6) Privacy, (b) (7)(C) Personal Privacy is part of the national (b) (6) Privacy, (b) (7)(C) Personal Pri which was formed to confront the interlocking evils of systemic racism, poverty, and ecological devastation, among other issues. The (b) (6) Privacy, (b) (7)(C) Pe aims to shift the moral narrative and impact policies at every level of government, and build lasting power for poor and impacted people. The (b) (6) Privacy, (b) (7)(C) Personal Privacy is a network of compassionate, hardworking people from all walks of life from across North Carolina who are dedicated to advancing racial, social, and economic justice for their communities. The (b) (6) Privacy, (b) (7)(C) Personal Pri are groups that represent the different geographical regions of the state.

Announces-Landmark-Investment-to-Reduce-Greenhouse-Gas-Emissions (last visited Sept. 21, 2021). Three of the four Hog Operations are part of the first large-scale biogas project sponsored by Align RNG, a joint venture of Smithfield Foods and Dominion Energy. According to public statements, the project will involve capping hog waste lagoons at 19 industrial hog operations, laying approximately 30 miles of pipeline connecting the hog operations and a processing plant, and constructing a processing plant where the biogas will be collected, processed, and injected into the existing natural gas pipeline. Order Approving Participation in Pilot Program with Conditions, N.C. Utilities Comm., Dkt. No. G-9, Sub 764 at 2 (Apr. 3, 2020), https://starw1.ncuc.net/NCUC/ViewFile.aspx?Id=71c9990f-3bc4-4ce0-9618-c47f733c04f6.

[14] (b) (6) Privacy, (b) (7)(C) Personal Privacy (b) (6) Privacy, (b) (7)(C) Personal Privacy (Exhibit 15).

DEQ is an agency of the State of North Carolina. N.C. Gen. Stat. § 143B-279.1. The North Carolina General Assembly charged the agency to protect the environment and human health. *Id.* at § 143B-279.2. DEQ has the authority to issue permits, including permits for animal feeding operations, to carry out this charge. *Id.* at § 143-215.1.

II. JURISDICTION

EPA has jurisdiction over a complaint under Title VI of the Civil Rights Act of 1964 if the complaint meets four requirements: (1) the complaint is in writing; (2) the complaint alleges discriminatory acts that, if true, violate EPA's Title VI regulations; (3) the complaint identifies a recipient of EPA funding that committed the alleged discriminatory act; and (4) the complaint is filed within 180 days of the alleged discriminatory act.[15]

This written complaint is timely filed and identifies violations by DEQ, a state government agency that receives EPA funding and is thus bound by Title VI of the Civil Rights Act of 1964.[16] At the time the Permits were issued, DEQ was a recipient of EPA assistance.[17] According to USASpending.gov, "the official source for spending data for the U.S. Government,"[18] EPA awarded DEQ $165,891,031 in fiscal year 2020 and $68,583,413 in fiscal year 2021.[19] DEQ is required to comply with Title VI and EPA's Title VI implementing regulations but failed to do so, resulting in disproportionate adverse impacts to individuals protected under Title VI.

III. FACTUAL BACKGROUND

A. Pollution from lagoons and sprayfields disproportionately affect communities of color in eastern North Carolina.

For decades, the swine industry has avoided properly managing animal waste to prevent pollution, and instead displaced harm onto communities of color.[20] As a result, North Carolinians

---

[15] 40 C.F.R. § 7.120; *see also* EPA External Civil Rights Compliance Office, *Case Resolution Manual* (January 2017), 7-11, https://www.epa.gov/sites/production/files/2017-01/documents/final_epa_ogc_ecrco_crm_january_11_2017.pdf.

[16] 42 U.S.C. § 2000d (2018); 40 C.F.R. § 7.25; 40 C.F.R. § 7.35(b); *see also Title VI Compliance*, N.C. DEP'T OF ENV'T QUALITY, https://deq.nc.gov/permits-regulations/title-vi-compliance (last visited July 20, 2021) ("As a recipient of federal funding, DEQ is required to comply with the rules, laws and regulation of Title VI.").

[17] Under EPA's Title VI regulations, a "[r]ecipient" is "any State or its political subdivision, any instrumentality of a State or its political subdivision, [and] any public or private agency… to which Federal financial assistance is extended directly or through another recipient . . ." 40 C.F.R. § 7.25. "EPA assistance" is "any grant or corporative agreement, loan, contract . . . , or any other arrangement by which EPA provides or otherwise makes available assistance in the form of funds." *Id.*

[18] USA Spending, *About*, https://www.usaspending.gov/about (last visited Sept. 21, 2021).

[19] USA Spending, *Recipient Profile, North Carolina Department of Environmental Quality*, https://www.usaspending.gov/recipient/c6114f75-d069-29a6-efae-646feca75f61-C/latest (last visited Sept. 21, 2021) (showing that DEQ received $165,891,031 and $68,583,413 in federal funding in 2020 and 2021, respectively, the years during which DEQ prepared and issued the Permits).

[20] *See* Wing 2000 Study, *supra* note 6, at 229-30 (finding that North Carolina's more than 2,000 industrial hog hog operations are "located disproportionately in communities with higher levels of poverty, higher proportions of nonwhite people, and higher dependence of wells for household water supply"); *see* Steve Wing & Jill Johnston, *Industrial Hog Operations in North Carolina Disproportionately Impact African-Americans, Hispanics and*

who live close to hog operations experience a lower life expectancy and higher likelihood of death from common illnesses than those who live further away.[21] Research has repeatedly shown that industrial hog operations are much more likely to be located near Black, Latinx, and Native American residents than White residents.[22]

These hog operations are concentrated in the Black Belt—the crescent-shaped swath of dark, fertile soils stretching from Virginia to Mississippi where large numbers of African Americans were enslaved on plantations before the Civil War.[23] Many formerly enslaved people stayed in the area after Emancipation and worked as farmers, on their own land or as sharecroppers or tenant farmers.[24] Some Black families live on land that has been passed down for generations.

In addition to Black residents, Native Americans have lived in eastern North Carolina since before European settlers began arriving in the 1600s. The (b) (6) Privacy, (b) (7)(C) Personal Privacy tribes are located in eastern counties, as well as an (b) (6) Privacy, (b) (7)(C) Personal Privacy County.[25] The (b) (6) Privacy, (b) (7)(C) Personal Privacy one of North Carolina's eight recognized American Indian tribes,[26] is located in (b) (6) Privacy, (b) (7)(C) Personal Privacy counties, where approximately 80% of the tribe's 3,000 members reside within tribal communities around the Little Coharie River.[27]

There is also a large, growing Latinx population in this part of the State. Among all counties in North Carolina, (b) (6) Privacy, (b) (7)(C) Personal Privacy counties have the largest share of their population made up of Latinx residents.[28]

In 2013, hundreds of neighbors, most of whom are Black, filed private nuisance claims against Smithfield Foods, claiming that the company's use of the lagoon and sprayfield system

---

American Indians 2 (2014), *available at* https://www.ncpolicywatch.com/wp-content/uploads/2014/09/UNC-Report.pdf (hereinafter Wing & Johnston) (noting that industrial hog operations operating under North Carolina's state general permit are disproportionately located near communities of color) (Exhibit 16).

[21] *See* Kravchenko et al., *supra* note 6, at 278; *see also* Virginia Guidry, et al., *Connecting Environmental Justice and Community Health*, 79 N.C. MEDICAL J. 324 (2018), https://www.ncmedicaljournal.com/content/ncm/79/5/324.full.pdf (Exhibit 17).

[22] Wing & Johnston, *supra* note 20, at 1; *see also* Wing 2000 Study, *supra* note 6.

[23] *See* Wendee Nicole, *CAFOs and Environmental Justice: The Case of North Carolina*, 121 ENV'T HEALTH PERSPECTIVES A182, A183 (2013), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3672924/ (Exhibit 18); Wing 2000 Study, *supra* note 6, at 225.

[24] Wing 2000 Study, *supra* note **Error! Bookmark not defined.**.

[25] N.C. Comm. of Indian Affairs, *N.C. Tribal and Urban Communities* (2020), https://files.nc.gov/ncdoa/cia/documents/populationdata/NC-Tribal-and-Urban-Communities-Map-2020.pdf.

[26] N.C. Dep't of Admin., *N.C. Tribal Communities*https://ncadmin.nc.gov/public/american-indians/nc-tribal-communities (last visited June 8, 2021).

[27] (b) (6) Privacy, (b) (7)(C) Personal Privacy (last visited June 8, 2021). While the Native American population near the Hog Operations is very small, *see* DEQ EJ Report, *supra* note 2 at p. 7 Table 3b. EPA's earlier investigation noted that Native Americans are disproportionately impacted by the lagoon and sprayfield system. *See* Dorka Letter, *supra* note 5. This community may also be impacted by the forthcoming biogas general permit.

[28] *See* Carolina Demography, *North Carolina's Hispanic Community: 2020 Snapshot*, https://www.ncdemography.org/2021/02/05/north-carolinas-hispanic-community-2020-snapshot/ (last visited Sept. 24, 2021).

made living nearby unbearable.[29] Five juries heard these cases, and each jury sided with the plaintiffs and also awarded punitive damages, indicating that Smithfield willfully and wantonly disregarded these conditions that significantly diminished neighbors' quality of life.[30] One of these cases was appealed, and U.S. Court of Appeals for the Fourth Circuit affirmed the verdict as to liability for compensatory and punitive damages.[31] In a scathing concurrence, Judge J. Harvie Wilkinson described the "outrageous conditions" endemic in the use of "large uncovered cesspool[s]" that "bred horrible outcomes for pigs and human alike," including toxic gases, noxious fumes, respiratory problems, increased likelihood of asthma among children, and the presence of buzzards and flies.[32]

Shortly after these nuisance cases were filed, in 2014, the North Carolina Environmental Justice Network, the Rural Empowerment Association for Community Help, and Waterkeeper Alliance filed a Title VI complaint with this office against DEQ.[33] These complainants asserted that DEQ's issuance of the swine general permit, which covers the majority of industrial hog operations in North Carolina, violated Title VI because it authorized industrial hog operations to use "grossly inadequate and outdated systems of controlling animal waste . . . [that have] an unjustified disproportionate impact on the basis of race and national origin against African Americans, Latinos and Native Americans[.]"[34]

In 2017, after a months-long investigation, this office expressed "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[.]"[35] Key findings included that:

- People experienced an increase in the number and severity of health effects, like asthma and other respiratory illnesses, nausea, and headaches, which residents reported were "compounded by the increase in industrial poultry operations, as well as the operation of landfills and waste disposal sites for hog sludge and carcasses."[36]

---

[29] *See* (b) (6) Privacy, (b) (7)(C) Personal Privacy [redacted]. After these cases were filed, the North Carolina General Assembly adopted House Bill 467 in 2017 and Senate Bill 711 in 2018, which together significantly limited the ability for neighbors living nearby hog operations to sue for nuisance. Several community groups have challenged these legislative actions as violations of the North Carolina Constitution; this litigation is pending. *Rural Empowerment Ass'n for Comm. Help, et al. v. State of N. Carolina*, Docket 21-175 (N.C. Ct. of Appeals).
[30] *McKiver v. Smithfield*, 980 F.3d 937 (4th Cir. 2020) (Exhibit 19).
[31] *Id.* at 946.
[32] *Id.* at 979 (J. Wilkinson, concurring).
[33] *See* Complaint (Sept. 3, 2014), *available at* https://earthjustice.org/sites/default/files/files/North-Carolina-EJ-Network-et-al-Complaint-under-Title-VI.pdf.
[34] *Id.* at 1.
[35] *See* Dorka Letter, *supra* note 5.
[36] *Id.*

- The stench and fear of health impacts caused residents to feel a loss of community because young people leave and do not return, and people no longer gather together outdoors.[37]

- Community members were concerned that the drinking water, fish, and vegetables grown in home gardens were contaminated by pollution from the industrial hog operations. They also could no longer keep their windows open or dry clothes outdoors when nearby hog operations were spraying untreated waste on fields. People spent money on water, clothes dryers, air fresheners, pesticides, air conditioning, and food, to try to deal with the odor and avoid potentially contaminated food and water.[38]

The 2014 complaint resulted in a settlement with DEQ, which required, among other things, that DEQ enhance public participation, stakeholder engagement, and communication with community members impacted by DEQ permitting decisions.[39] DEQ also agreed to conduct environmental justice analyses and develop an environmental justice mapping tool to evaluate impacts of permitting decisions on community members.[40] That settlement does not address the increased pollution risks from biogas digester waste that DEQ has authorized with the Permits.

These problems found by EPA in 2017 persist today and are likely to get worse as a result of the Permits. Industry-sponsored biogas projects exacerbate this long-standing environmental injustice by increasing the risks of the polluting lagoon and sprayfield system without addressing the system's disproportionate impact on communities of color.[41]

B. <u>Pollution and harm to human health from the industry's use of lagoons and sprayfields is well-documented and long standing.</u>

Approximately 9 million hogs are housed at more than 2,000 industrial hog operations in the low-lying, flood-prone coastal plain of eastern North Carolina.[42] (b) (6) Privacy, (b) (7)(C) Personal Privacy [redacted] counties produce more hogs and poultry than any other counties in the state[43] and more hogs

---

[37] *Id.*
[38] *Id.*
[39] *See* Settlement Agreement, Section VI(C) (May 3, 2018), *available at* https://waterkeeper.org/wp-content/uploads/2018/05/Final-Settlement-Agreement_attachments-and-sig.pdf.
[40] *See id.* at Section VI(B).
[41] *Id.*; *see also* Wing & Johnston, *supra* note 20.
[42] According to the 2017 Agricultural Census, the total hog inventory in North Carolina was 8,899,459. USDA, National Agricultural Statistics Service, *Quick Stats*, https://quickstats.nass.usda.gov/#6D9024D3-45BC-3F9C-AFBC-E5725EA69F09 (filter by "census" "animals &products" "livestock" "hogs" "inventory" "state" "North Carolina" "2017") (last visited Sept. 24, 2021); *see also* DEQ, *List of Permitted Animal Facilities* (Apr. 1, 2020), https://deq.nc.gov/about/divisions/water-resources/water-resources-permits/wastewater-branch/animal-feeding-operation-permits/animal-facility-map.
[43] Soren Rundquist & Don Carr, *Under the Radar: New Data Reveals N.C. Regulators Ignored Decade-Long Explosion of Poultry CAFOs*, 3 (2019), https://cdn3.ewg.org/sites/default/files/u352/EWG_NC-CAFO_Report_C05.pdf?_ga=2.1334065.1430473716.1551716861-932720297.1551716861.

than any other counties in the nation.[44] Hogs produce an enormous amount of waste—billions of gallons of waste each year.[45]

Industrial hog operations in North Carolina use the harmful and primitive "lagoon and sprayfield" system to dispose of this waste. Untreated hog urine and feces are stored in giant open cesspits, known as lagoons. The chemical and biological processes that take place in these lagoons generate and release harmful pollutants such as ammonia and methane. Periodically the waste is pumped out of the pits and sprayed into the air and onto nearby fields. The spray often blows onto neighboring homes and passing cars.[46] Even when operators only spray as much waste as the crops can use, which is referred to as the agronomic rate, pollutants in the waste reach rivers and streams through leaching and runoff.[47] When waste is applied above the agronomic rates, excess nutrients also run off into surface waters and leach into groundwater.[48] Making matters worse, operators often pump down the liquid in lagoons ahead of major rainfall events to reduce the risk of lagoon overflows; often the land is oversaturated and the sprayed waste runs off the fields onto neighboring properties and streams during and after these heavy rain events.[49] The lagoon and sprayfield system causes significant pollution; this system

---

Jennifer Shike, *America's Top 20 Pig Counties*, PORK BUSINESS (July 23,2019), https://www.porkbusiness.com/news/hog-production/americas-top-20-pig-counties.

[45] A single hog at a farrow-to-finish facility, which grows to be approximately 280 lbs., produces approximately 10,479 gallons of manure per year. *See* 2021 NC Agricultural Chemical Manual, Table 4-14, https://content.ces.ncsu.edu/north-carolina-agricultural-chemicals-manual/fertilizer-use (last visited Sept. 24, 2021).

[46] *See* Nicole, *supra* note 23, at A183.

[47] *See* JoAnn Burkholder et al., *Impacts of Waste from Concentrated Animal Feeding Operations on Water Quality*, 115 ENV'T HEALTH PERSPECTIVES 308, 308-09 (2007), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1817674/pdf/ehp0115-000308.pdf (hereinafter Burkholder 2007) (Exhibit 20); Stephen L. Harden, *Surface-Water Quality in Agricultural Watershed of the North Carolina Coastal Plain Associated with Concentrated Animal Feeding Operations, Scientific Investigations Report 2015-5080*, U.S. DEP'T OF INTERIOR 2–4 (2015), https://pubs.usgs.gov/sir/2015/5080/pdf/sir2015-5080.pdf. (Exhibit 21); *see also* Michael Mallin, et al., *Industrial Swine and Poultry Production Causes Chronic Nutrient and Fecal Microbial Stream Pollution*, 226 J. WATER AIR SOIL POLLUTION 1, 8-13 (2015), https://uncw.edu/cms/aelab/reports%20and%20publications/2015/mallin%20et%20al%202015%20cafo%20pollution%20wasp.pdf (hereinafter Mallin 2015 Study) (documenting pollution from a watershed with a high concentration of industrial hog operations and noting elevated levels of many pollutants, including nutrients and fecal bacteria, among others) (Exhibit 22).

[48] *See, e.g., id.*

[49] *See, e.g., id.*

degrades rivers and streams,[50] contaminates groundwater,[51] poisons the air,[52] and detrimentally impacts quality of life for nearby families.[53]

Hog waste pollutes waterways in four primary ways: (1) runoff of pollutants from sprayfields; (2) leaching of pollutants into groundwater from lagoons and sprayfields; (3) atmospheric deposition of ammonia from barns, lagoons, and spraying into surface waters and land; and (4) spills from lagoons and flooding of sprayfields due to weather or other failures. The agronomic rate applies exclusively to nitrogen, allowing phosphorus and heavy metals to be applied at high concentrations without any consequences.[54] Numerous studies have shown that hog operations routinely apply more waste to fields than can be absorbed,[55] leading to excessive nitrogen and phosphorus in soils, groundwater, and surface water.[56] Eastern North Carolina's high water table and sandy soil composition make the region particularly vulnerable to pollutants leaching into groundwater.[57] Making matters worse, the pollutants then migrate through groundwater into nearby surface waters.[58] For decades, scientists have documented seepage of contaminants from hog waste lagoons into nearby surface and groundwater.[59] In the 1990s, researchers found the majority of lagoons studied in North Carolina leached pollutants, including

---

[50] *See, e.g.,* Colleen N. Brown et al., *Tracing nutrient pollution from industrialized animal production in a large coastal watershed*, 192, ENV'T MONITORING & ASSESSMENT 515 (July 2020), https://www.researchgate.net/publication/342931475_Tracing_nutrient_pollution_from_industrialized_animal_production_in_a_large_coastal_watershed (tracing nutrient pollution in the Cape Fear River Basin from hog waste all the way to the Cape Fear estuary near Wilmington, NC) (Exhibit 23); *see also* Michael A. Mallin & Lawrence B. Cahoon, *Industrialized Animal Production: A Major Source of Nutrient and Microbial Pollution to Aquatic Ecosystems*, 24 POPULATION & ENV'T 369 (2003). https://www.researchgate.net/publication/263519914_Industrialized_Animal_Production-A_Major_Source_of_Nutrient_and_Microbial_Pollution_to_Aquatic_Ecosystems (describing the impact of nutrient pollution from swine and poultry waste on water quality on vulnerable surface waters of the Cape Fear Watershed) (Exhibit 24).

[51] *See, e.g.,* Burkholder 2007, *supra* note 47, at 308-09; *see also* Harden, *supra* note 47, at 4-5; Wing 2000 Study, *supra* note 6, at 225 (finding hog operations are located disproportionately in communities with higher dependence on wells for household water supply).

[52] *See* Domingo, *supra* note 3.

[53] *See* Kravchenko et al., *supra* note 6, at 278 (documenting physical and mental health risks in communities near industrial hog operations); Dorka Letter, *supra* note 5, at 3–4 (describing "the loss of community that has occurred since industrial hog farms began operating" and physical, mental, and emotional impacts upon residents).

[54] *See, e.g.* Murphy-Brown, Nutrient Utilization Plan, 4 (Jan. 29, 2020) (Nutrient Utilization Plan for the Waters operation, stating "[t]his plan only addresses nitrogen.") (Exhibit 25).

[55] *See, e.g.,* J.C. Barker & J.P. Zublena, *Livestock manure nutrient assessment in North Carolina*, N.C. COOPERATIVE EXTENSION SERV. (1996), http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.532.5169&rep=rep1&type=pdf; Robert L. Kellog et al., *Manure Nutrients Relative to Capacity of Cropland and Pastureland to Assimilate Nutrients: Spatial and Temporal Trends for the United States*, USDA, 74-75 (2000), https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs143_012133.pdf.

[56] Mallin & Cahoon, *supra* note 50, at 375.

[57] *See* Burkholder 2007, *supra* note 47, at 309; Brown et al., *supra* note 50, at 515; Mallin 2015 Study, *supra* note 47 at 2.

[58] Harden, *supra* note 47, at 4–5 (finding that streams near industrial hog operations were more enriched with nitrate than streams that were not located near hog operations).

[59] *See, e.g.*, T.G. Ciravolo et al., *Pollutant Movement to Shallow Ground Water Tables from Anaerobic Swine Waste Lagoon*, VA. WATER RES. RESEARCH CTR. (1977), https://vtechworks.lib.vt.edu/bitstream/handle/10919/46584/WRRC_Bull_100.pdf?sequence=1&isAllowed=y (Exhibit 26).

fecal bacteria, nitrogen, and phosphorus, into groundwater.[60] Many of those lagoons remain in operation today.

The threat of groundwater contamination is particularly serious for communities in eastern North Carolina where the vast majority of industrial swine operations are located, because these communities are heavily dependent on well water for drinking water.[61] Groundwater contamination from pathogens and nitrates present in swine waste can have devastating impacts on human health.[62] In 1995, the North Carolina Governor's Office initiated a water testing program for residents located near industrial animal operations; by 1998, 1595 wells in 57 counties had been tested, over 10 percent of which had nitrate contamination at or above the drinking water standard of 10 parts per million.[63] (b) (6) Privacy, (b) (7)(C) Personal Privacy Counties had higher percentages of contamination: nitrate levels greater than 9.5 parts per million were found in 22.5 percent of tested wells in (b) (6) Privacy, (b) (7)(C) County and in 11.7 percent of tested wells in (b) (6) Privacy, (b) (7) County.[64] Other pollutants from lagoons and sprayfields, including phosphorus, fecal coliform, and heavy metals, have also been found in groundwater and surface waters near hog operations, often at levels that exceed drinking water standards.[65]

This year, the congregation of (b) (6) Privacy, (b) (7)(C) Personal Privacy Church in (b) (6) Privacy, (b) (7)(C) County, which is surrounded by hog operations, was forced to spend more than $3,800 to dig a deeper well for the church after the County posted notices at the church that the water was unsafe to drink due to high levels of nitrates detected in the water.[66] As (b) (6) Privacy, (b) (7)(C) Personal put it, "I participated in the public hearings to share my concern about the biogas facility and share my church's experiences with ground water issues. I also drove to Raleigh a little over a month ago to share my concerns in

---

[60] *See* R.L. Huffman & Phillip W. Westerman, *Estimated Seepage Losses from Established Swine Waste Lagoons in the Lower Coastal Plain of North Carolina*, 38 TRANSACTIONS AM. SOC'Y AGRIC. ENG'RS 449, 453 (1995) https://elibrary.asabe.org/abstract.asp?aid=27852 (Exhibit 27).

[61] *See* Wing 2000 Study, *supra* note 6 (finding hog operations are located disproportionately in communities with higher dependence on wells for household water supply).

[62] Shane Rogers & John Haines, *Detecting and mitigating the environmental impact of fecal pathogens originating from confined animal feeding operations: Review*, U.S. EPA, (2005), https://nepis.epa.gov/Exe/ZyPDF.cgi/P10089B1.PDF?Dockey=P10089B1.PDF (Exhibit 28); *Nitrate and Drinking Water from Private Wells*, CTR. FOR DISEASE CONTROL AND PREVENTION, https://www.cdc.gov/healthywater/drinking/private/wells/disease/nitrate.html (last visited Aug. 9, 2021).

[63] Kenneth Rudo, *Groundwater Contamination of Private Drinking Well Water by Nitrates Adjacent to Intensive Livestock Operations (ILOs)*, N.C. DEP'T OF HEALTH AND HUMAN SERV., 414, 418 (June 1999) (Exhibit 29); *see also* Kenneth C. Stone et al., *Impact of Swine Waste Application on Ground and Stream Water Quality in an Eastern Coastal Plain Watershed*, 41 TRANSACTIONS AM. SOC'Y AGRIC. ENG'RS 1665 (1998), https://www.researchgate.net/profile/Pg-Hunt/publication/43269888_Impact_of_swine_waste_application_on_ground_and_stream_water_quality_in_an_eastern_Coastal_Plain_watershed/links/548f1b710cf214269f26363a/Impact-of-swine-waste-application-on-ground-and-stream-water-quality-in-an-eastern-Coastal-Plain-watershed.pdf (documenting increased nitrate in monitoring wells near hog facilities and lagoons) (Exhibit 30).

[64] Rudo, *supra* note 63, at 414, 418.

[65] *See id.*; Amy R. Sapkota et al., *Antibiotic-Resistant Enterococci and Fecal Indicators in Surface Water and Groundwater Impacted by a Concentrated Swine Feeding Operation*, 115 ENV'T. HEALTH PERSPECTIVES 1040, 1043-45 (2007), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1913567/ (detecting elevated fecal indicators and antibiotic-resistant bacteria in surface waters down gradient from hog lagoons and sprayfields) (Exhibit 31); Huffman, *Seepage Evaluation of Older Swine Lagoons in North Carolina*, 47 TRANSACTIONS AM. SOC'Y AGRIC. ENG'RS 1507, 1511 (2004) (Exhibit 32).

[66] *See* Melvin, *supra* note 14.

person. It seems my concerns have fallen on deaf ears. . . . This is not only a water and environment issue. It is a humanity issue."[67]

Almost all of North Carolina's industrial hog operations, including the Hog Operations that received the Permits, are located in the flood prone, low-lying eastern coastal plain.[68] During rain events, which are becoming increasingly more severe and frequent,[69] hog waste lagoons are often damaged or flooded and sprayfields flood, releasing untreated waste into nearby rivers and streams.[70] For example, during Hurricane Florence in 2018, millions of gallons of hog waste spilled into rivers and streams throughout eastern North Carolina.[71]

Lagoons are also prone to leaking or overflowing on sunny days. The first major spill to capture the attention of policy-makers and the public occurred in 1995, when 25 million gallons of raw hog sewage spilled into the New River.[72] More recently in December 2020, a Jones County hog operation that had been cited twice for freeboard violations in the last year, spilled 1 million gallons of untreated hog waste into the Trent River after a lagoon breached.[73] In 2017 and again in 2019, the Waters Operation—one of the four Hog Operations DEQ permitted to produce biogas— spilled hog waste into a nearby stream due to equipment malfunctions.[74]

---

[67] *Id.*
[68] *See* DEQ, *Animal Facility Map*, https://ncdenr.maps.arcgis.com/apps/webappviewer/index.html?id=85ae6392d0e94010a305eedf06e3f28.
[69] DEQ, *NC Climate Risk Assessment and Resiliency Plan* (2019) https://deq.nc.gov/energy-climate/climate-change/nc-climate-change-interagency-council/climate-change-clean-energy-4.
[70] JoAnn Burkholder et al., *Impacts to a Coastal River and Estuary from Rupture of A large Swine Waste Holding Lagoon*, 26 J. ENV'T QUALITY 1451, 1451 (1997), https://uncw.edu/cms/aelab/reports%20and%20publications/1997/1997,jeq,%20impacts%20to%20a%20coastal%20river....pdf (Exhibit 33); Michael A. Mallin, *Impacts of Industrial Animal Production on Rivers and Estuaries*, 88 AM. SCI. 26, 26 (2000) (Exhibit 34), https://www.researchgate.net/publication/246425558_Impacts_of_Industrial_Animal_Production_on_Rivers_and_Estuaries; *see also* Kendra Pierre-Louis*, Lagoons of Pig Waste Are Overflowing After Florence. Yes, That's as Nasty as It Sounds*, N.Y. TIMES (Sept. 19, 2018), https://www.nytimes.com/2018/09/19/climate/florence-hog-farms; K. Gee & C. McWhirter, *North Carolina's Poultry, Hog Producers Bail Out from Under Hurricane Matthew: Disposal of millions of carcasses poses challenges and raises public-health concerns*, WALL STREET J. (Oct. 15, 2016), https://www.wsj.com/articles/north-carolinas-poultry-hog-producers-bail-out-from-under-hurricane-matthew-1476554376; Nathanael Johnson, *Why the heck are there pig farms in the path of hurricanes?*, GRIST (Oct. 19, 2016), https://grist.org/food/why-the-heck-are-there-pig-farms-in-the-path-of-hurricanes/.
[71] *See, e.g.*, Wynne Davis, *Overflowing Hog Lagoons Raise Environmental Concerns in North Carolina*, NPR (Sept. 22, 2018), https://www.npr.org/2018/09/22/650698240/hurricane-s-aftermath-floods-hog-lagoons-in-north-carolina; *see also* Pierre-Louis, *supra* note 70; Chick Jacobs, *Final report on Hurricane Florence's record-smashing destruction*, THE FAYETTEVILLE OBSERVER (May 6, 2019), https://www.fayobserver.com/news/20190506/final-report-on-hurricane-florences-record-smashing-destruction
[72] *Huge Spill of Hog Waste Fuels an Old Debate in North Carolina*, N.Y. TIMES (Jun. 25, 1995), https://www.nytimes.com/1995/06/25/us/huge-spill-of-hog-waste-fuels-an-old-debate-in-north-carolina.html.
[73] *See* Lisa Sorg, *Hog farm that spilled 1 million gallons of feces, urine into waterways had been warned of lagoon problems*, N.C. POLICY WATCH (Jan. 12, 2021), http://www.ncpolicywatch.com/2021/01/12/hog-farm-that-spilled-1-million-gallons-of-feces-urine-into-waterways-had-been-warned-of-lagoon-problems/.
[74] See *infra* Section III(E).

This pollution causes terrible health effects for people living nearby, including serious, chronic illnesses and premature death. Earlier this year, the National Academy of Sciences published a study linking emissions from industrial hog operations to increased mortality in nearby communities.[75] Ammonia-derived particulate matter with a diameter of 2.5 microns or less, known as PM2.5, can penetrate deep into lungs and case serious cardiovascular and respiratory problems.[76] There is a well-established link between particulate matter and various adverse health outcomes including increased mortality rates.[77] This study found that the emissions from industrial hog operations are responsible for a combined total of 178 premature deaths in [redacted] Counties annually.[78]

In addition, researchers have documented excessive respiratory symptoms in neighbors of hog lagoons and increased levels of mood disorders, including anxiety, depression, and trouble sleeping.[79] Children living near industrial hog operations have an increased risk of asthma.[80] In 2018, researchers from Duke University found that in North Carolina communities near hog operations using the lagoon and sprayfield system, mortality rates are substantially higher from common diseases such as anemia, kidney disease, tuberculosis, and lower birth rates than residents who live further away from these operations.[81] The study also found higher rates of low birth weight and infant hospitalization among residents who live near industrial hog operations.[82] The presence of nitrate in wells used for drinking water endangers the health of infants, pregnant women, children, the elderly, and others with weakened immune systems.[83]

Hog operations' use of polluting waste management systems disrupts communities, curtails social and recreational opportunities, and likely contributes to a loss in generational wealth for people of color in particular.[84] In addition to economic, environmental, and health impacts, the lagoon and sprayfield system also has adverse social impacts, reducing quality of life for communities and making it difficult or impossible for people to enjoy time together

---

[75] Domingo et al., *supra* note 3, at 2.
[76] *Id.* While EPA cited scientific uncertainty about the positive health effects of reducing PM2.5 levels below the NAAQS, the agency also found that decreasing long-term PM2.5 exposure decreases cardiovascular mortality—and could "not identify a threshold below which effects do not occur." Review of the National Ambient Air Quality Standards for Particulate Matter, 85 Fed. Reg. 82705, 82698 (Dec. 18, 2020).
[77] C.A. Pope III et al., *Lung cancer, cardiopulmonary mortality, and long-term exposure to fine particulate air pollution*, 287 J. AM MED ASSOC. 1132 (2002), https://jamanetwork.com/journals/jama/fullarticle/194704 (Exhibit 35).
[78] Domingo et al., *supra* note 3, at 2; *see also* County Level Data for Domingo Report, *supra* note 3 (noting 83 deaths in [redacted] County and 95 in [redacted] County due to emissions from hog operations).
[79] *See, e.g.,* Kelley Donham, et al., *Community Health and Subeconomic Issues Surrounding Concentrated Animal Feeding Operations*, 115 ENV'T HEALTH PERSPECTIVES 317, 318 (2007), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1817697/ (Exhibit 36).
[80] *Id.*
[81] Kravchenko et al., *supra* note 6, at 278.
[82] *Id.*
[83] EPA, CHILDREN AND DRINKING WATER STANDARDS 6, https://www3.epa.gov/safewater/kids/kidshealth/pdfs/brochure_childrenstandards.pdf (last visited Sept. 24, 2021); Ward, et al, *Drinking Water Nitrate and Human Health: An Updated Review*, 15 INT'L J. ENV'T RESEARCH & PUBLIC HEALTH 1 (July 23, 2018), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6068531/(Exhibit 37).
[84] *See* Dorka Letter, *supra* note 5, at 3–4.

outdoors.[85] The waste management practices also bring conflict into communities. As EPA has found, people who complain about the odor and other negative aspects of the hog operation often are ignored or harassed.[86] They also are more likely to have fewer financial resources—"[t]he concentration and industrialization of agriculture are associated with economic and community decline locally and regionally[.]"[87] People living nearby these hog operations also experience a loss of community because of the odors, decreased quality of life, and pollution resulting from lagoons and sprayfields.[88]

C. Storing digester waste in open lagoons and spraying it on fields without cleaner technology is likely to increase harm to the community and the environment.

Under the new Permits issued by DEQ, the hog waste will be moved from confinement barns into covered anaerobic digesters, where the waste will break down faster and to a greater extent than in a conventional lagoon.[89] Processing waste in a covered lagoon and removing the biogas significantly alters the properties of the resulting waste. The process increases the concentration of ammonia/ammonium (forms of nitrogen)[90] and produces other forms of nitrogen, namely nitrate and nitrite, that are more likely to infiltrate groundwater and run off into surrounding waterways when land-applied.[91] Once the biogas is siphoned off, the remaining waste will be pumped to one or more open-air secondary lagoons. Due to the increased ammonia/ammonium concentration, the waste in the open secondary lagoon is likely to emit significantly more ammonia than a conventional open-air hog waste lagoon.[92]

---

[85] Donham *supra* note 79, at 318; *see also* Dorka Letter *supra* note 5, at 2. ("Residents described the loss of community that has occurred since the industrial hog farms began operating . . . Prior to the arrival of the industrial hog operations, many of their family, community, and church gatherings had been held outdoors. Now they said those events are rarely held outdoors or if attempted outdoors, they are marred or forced to end early due to odors, flies, and other impacts.").

[86] Donham, *supra* note 79, at 318. *See also* Dorka Letter, *supra* note 5, at 4 ("[The External Office of Civil Rights] was told the filing of complaints with NCDEQ would be pointless and has resulted in retaliation, threats, intimidation, and harassment by swine facility operators and pork industry representatives.").

[87] Phoebe Gittelson, et al., *The False Promises of Biogas: Why Biogas is an Environmental Justice Issue*, ENV'T JUSTICE 3 (2021https://www.liebertpub.com/doi/full/10.1089/env.2021.0025 (Exhibit 38).

[88] *See* Dorka Letter, *supra* note 5, at 4.

[89] *See* EPA, *Basic Information about Anaerobic Digestion (AD)*, https://www.epa.gov/anaerobic-digestion/basic-information-about-anaerobic-digestion-ad (last visited September 23, 2021).

[90] Baines, R. (Edited), *Reducing greenhouse gas emissions from livestock production*, Taylor & Francis Group, London, 145 (2021) ("NH4+ content and pH in digested slurry are higher than in untreated slurry. Thus, potential for ammonia emissions during subsequent slurry storage are increased. Digested slurry therefore has to be stored in covered slurry stores.") (Exhibit 39).

[91] *Conservation Practice Standard, Anaerobic Digester, Code 366*, U.S. DEP'T AGRICULTURE, NAT. RES. CONSERVATION SERV.., 366-CPS-6, (June 2017) ("USDA Conservation Practice Standard"), https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1254996.pdf (Exhibit 40) ("Compounds such as nitrogen, phosphorus and other elements become more soluble due to anaerobic digestion and therefore have higher potential to move with water".).

[92] *See* Viney Aneja, et. al, *Characterizing Ammonia Emissions from Swine Farms in North Carolina: Part 2—Potential Environmentally Superior Technologies for Waste Treatment*, 58 J. AIR & WASTE MGMT. ASS., 1145, 1156 tbl. 4 (2008) (finding a 11.9% increase in ammonia emissions from an open secondary lagoon storing digester waste over an open lagoon storing conventional hog waste) (hereinafter Aneja 2008 Study) (Exhibit 41); *see also* Kupper et al., *Ammonia and greenhouse gas emissions from slurry storage—A Review*, 300 AGRICULTURE, ECOSYSTEMS, & ENV'T 1, 9 tbl. 10 (2020) (the one result showing emission decreasing was from a lab study where the waste was stored in sealed, heated containers) (Exhibit 42); *see also* Lowry A. Harper et al, *The Effect of Biofuel Production on*

In short, with the more-polluting digester waste being stored and disposed of using open lagoons and sprayfields under the waste system DEQ has authorized, any benefits from capturing emissions of methane and other gases through biogas production will come at the expense of not only ongoing but *increased* ammonia emissions, increased mobility of pollutants, and resulting air and water pollution. Furthermore, for all but one of the four Hog Operations, these new systems do not even reduce the amount of open lagoons susceptible to overflowing during rain events, and in fact add an additional waste-holding structure—the anaerobic digesters—which has potential to leach pollutants into groundwater.

Additional technologies that address water and air pollution—and that are compatible with biogas production—are available and practicable. Comments submitted to DEQ during the permitting process suggested additional technologies and called on DEQ to comply with its statutory obligation under N.C. Gen. Stat. § 143-215.1(b)(2) to require the practicable waste treatment and disposal alternative with the least adverse impact on the environment.[93] Yet the Permits do not require any additional treatment of this more harmful waste to reduce impacts to the environment and nearby communities.[94] As a result, these new biogas permits stand to worsen harm to the communities living near industrial hog operations in [redacted] counties, and in particular communities of color.

i. The digester process increases ammonia emissions.

Anaerobic digesters capture methane and other gases unlike conventional open-air hog waste lagoons which emit these gases directly into the atmosphere. However, the process of anaerobic digestion and removal of methane (a form of carbon) alters the composition of the remaining waste in the digester ("digester waste"). The digester waste contains more ammonia and ammonium, less carbon, and has a higher pH.[95] As a result, digester waste stored in open secondary lagoons and land-applied is likely to emit *more* ammonia into the atmosphere than conventional hog waste lagoons or fresh hog waste.[96] Increased ammonia emissions from an open lagoon storing digester waste has been documented in North Carolina and many other

---

Swine Farm Methane and Ammonia Emissions, 39 J. ENV'T QUAL. 62 (2010), https://pubmed.ncbi.nlm.nih.gov/21284295/ (finding a 46 percent increase in ammonia emissions from mesophilic biogas digester relative to control lagoons) (Exhibit 43).

[93] *See, e.g.*, Letter from Blakely Hildebrand and Maia Hutt, SELC, to Ramesh Ravella, DEQ (Jan. 29, 2021) (hereinafter Comment Letter) (Exhibit 44).

[94] DEQ admitted that "atmospheric loses from the lagoons" would occur, and relies on this statement to support its statement that land-applied digester waste will not contain a higher concentration of pollutants than waste from a conventional hog lagoon. *See* Public Meeting Report, *infra* note 122, at 18.

[95] *See* Jeffery Lorimor & John Sawyer, *Final Report: Swine USA Anaerobic Digester Performance Analysis*, NAT. RES. CONSERVATION SVC. – IOWA STATE UNIV. 3, 5 (2004) (Exhibit 45); Baines, *supra* note 90, at 116 (explaining that as ammonia (NH_3) increases as a portion of Ammoniacal nitrogen, pH also increases); Roger Nkoa, *Agricultural benefits and environmental risks of soil fertilization with anaerobic digestates: a review*, 24 AGRONOMY FOR SUSTAINABLE DEV. 473, 480 (2015), https://hal.archives-ouvertes.fr/hal-01234816/document (Exhibit 46).

[96] *See* Aneja 2008 Study, *supra* note 92, at 1155, 1156; Harper et. al, *supra* note 92; Kim Weaver et al, *Effects of Carbon and Nitrogen Emissions due to Swine Manure Removal for Biofuel Production*, J. ENV'T QUALITY, 1371, 1374 (2012) (Exhibit 47); T. Nyord et. al, *Ammonia Volatilization and crop yield following land application of solid-liquid separated, anaerobically digested, and soil injected animal slurry to winter wheat,* 160 J. AGRIC., ECOSYSTEMS, AND ENV'T, 75, 78 (2012) (Exhibit 48); Nkoa, *supra* note 95, at 480.

places.[97] When the digester waste effluent is applied to fields, the increased rate of ammonia emission is likely to continue.[98] This is especially the case in summer months and with the use of high pressure spray irrigation equipment at the Hog Operations.[99] For this reason "[d]igested slurry … has to be stored in covered slurry stores" and experts "strongly recommend to apply biogas slurry with low-emission techniques near or below the soil surface."[100] The permits issues by DEQ fail to require either of these necessary safeguards.

ii. Increased ammonia emissions harm air quality and water quality.

Increased ammonia emissions from secondary open-air lagoons and land application worsen air quality and water pollution. Ammonia travels through the air and deposits on land, contaminating soil, groundwater, and ultimately rivers and streams, and also deposits directly in waterways.[101] Atmospheric deposition of ammonia accounts for a significant portion of nitrogen impacts in North Carolina's coastal ecosystems, including the Albemarle and Pamlico Sounds.[102] Aerosolized ammonia can travel as far as 60 miles from its point of origin.[103] Ammonia emissions can contribute to eutrophication of waterways, and can reduce dissolved oxygen levels.[104]

---

[97] *See* Aneja 2008 Study, *supra* note 92, at 1155, 1156 (finding a 11.9 percent increase in NH3 emissions from an open lagoons storing digester waste relative to a conventional primary anaerobic lagoon); Harper et al, *supra* note 92 (finding a 46 percent increase in NH_3 emissions from hog operations using open secondary lagoons to store digester waste relative to those using a conventional primary anaerobic lagoon); Weaver et al., *supra* note 96, at 1374 (finding a statistically significant increase in NH_3 emissions from secondary open lagoons storing digester waste relative to conventional lagoons); Kupper, *supra* note 92 (finding increases in NH_3 emissions from stored digester slurry relative to conventional manure slurry—the one instance of NH_3 emissions decreasing involved a lab-scale study where digester waste was kept in a sealed, heated container—very different from an ambient temperature open lagoon).

[98] *See* Nyord, *supra* note 96, at 78-79.

[99] *Id.* at 79 ("Compared to surface application, soil injection seems to reduce the NH3 emission[.]"); *see also* Biswanath Dari et. al, *Understanding Factors Controlling Ammonia Volatilization from Fertilizer Nitrogen Applications*, UNIV. OF IDAHO – EXTENSION (2019) (finding that surface application of N-fertilizers without incorporation "increase the susceptibility to NH3 loss.") (Exhibit 49).

[100] Baines, *supra* note 90, at 145.

[101] Viney P. Aneja et al, *Atmospheric nitrogen compounds II: emissions, transport, transformation, deposition and assessment*, 35 ATMOSPHERIC ENV'T 1903, 1904-06 (2001) (hereinafter Aneja 2001 Study) (Exhibit 50).

[102] *See* Jennifer K. Costanza et al., *Potential geographic distribution of atmospheric nitrogen deposition from intensive livestock production in North Carolina, USA,* 398 SCI. OF TOTAL ENV'T 76, 77 (2008) http://jencostanza.com/docs/Costanza_et_al_2008_STOTEN.pdf (noting the significant amount of ammonia deposition accounting for new nitrogen inputs into the coastal ecosystem) (Exhibit 51).

[103] *See* John T. Walker et al, *Atmospheric transport and wet deposition of ammonia in North Carolina*, 34 ATMOSPHERIC ENV'T, 3407, 3416 (2000) (detecting deposition of NH3 and/or NH4+ at distances up to 80 km from their source) (Exhibit 52); Aneja 2001 Study, *supra* note 101 (noting that while 20-40 percent of ammonia in the atmosphere deposits near its source, ammonium aerosols, which have longer atmospheric lifetimes, tend to deposit at larger distances downwind of sources); *see also* Constanza, *supra* note 102.

[104] *See* Mallin 2000 Study, *supra* note 70, at 11; *see* Aneja 2001 Study, *supra* note 101, at 1905–06 (stating that "NH_3 emissions from this source region, primarily evolving from swine and poultry operations, are found to increase NH_4+ concentration in precipitation at sites up to +80 km away."); Kanwardeep S. Bajwa et al., *Modeling studies of Ammonia dispersion and dry deposition at some hog farms in North Carolina*, 58 J. AIR & WASTE MGMT. ASSOC. 1198-07 (2008) ("Dry deposition of NH_3 up to 2500 m downwind of the farm was studied under different stability conditions and over crop and grass surfaces. The majority of deposition as a percentage of total emission occurs within 500 m of the farm because ground-level concentrations are much higher there.") (Exhibit 53); *see* Costanza, *supra* note 102, at 77; Burkholder 2007 Study, *supra* note 47, at 309 ("Inorganic N forms are added to the

When exposed to oxygen and deposited on soils, ammonia is converted to nitrate, which is highly soluble in water, which means water carries the nitrate with it as it moves through and over soil.[105] Sandy soils are prevalent in eastern North Carolina, including at the Hog Operations, and the water table is high, increasing the risk that nitrate moves into groundwater and eventually into nearby streams.[106] Nitrate is a form of nitrogen whose presence in drinking water has been linked to various health effects including blue baby syndrome.[107] In addition, this increased nitrate pollution can lead to algal blooms, affect aquatic life, and drive down dissolved oxygen levels in waterways, which in turns creates biochemical oxygen demand and results in degraded water quality that is unsafe and/or undesirable for recreation.[108]

Ammonia air pollution can cause adverse health impacts in humans and drives production of PM2.5, which is associated with respiratory issues in humans.[109] Furthermore, airborne ammonia deposited on land and various forms of nitrogen, including nitrate, in hog waste sprayed or land-applied on crop fields can pollute groundwater.[110]

In sum, the increased ammonia emissions as a result of the Permits are likely to further degrade groundwater, surface water, and air quality.

iii. The secondary lagoons are still at risk for flooding and failures

The installation of covered anaerobic digesters does not address the significant risk of pollution from industrial hog operations during major rain events, which are becoming more frequent and intense because of climate change. As noted above, the lagoon and sprayfield system is extremely vulnerable to flooding during major rain events. Uncovered secondary lagoons will continue to be vulnerable to inundation and structural failure, while sprayfields remain equally susceptible to flooding from major storm events. For example, the [redacted] County is located partially within the FEMA flood hazard zone, with at least one sprayfield located in the floodplain.[111]

The permits issued by DEQ for all but one of the four Hog Operations do not even reduce the amount of open lagoons susceptible to overflowing during rain events, and in fact add an

---

atmosphere during spray practices, and both ammonia and phosphate can also adsorb to fine particles (dust) that can be airborne . . . [A] significant proportion of the total ammonium from uncovered swine effluent lagoons and effluent spraying . . . reenters surface waters as local precipitation or through dry fallout.").

[105] *See* Mary Berg et al, *Nitrogen Behavior in the Environment*, N.D. AGR. EXTENSION SERV. 3 (2017), https://www.ag.ndsu.edu/publications/environment-natural-resources/nitrogen-behavior-in-the-environment (Exhibit 54).

[106] *See, e.g.,* W.F. Ritter & A.E.M. Chirnside, *Impact of Animal Waste Lagoons on Ground-Water Quality*, 34 BIOLOGICAL WASTES 39 (1990) (Exhibit 55); Dennis Keeney & Robert Olsen, *Sources of nitrate in groundwater*, 16 CRITICAL REVIEWS IN ENV'T SCI. & TECH. 257 (1986) (Exhibit 56); William Liebhardt, et al, *Nitrate and Ammonium Concentrations of Ground Water Resulting from Poultry Manure Applications*, 8 J. OF ENV'T QUALITY 211 (1979).

[107] *See* CHILDREN AND DRINKING WATER STANDARDS, *supra* note 83, at 6; *see also* Ward, et al, *supra* note 83, at 1.

[108] *See* Burkholder 2007, *supra* note 47; Mallin 2015 Study, *supra* note 47.

[109] *See* Domingo et al., *supra* note 3.

[110] *See supra* Sections III(A)-(B).

[111] DEQ, Certificate of Coverage No. (b) (6) Privacy, (b) (7)(C) Personal Privacy (Sept. 23, 2019), https://edocs.deq.nc.gov/WaterResources/(b) (6) Privacy, (b) (7)(C) Personal Privacy

additional waste-holding structure—the anaerobic digesters—which has potential to leach pollutants into groundwater. Moreover, the secondary lagoons and sprayfields will store more concentrated waste that is more likely to contaminate groundwater and move with runoff, increasing the risk of pollution, particularly during major rain events.

As illustrated below, the Hog Operations at issue here are all located in the lower Cape Fear River Basin, close to tributaries of the Cape Fear River. The [redacted] Operation is located on [redacted] The [redacted] Operations are located on [redacted] which drains into [redacted] The [redacted] Operation is also near [redacted] which drains into [redacted] The [redacted] Farm is located near [redacted] and [redacted] In 2015, the United States Geological Survey sampled at multiple sites along [redacted] and a site at [redacted] [112] and based on the levels of nitrates and other pollutants, concluded that there were "[swine] waste manure influences" on water quality at each site.[113] The proximity of these waterways to the Hog Operations increases the chances of flooding, and thus pollution into waterways. DEQ's recent sampling on [redacted] downstream of the [redacted] Operation showed elevated levels of nitrate, among other pollutants.[114]

[112] Harden, *supra* note 47, at 9.
[113] *Id.* at 40 (Table 13, indicating waste manure influences at the [redacted] sampling sites, SP-11, 11A, 11B, 11C, 11D); *id.* at Table 14 (indicating waste manure influence at [redacted] sampling site, SP-13).
[114] DEQ, *Cape Fear River Animal Feeding Operations Monitoring Study: Preliminary Report* (May 4, 2020), Cape Fear River Animal Feeding Operations Monitoring Study: Preliminary Report, https://files.nc.gov/ncdeq/EJ/AttachG-CFRAFOMS--Preliminary-Report.pdf (Exhibit 57).

(b) (6) Privacy, (b) (7)(C) Personal Privacy

[redacted]

D. DEQ has failed to protect people of color and the environment from hog waste pollution.

Despite being on notice of these environmental injustices for many years and despite the settlement reached after the 2014 Title VI complaint referenced above, DEQ has done little to actually prevent or reduce disproportionate harms caused by industrial hog operations. Pollution from the lagoon and sprayfield system persists today, and DEQ's current permitting approach to biogas projects is only making it worse.

Despite having agreed to do so, DEQ has not initiated rulemaking to codify a Violation Points System, which is required by state law.[115] The Violation Points System would hold repeat violators accountable for continued non-compliance with their permit and protect the

[115] *See* Settlement, *supra* note 39, at 5; *see also* N.C. Gen. Stat 143-215.6E.

environment and the surrounding communities. In the meantime, DEQ enforcement efforts have fallen short and fail to protect communities and the environment. When DEQ identifies violations or deficiencies, the agency rarely initiates enforcement actions. For instance, in 2020, DEQ found 224 deficiencies and violations during annual inspections.[116] Yet DEQ only initiated 29 enforcement actions against violators.[117]

More recently, DEQ has enabled the hog industry's push for biogas.[118] On March 31, 2021, DEQ issued the Permits. The Permits are a continuation of this history of systemic discrimination. Despite strong pushback and legal challenges from community members and environmental groups,[119] reams of research documenting the harms of the system,[120] and reduced capacity for proper enforcement, DEQ continues to authorize the industry to use the lagoon and sprayfield system at existing operations at the expense of community health and the environment.[121]

E. <u>The Hog Operations have repeatedly violated their permits.</u>

The Hog Operations have histories of non-compliance with their permits, increasing the risks of pollution. In fact, during the site visit before the Permits were issued, DEQ staff noticed several compliance issues, including high freeboard levels and mismanagement of pollutant-laden sludge.[122] Nevertheless, on March 31, 2021 DEQ issued the [redacted], and [redacted] operations were new individual permits to install new anaerobic digesters, produce biogas, and dispose of digester waste in secondary open lagoons and crop fields, and the [redacted] Operation was issued a new certificate of coverage under the state general permit to convert an existing lagoon into a covered anaerobic digester, produce biogas, and dispose of digester waste in secondary open lagoons and crop fields.[123]

In recent years, the [redacted] Operation has struggled to comply with requirements meant to prevent waste from contaminating nearby rivers and streams.[124] For example, in March 2019

---

[116] DIV. WATER RES., N.C. DEP'T ENV'T QUALITY, ANNUAL REPORT TO THE NORTH CAROLINA GENERAL ASSEMBLY ON ANIMAL WASTE MANAGEMENT PERMITTING, INSPECTION AND COMPLIANCE ACTIVITIES: JULY 1, 2019 – JUNE 30, 2020, Table 3 (Oct. 2020), https://www.ncleg.gov/documentsites/committees/ERC/ERC%20Reports%20Received/2020/DEQ/2020-Oct%20DEQ_Animal%20Waste%20Management.pdf (Exhibit 58).

[117] *See id.*

[118] *See* Public Meeting Report, *infra* note 122 (indicating a lack of response to comments regarding environmental justice, degradation of water and air quality, and other concerns raised by community members and other members of the public). *See also infra* note 130 (showing that DEQ staff did not directly address comments and question from community members during the public meeting on the draft Permits).

[119] *See,* Complaint, *supra* note 33; *see also* Letter from B. Hildebrand, et al. to DEQ (March 2019) (Exhibit 60) (providing extensive technical comments on the draft swine general permit on behalf of numerous environmental and community organizations).

[120] See *supra* Sections III(B).

[121] *See* DEQ Swine Waste Management System General Permit (Apr. 2019), https://files.nc.gov/ncdeq/General-Permit---Swine-2019.pdf (Exhibit 59).

[122] *Swine Biogas Permit Modifications: Public Meeting Report and Recommendations*, DEQ, (Mar. 31, 2021), https://files.nc.gov/ncdeq/afo/BiogasMtgReport20210331_FINAL.pdf (hereinafter Public Meeting Report) (Exhibit 61).

[123] See Permits for the Hog Operations, *supra* note 1.

[124] *See* Compliance History for [redacted] Farm (Farm [redacted]) (Jan. 2019-Mar. 2021) (Exhibit 62).

an inspection report indicated an overflow of hog waste at the facility. A December 2019 Plan of Action for sludge management shows the facility violated the sludge requirements for two of the lagoons on-site and was required to remove nearly five million gallons of pollutant-laden sludge that had accumulated at the facility in order to come back into compliance. And on at least four occasions in the past year alone, the facility failed to maintain sufficient storage capacity in its lagoons to avoid waste overflowing during heavy rainfall.

Like the [redacted] Operation, the [redacted] Operation has also repeatedly failed to maintain sufficient room in its lagoons to prevent a spill of untreated hog waste during a heavy rainfall.[125] In 2017, a pipe at the operation broke, leading to the spill of 900 gallons of hog waste into an unnamed tributary of [redacted]. On May 20, 2019, a pipe at one of the lagoons cracked, causing 13,200 gallons of raw hog feces and urine to gush out of the lagoon at a rate of 10 gallons per minute, some of which spilled down a ditch and into a nearby creek. The [redacted] also kept too much sludge in all of its lagoons, violating its sludge level requirements.

In an April 2020 inspection report, DEQ noted the [redacted] facility was "out of compliance with permit conditions related to sludge" because sludge accumulation in the lagoons at the facility exceeded safe levels.[126]

The [redacted] is located very close to the 100-year floodplain. It too has a history of non-compliance with its permit requirements. In 2019, the facility built up more pollutant-laden sludge in its lagoons than was allowed, and it was required to remove more than 1.3 million gallons to come back into compliance.[127]

F. <u>DEQ's Permitting Process Did Not Prevent Disparate Impacts.</u>

i. The Permitting Process

On December 23, 2019, [redacted] submitted four applications for permit modification for the Hog Operations.[128] On December 22, 2020, DEQ issued draft permits for each of the Hog Operations and a notice of a public hearing and a public comment period. DEQ solicited comments from the public between December 23, 2020 and January 29, 2021. On March 31, 2021, DEQ issued individual waste management permits to the [redacted], [redacted], and [redacted] and a modified certificate of coverage under the swine general permit for [redacted].[129]

---

[125] Compliance History for Waters Operation (Mar. 2018-Mar. 2021) (Exhibit 63).
[126] DEQ, Routine Compliance Inspection, Benson Farm, Facility No. 31-39 (Apr. 2, 2020), https://edocs.deq.nc.gov/WaterResources/DocView.aspx?id=1156021&dbid=0&repo=WaterResources (Exhibit 64).
[127] DEQ, Plan of Action (POA) for Lagoon Sludge Reduction, Facility No. [redacted] (May 21, 2019), https://edocs.deq.nc.gov/WaterResources/DocView.aspx?id=1380337&dbid=0&repo=WaterResources (Exhibit 65).
[128] *See* Public Meeting Report, *supra* note 122.
[129] *Swine Biogas Processing Permitting Actions and Information*, N.C. DEP'T OF ENV'T QUALITY, https://deq.nc.gov/swinebiogas.

A virtual public meeting was held on January 26, 2021, through the WebEx online platform, and many people spoke out in opposition to issuance of the draft water permits.[130] Community members raised concerns about their personal health, the safety of their drinking water, noxious odors, and the wellbeing of their local economies, and asked DEQ not to issue the permits without considering the cumulative impacts of the many polluting industries in [redacted] and [redacted] counties.[131] One community member stated that "[redacted] County is being turned into the county of waste and we really need to consider if we want to add to the waste issues that we are already dealing with . . . most of these neighborhoods are Black and Brown and we are being impacted the most."[132] Another community member demanded to know why DEQ wasn't protecting her community by requiring monitoring in the Permits.[133] Yet another community member implored DEQ to "listen to the concerns of the most impacted communities affected by the proposed [biogas] project and take the steps necessary to protect the health of these vulnerable communities."[134] Community members also requested that DEQ require [redacted] to install cleaner technology that would address many of the adverse environmental and public health effects caused by covering a hog waste lagoon. Community and environmental groups submitted written comments opposing issuance of the draft permits, including comments that urged DEQ to evaluate and address the increased pollution risks from the Hog Operations and the disproportionate impacts of these permits on communities of color.[135]

ii. DEQ's own environmental justice report shows disproportionate impact on Black and Latinx people living near the Hog Operations

DEQ's own environmental justice report shows that the communities around the Hog Operations have disproportionately higher Black, Latinx, and low-wealth populations as compared to the rest of the state.[136] DEQ used EJSCREEN to report the demographics of communities within one mile of each of the Hog Operations.

As illustrated in Exhibit 6 f the people living within one mile of the [redacted] 76 percent are people of color; within one mile of the [redacted] 55 percent are people of color; within one mile of the [redacted], 54 percent are people of color; and within one mile of the [redacted], 58 percent are people of color. The report also identifies two churches—[redacted] and [redacted]—and *209 households*

---

[130] N.C. Dep't of Env't Quality, Video of Public Meeting (Jan. 26, 2021), https://files.nc.gov/ncdeq/afo/Swine-Biogas-Public-Meeting-20210126-2300-1.mp4. The January 26, 2021 public meeting was held on the WebEx platform and was inaccessible to many and fraught with technological issues. Many impacted community members have limited internet access. Many who were able to access the virtual meeting had trouble with the WebEx software and were unable to speak even though they had registered to do so. Further, DEQ staff repeatedly refused answer numerous specific questions posed by impacted community members. *Id.* (responding to questions about environmental justice, cumulative impacts, and other concerns saying that the concerns "are outside the scope" of these permits).

[131] *Id*.

[132] *Id.* (comments by [redacted]).

[133] *Id.* (comments by [redacted]).

[134] *Id.* (comments by [redacted]).

[135] *See* Comment Letter, *supra* note 93; *see also* Letter from [redacted] and [redacted], to Ramesh Ravella, DEQ (Jan. 29, 2021) (Exhibit 66).

[136] *See* DEQ EJ Report, *supra* note 2.

within a one-mile radius of the four hog operations.[137] These congregations and households, which are predominantly made up of people of color and already bear the burden of the hog industry's pollution, as well as poultry operations and other polluting industries, would face additional environmental and health impacts if the permits are issued as drafted. Yet, the report did not include any recommendations or requirements for mitigating impacts to these communities.

IV. LEGAL VIOLATIONS

A. Legal Background.

i. Title VI of the Civil Rights Act of 1964 & EPA's Implementing Regulations

Title VI of the Civil Rights Act of 1964 prohibits recipients of federal funds from discriminating against individuals on the basis of race, color, or national origin, and provides that "[n]o person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance."[138] Title VI applies to all programs and activities receiving federal financial assistance.[139]

In 1973, EPA adopted nondiscrimination regulations implementing the purposes of Title VI. EPA regulations require state permitting agencies to minimize the "environmental impacts to local communities and ensur[e] that their practices and policies are implemented in a nondiscriminatory manner."[140]

In sum, federal civil rights laws and EPA regulations prohibit a recipient of federal funds from using criteria or methods of administering a program or activity which have the effect of subjecting individuals to discrimination.[141] Additionally, "Title VI imposes on states an affirmative obligation to include consideration of Title VI criteria in permitting decisions."[142] Therefore, DEQ—as a recipient of federal funds—is required to administer its permitting regime in a manner that does not have the effect of subjecting individuals to discrimination.

ii. North Carolina State Laws

The North Carolina General Assembly specifically "provid[ed] for the conservation of [the State's] water and air resources" and "achiev[ing] and [] maintain[ing] for the citizens of the State a total environment of superior quality,"[143] and authorized DEQ to deny a permit or attach

---

[137] *Id.* at 15.
[138] 42 U.S.C. § 2000d.
[139] CIVIL RIGHTS DIV., U.S. DEP'T OF JUSTICE, TITLE VI LEGAL MANUAL 22, https://www.justice.gov/crt/book/file/1364106/download.
[140] Title VI Public Involvement Guidance for EPA Assistance Recipients Administering Environmental Permitting Programs (Recipient Guidance), 71 Fed. Reg. 14207, 14214 (Mar. 21, 2006), , https://www.epa.gov/sites/default/files/2013-09/documents/title6_public_involvement_guidance.3.13.13.pdf.
[141] 42 U.S.C. § 2000d (2018); 40 C.F.R. § 7.35(b).
[142] *S. Camden Citizens in Action v. New Jersey Dept. of Env't Prot.*, 145 F.Supp. 2d 446, 476 (D.N.J. 2001).
[143] N.C. GEN. STAT. § 143-211(a).

a condition to a permit when DEQ "finds such denial or such conditions are necessary to effectuate the purposes of this Article."[144] The General Assembly requires anyone seeking to carry out any activity that impacts the waters of the State, including construction or operation of an animal waste management system, to obtain and comply with a state permit.[145] DEQ's Division of Water Resources ("DWR") has the authority to grant, modify, or revoke any permit as necessary to effectuate the State's policies.[146]

B. Legal Violation.

i. The Permits issued by DEQ disparately impact Black and Latinx families in (b) (6) Privacy, (b) [redacted] *Counties by increasing the risks of hog waste pollution.*

DEQ's Permits authorize waste treatment systems that will put more harmful ammonia into the air that nearby residents breathe—an unacceptable added harm for communities that have suffered health problems from hog operations for decades. In addition, the ammonia emissions and other changes to the hog waste from biogas production will exacerbate pollution to groundwater, rivers, and streams nearby the Hog Operations, potentially contaminating drinking water for residents and causing algal blooms and fish kills.[147] The Permits also allow (b) (6) Privacy, (b) (7)(C) Personal Privacy [redacted] to continue to dispose of waste using the harmful lagoon and sprayfield waste management system, about which EPA itself has expressed "deep concern."[148] These harms will be disproportionately borne by Black and Latinx neighbors of the Hog Operationsin violation of Title VI.

The Hog Operations at issue here are all located in parts of (b) (6) Privacy, (b) (7)(C) Personal Privacy [redacted] Counties that are already overburdened by industrial pollution that has compromised surface water and groundwater quality in the Cape Fear River Basin and harmed the health and well-being of local, predominantly Latinx and Black communities.[149]

ii. DEQ's Failure to Prevent Disproportionate Adverse Impacts on Communities of Color Is Not Justified.

Many people, including impacted community members, submitted comments to DEQ during the public comment period for the Permits. As noted above, several themes emerged from these comments: concern about the Permits' risk to drinking water, concern about the Permits' impact on air quality, concern about the Permits' pollution of nearby waterways, and concern that these risks, as well as other negative impacts, would be disproportionately shouldered by predominately people of color already suffering under a legacy of industrial pollution facilitated by DEQ.

---

[144] *Id.* § 143-215.1(b)(1).
[145] *Id.* § 143-215.1(a)(12).
[146] *Id.* §§ 143-211(c) & 143-215.1(b). The General Assembly granted the Environmental Management Commission certain powers as to these permits, which the Commission delegated to the DEQ's Division of Water Resources. *Id.* § 143-211(c).
[147] *See supra* Section III(A)-(C).
[148] Dorka Letter, *supra* note 5, at 1, 6.
[149] *See supra* Section III.

As EPA Title VI regulations provide, "[i]n administering a program or activity receiving Federal financial assistance in which the recipient has previously discriminated on the basis of race, color, sex, or national origin, the recipient shall *take affirmative action* to provide remedies to those who have been injured by the discrimination."[150] Yet in the "Environmental Justice" response section of its public meeting report, DEQ cited no information on environmental or public health impacts, nor did it point to any substantive protections included in the Permits to address those impacts. Instead, DEQ stated only that it gave "meaningful consideration of Environmental Justice issues," and cited to the public notice and public hearing on the Permits as sufficient to resolve any environmental justice concerns.[151] This does not constitute DEQ taking action to resolve disparate impacts and is not sufficient.

Although it is true that DEQ drafted an environmental justice report as part of the permitting process, this report simply evaluated the demographics and socioeconomics of the project area. DEQ did nothing to reduce the disproportionate adverse impacts of the Permits on the Black and Latinx communities in [redacted] County as Title VI requires. The report itself is devoid of any actual analysis of these impacts, much less any recommendations for reducing these impacts.[152]

If DEQ could justify these environmental harms and other harms, it would need to "offer evidence that its policy or decision in question is demonstrably related to a significant, legitimate goal related to its mission."[153] But to date, DEQ has not put forward *any* justification for failing to consider disproportionate adverse impacts to communities of color, in the environmental justice report, public meeting report, or elsewhere. Nor could it, given that DEQ's Division of Water Resources' mission is "to protect, enhance, and manage North Carolina's surface water and groundwater resources for the health and welfare of the citizens of North Carolina and the economic well-being of the state."[154]

When considering whether a disparate impact on a particular community is justified, EPA guidance instructs DEQ to consider whether any purported benefits would be "delivered directly to the affected population," keeping in mind "the views of the affected community" about

---

[150] 40 C.F.R. § 7.35(a)(7) (emphasis added). Here, DEQ's permitting practices have had a disparate effect on people of color. *See, e.g.,* Dorka Letter, *supra* note 5, 1, 5-6; *see also* Complaint, *supra* note 33 (alleging discriminatory effect of DEQ's permitting of lagoons and sprayfield systems on people of color in eastern North Carolina). *See also* § 7.35(b) ("A recipient shall not use criteria or methods of administering its program or activity which have the effect of subjecting individuals to discrimination because of their race, color, national origin, or sex, or have the effect of defeating or substantially impairing accomplishment of the objectives of the program or activity with respect to individuals of a particular race, color, national origin, or sex.").

[151] *See* Public Meeting Report, *supra* note 122, at 17; *see also id.* at 13 (referencing non-specific "necessary monitoring requirements" as addressing commenters' concerns).

[152] *See generally* DEQ EJ Report, *supra* note 2.

[153] U.S. EPA's External Civil Rights Compliance Office Compliance Toolkit, 15 (Jan. 18, 2017), https://www.epa.gov/sites/default/files/2020-02/documents/toolkit_ecrco_chapter_1-letter-faqs_2017.01.18.pdf; *see also* DEQ EJ Report, *supra* note 2 at 9.

[154] *About Water Resources*, N.C. DEP'T OF ENV'T QUALITY, https://deq.nc.gov/about/divisions/water-resources/about-water-resources; *see also* N.C. Constitution, Art. IXV, Sect. 5 ("It shall be the policy of this State to conserve and protect its lands and waters for the benefit of all its citizenry.").

whether the benefits justify the disparate impacts.[155] The community made its voice very clear, as the comments given indicate: it did not think the Permit benefited them, and thought it would actually harm them—socially, economically, and environmentally.[156]

DEQ is fully capable of ensuring that its permitting program fulfils its primary purpose while also avoiding discriminatory effects. Its decision to forgo such analysis here, despite comments and evidence suggesting that the decision to issue the Permits would cause disproportionate adverse impacts to Black and Latinx communities, violates Title VI's requirement to administer programs in a non-discriminatory manner.

iii. Less discriminatory alternatives to the Permits exist and are within DEQ's authority to require.

DEQ has the authority, indeed the obligation, to permit biogas projects in a way that protects nearby communities and the environment.[157]

Researchers and businesses have developed technologies and practices that significantly reduce the environmental impacts associated with managing hog waste, and industrial hog operations—including [redacted], Smithfield—have implemented such technologies elsewhere. These cleaner technologies include, for example:

- separating solids and liquids, which removes solid waste so it can be sold as fertilizers or soil amendments and minimizes sludge accumulation;
- nitrification-denitrification systems to eliminate nitrogen and nitrate, as well as reducing ammonia air pollution, from digester waste;
- alkaline treatment to address phosphorus and pathogens in digester waste; and
- injection or hose drag irrigation systems to apply waste directly to the soil, which reduces pollutant runoff.[158]

These technologies and practices have been successfully implemented, often in combination, on other hog operations in North Carolina and elsewhere and have significantly reduced the environmental impacts associated with hog waste management, and thus the impact

---

[155] Civil Rights Compliance Toolkit, *supra* note 153, at 15.

[156] *See, e.g.,* Public Meeting Report, *supra* note 122, at 12-13 (documenting comments from community members expressing concerns about public health, reduced property values, and the cumulative impacts of polluting industries, including poultry and hog operations, in the vicinity of the Hog Operations); *see also* Comment Letter, *supra* note 93.

[157] In addition to DEQ's obligations under federal civil rights and environmental laws, DEQ is also bound by state laws ensuring protection of the environment and public health. *See* N.C. Gen. Stat. § 143-215.1(b)(1) (providing that DEQ "prevent . . . any significant increase in pollution of the waters of the State"); *id*. § 143-211 ("It is the public policy of the State to maintain, protect, and enhance water quality within North Carolina."); *see also* 15A N.C. Admin. Code 2T.0108(c) (providing DEQ with the authority to "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.").

[158] *See generally* Comment Letter, *supra* note 93, at 23-27; *see also* Garry Grabow, Overview of Different Lagoon Effluent Application Methods on Odor and Ammonia Emissions (2007) https://projects.ncsu.edu/project/swine_extension/ncporkconf/2007/generalsessions/grabow.pdf.

on communities living nearby.[159] These solutions are commercially available[160] and are compatible with the use of covered digesters to produce biogas. Community and environmental groups provided DEQ information about these and other alternatives during the permitting process.[161] Yet DEQ failed to include any additional treatment technology or other protective practices as part of the Permits.

DEQ also failed to include surface water monitoring or groundwater monitoring to confirm a basic assumption underlying the Permits—that the waste generated at the Hog Operations will not reach waters of the State or otherwise pollute the environment. Instead, DEQ ignored decades of research documenting pollution and public health harms from industrial hog operations utilizing the lagoon and sprayfield waste management system, including data from the agency itself.[162] Earlier this month, the Ninth Circuit Court of Appeals roundly rejected as arbitrary and capricious this approach of blindly assuming that non-discharge facilities do not affect water quality. *See Food & Water Watch v. U.S. Environmental Protection Agency*, No. 20-71554 (9th Cir. Sept. 16, 2021). The court stated, "[w]ithout a requirement to monitor runoff . . . there is no way to ensure that a [hog operation] is complying with the [p]ermit's . . . non-discharge requirement for land-application areas." *Id.* at 24-25. DEQ's permits contain exactly this fatal flaw.

DEQ also failed to add more protective freeboard or sludge management conditions to reflect the changing nature of the waste and the increased risk of water and air pollution, and did not require any operations to update their waste utilization plans or animal waste management plans before spraying of digester waste begins.

---

[159] *See*, *e.g.*, Jiele Xu et al, *Performance Evaluation of a full-scale innovative swine waste-to-energy system*, 216 BIORESOURCE TECH. 494 (2016) (evaluating nitrification-denitrification technology used to reduce nitrogen pollution and ammonia emissions at Lloyd Ray Farms in Yadkinville, North Carolina) (Exhibit 67); Matias B. Vanotti et al, *High-rate solid-liquid separation coupled with nitrogen and phosphorus treatment of swine manure: effect on water quality*, FRONTIERS SUSTAINABLE FOOD SYS. (Aug. 16, 2018), https://www.frontiersin.org/articles/10.3389/fsufs.2018.00049/full (evaluating solid-liquid separation, nitrification-denitrification, and phosphorus removal system implemented in Kenansville, North Carolina) (Exhibit 68); Kyoung S. Ro, *High-Rate Solid-Liquid Separation Coupled with Nitrogen and Phosphorous Treatment of Swine Manure: Effect on Ammonia Emission*, 2 FRONTIERS IN SUSTAINABLE FOOD SYS. 1 (Sept. 28, 2018), https://www.ars.usda.gov/ARSUserFiles/60820500/Manuscripts/2018/Man1059.pdf (Exhibit 69); *Sistrates*, EMBRAPA, https://www.embrapa.br/en/suinos-e-aves/biogasfert/biogas/sistrates (last visited May 13, 2021 (describing a modular waste management system that employs and anaerobic digester, nitrification-denitrification, and phosphorus removal modules to significantly improve water quality and reduce ammonia emissions); Betsy Freese, *SF Special: How Smithfield Saved the Worst Hog Farm in America*, SUCCESSFUL FARMING (Jan. 4, 2018), https://www.agriculture.com/livestock/pork-powerhouses/how-smithfield-saved-the-worst-hog-farm-in-america. (describing Smithfield's Missouri waste management system, which includes barn scrapers and nitrification-denitrification).

[160] *See, e.g.*, *Manure and Digestate Management*, DIGESTED ORGANICS, https://digestedorganics.com/manure-and-digestate-management/ (last visited May 14, 2021); *Newtrient Technology Catalogue*, NEWTRIENT, https://www.newtrient.com/Catalog/Technology-Catalog (last visited May 14, 2021).

[161] *See* Comment Letter, *supra* note 93.

V. RELIEF REQUESTED

As detailed above, DEQ issued permits for biogas waste management systems that fail to protect the health and environment of families living near the Hog Operations, and in fact may make pollution and the risk of health harms even worse. And DEQ is preparing to issue a biogas general permit that will continue this same defective approach on an even greater scale.

These harms disproportionately affect Black and Latinx people living near the Hog Operations, and it is these communities who will suffer most if pollution from the Hog Operations worsens, as is expected with the Permits. Decades of research—including research reviewed by this office—demonstrate how the lagoon and sprayfield waste management system authorized by the Permits pollute rivers, streams, and air quality throughout eastern North Carolina. Despite this, and despite evidence indicating the increased risk of pollution and adverse health impacts to nearby residents from the increases to harmful hog waste pollutants resulting from biogas production, DEQ issued the Permits without addressing these harms. This is unacceptable and a violation of federal law.

Complainants request that ECRCO conduct an investigation to determine whether DEQ violated Title VI and EPA regulations in issuing the Permits with inadequate protections for the water quality and health of people living nearby, a disproportionate share of whom are Black and Latinx.

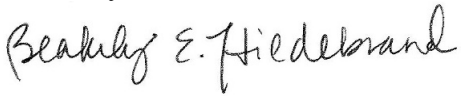
In addition, DEQ must change its current policy of refusing to consider ongoing and increasing water quality, air quality, and health impacts caused by the hog industry's polluting waste management systems. With regard to the Permits at issue in this complaint and future permits for biogas production, DEQ must identify, avoid, and if necessary mitigate any discriminatory effects caused by its permitting decisions. DEQ's policies and practices lead to disparate adverse impacts, and EPA should counsel DEQ on how to develop a permit decision-making policy that is fair, equitable, and Title VI-compliant going forward, as well as on how to administer that policy in a non-discriminatory manner.

VI. CONCLUSION

For all of the reasons outlined above, Complainants request that EPA accept this compliant for investigation, and upon a finding of disparate impact, bring DEQ into compliance with Title VI of the Civil Rights Act of 1964 and EPA's implementing regulations.

Thank you for your consideration of this matter. Should you have any questions or wish to discuss this matter further, please contact me at bhildebrand@selcnc.org or [redacted].

Sincerely,



Blakely Hildebrand
Staff Attorney
Southern Environmental Law Center

INDEX OF EXHIBITS

Exhibit No.	Title
01	DEQ, (b) (6), (b) (7)(C) [redacted]
02	DEQ, (b) (6), (b) (7)(C) [redacted]
03	DEQ, (b) (6), (b) (7)(C) [redacted]
04	DEQ, (b) (6), (b) (7)(C) [redacted]
05	DEQ, Draft Environmental Justice Report, 20 (Dec. 22, 2020)
06	Demographics of Impacted Communities, So. Env't Law Ctr (Sept. 21, 2021)
07	Prehearing Statement, *Env't Justice Comm. Action Network & Cape Fear River Watch v. N.C. Dep't of Env't Quality – Div. Water Res & Murphy Brown, LLC*, Case Nos. 21 EHR 02068, 02069, 02070, 02071 (consolidated)
08	Nina G.G. Domingo et al., *Air quality-related health damages of food*, 118 PROCEEDINGS OF THE NAT'L ACAD. SCIS. 1 (May 18, 2021)
09	County-Level Data
10	Letter from Lilian Dorka to William Ross (Jan. 12, 2017)
11	Julia Kravchenko, *Mortality and Health Outcomes in North Carolina Communities Located in Close Proximity to Hog Concentrated Animal Feeding Operations*, 79 N.C. Med. J. 278
12	Steve Wing, et al., *Environmental Injustice in North Carolina's Hog Industry*, 108 Env't Health Perspectives 225 (2000)
13	*Food & Water Watch v. U.S. Environmental Protection Agency*, No. 20-71554 (9th Cir. Sept. 16, 2021)
14	N.C. Sess. L. 2021-78 § 11
15	(b) (6) Privacy, (b) (7)(C) Personal Privacy [redacted] *Hog operations have harmed Sampson-Duplin church, but NC legislators have turned deaf ear*, FAYETTEVILLE OBSERVER (June 25, 2021)

INDEX OF EXHIBITS

16	Steve Wing & Jill Johnston, *Industrial Hog Operations in North Carolina Disproportionately Impact African-Americans, Hispanics and American Indians* 2 (2014)
17	Virginia Guidry, et al., *Connecting Environmental Justice and Community Health*, 79 N.C. Medical Journal 324 (2018)
18	Wendee Nicole, *CAFOs and Environmental Justice: The Case of North Carolina*, 121 Env't Health Perspectives A182 (2013)
19	*McKiver v. Smithfield*, 980 F.3d 937 (4th Cir. 2020)
20	JoAnn Burkholder et al., *Impacts of Waste from Concentrated Animal Feeding Operations on Water Quality*, 115 Env't Health Perspectives 308 (2007)
21	Stephen L. Harden, *Surface-Water Quality in Agricultural Watershed of the North Carolina Coastal Plain Associated with Concentrated Animal Feeding Operations, Scientific Investigations Report 2015-5080*, U.S. Dep't of Interior (2015)
22	Michael Mallin et al., *Industrial Swine and Poultry Production Causes Chronic Nutrient and Fecal Microbial Stream Pollution*, 226 J. Water Air Soil Pollution 1 (2015)
23	Colleen N. Brown et al., *Tracing nutrient pollution from industrialized animal production in a large coastal watershed*, 192, Env't Monitoring & Assessment 515 (July 2020)
24	Michael A. Mallin & Lawrence B. Cahoon, *Industrialized Animal Production: A Major Source of Nutrient and Microbial Pollution to Aquatic Ecosystems*, 24 Population & Env't 369 (2003)
25	(b) (6) Privacy, (b) (7)(C) Personal Privacy [redacted] Nutrient Utilization Plan for (b) (6) Privacy, (b) (7 [redacted] Farm (Jan. 29, 2020)
26	T.G. Ciravolo et al., *Pollutant Movement to Shallow Ground Water Tables from Anaerobic Swine Waste Lagoon*, Va. Water Res. Rsch. Ctr. (1977)
27	R.L. Huffman & Phillip W. Westerman, *Estimated Seepage Losses from Established Swine Waste Lagoons in the Lower Coastal Plain of North Carolina*, 38 Transactions Am. Soc'y Agric. Eng'rs 449 (1995)
28	Shane Rogers & John Haines, U.S. EPA, *Detecting and mitigating the environmental impact of fecal pathogens originating from confined animal feeding operations: Review* (2005)

INDEX OF EXHIBITS

29	Kenneth Rudo, *Groundwater Contamination of Private Drinking Well Water by Nitrates Adjacent to Intensive Livestock Operations (ILOs)*, N.C. DEP'T OF HEALTH AND HUMAN SERV., 414 (June 1999)
30	Kenneth C. Stone et al., *Impact of Swine Waste Application on Ground and Stream Water Quality in an Eastern Coastal Plain Watershed*, 41 Transactions Am. Soc'y Agric. Eng'rs 1665 (1998)
31	Amy R. Sapkota et al., *Antibiotic-Resistant Enterococci and Fecal Indicators in Surface Water and Groundwater Impacted by a Concentrated Swine Feeding Operation*, 115 ENV'T. HEALTH PERSPECTIVES 1040 (2007)
32	Huffman, *Seepage Evaluation of Older Swine Lagoons in North Carolina*, 47 TRANSACTIONS AM. SOC'Y AGRIC. ENG'RS 1507 (2004)
33	JoAnn Burkholder et al., *Impacts to a Coastal River and Estuary from Rupture of A large Swine Waste Holding Lagoon*, 26 J. Env't Quality 1451 (1997)
34	Michael A. Mallin, *Impacts of Industrial Animal Production on Rivers and Estuaries*, 88 Am. Sci. 26 (2000)
35	C.A. Pope III et al., *Lung cancer, cardiopulmonary mortality, and long-term exposure to fine particulate air pollution*, 287 J. Am Med Assoc. 1132 (2002)
36	Kelley Donham, et al., *Community Health and Subeconomic Issues Surrounding Concentrated Animal Feeding Operations*, 115 Env't Health Perspectives 317 (2007)
37	Ward, et al, Drinking Water Nitrate and Human Health: An Updated Review, 15 Int'l J. Env't Research & Public Health 1 (July 23, 2018)
38	Phoebe Gittelson, et al., *The False Promises of Biogas: Why Biogas is an Environmental Justice Issue*, Environmental Justice 3 (2021)
39	Baines, R. (Edited), *Reducing greenhouse gas emissions from livestock production*, Taylor & Francis Group, London, 145 (2021)
40	USDA, Natural Res. Conservation Serv., Conservation Practice Standard, Anaerobic Digester, Code 366, 366-CPS-6, (June 2017)
41	Aneja et al, *Characterizing Ammonia Emissions from Swine Farms in North Carolina: Part 2—Potential Environmentally Superior Technologies for Waste Treatment*, 58 J. Air & Waste Mgmt. Ass., 1145 (2008)

INDEX OF EXHIBITS

42	Kupper et al., *Ammonia and greenhouse gas emissions from slurry storage—A Review*, 300 Agriculture, Ecosystems, & Env't 1 (2020)
43	Lowry A. Harper et al, *The Effect of Biofuel Production on Swine Farm Methane and Ammonia Emissions*, 39 J. Envt. Qual. 62 (2010)
44	Letter from Blakely Hildebrand and Maia Hutt, SELC, to Ramesh Ravella, DEQ (Jan. 29, 2021)
45	Jeffery Lorimor & John Sawyer, *Final Report: Swine USA Anaerobic Digester Performance Analysis*, NAT. RES. CONSERVATION SVC. – IOWA STATE UNIV. 3 (2004)
46	Roger Nkoa, *Agricultural benefits and environmental risks of soil fertilization with anaerobic digestates: a review*, 24 Agronomy for Sustainable Dev. 473 (2015)
47	Kim Weaver et al, *Effects of Carbon and Nitrogen Emissions due to Swine Manure Removal for Biofuel Production*, J. ENV'T QUALITY, 1371 (2012)
48	T. Nyord et. al, *Ammonia Volatilization and crop yield following land application of solid-liquid separated, anaerobically digested, and soil injected animal slurry to winter wheat,* 160 J. AGRIC., ECOSYSTEMS, AND ENV'T, 75 (2012)
49	Biswanath Dari et. al, *Understanding Factors Controlling Ammonia Volatilization from Fertilizer Nitrogen Applications*, UNIV. OF IDAHO – EXTENSION (2019)
50	Aneja, Viney P. et al., *Atmospheric nitrogen compounds II: emissions, transport, transformation, deposition and assessment*, Atmospheric Env't, 1903-11 (2001)
51	Jennifer K. Costanza et al., *Potential geographic distribution of atmospheric nitrogen deposition from intensive livestock production in North Carolina, USA,* 398 Sci. of the Total Env't 76 (2008)
52	John T. Walker et al., *Atmospheric transport and wet deposition of ammonium in North Carolina*, 34 J. Atmospheric Env't 3407 (2000)
53	Bajwa, K. S. et al., *Modeling studies of Ammonia dispersion and dry deposition at some hog farms in North Carolina*, 58 J. Air & Waste Mgmt. Ass., 9 (2008)
54	Mary Berg et al, *Nitrogen Behavior in the Environment*, N.D. AGR. EXTENSION SERV. 3 (2017)

INDEX OF EXHIBITS

55	W.F. Ritter & A.E.M. Chirnside, *Impact of Animal Waste Lagoons on Ground-Water Quality*, 34 BIOLOGICAL WASTES 39 (1990)
56	Dennis Keeney & Robert Olsen, *Sources of nitrate in groundwater*, 16 CRITICAL REVIEWS IN ENV'T SCI. & TECH. 257 (1986)
57	DEQ, *Cape Fear River Animal Feeding Operations Monitoring Study: Preliminary Report* (May 4, 2020), Cape Fear River Animal Feeding Operations Monitoring Study: Preliminary Report
58	DIV. WATER RES., N.C. DEP'T ENV'T QUALITY, ANNUAL REPORT TO THE NORTH CAROLINA GENERAL ASSEMBLY ON ANIMAL WASTE MANAGEMENT PERMITTING, INSPECTION AND COMPLIANCE ACTIVITIES: JULY 1, 2019 – JUNE 30, 2020, Table 3 (Oct. 2020)
59	N.C. Env't Mgmt Comm'n – Dep't Env't Quality, Swine Animal Waste Management General Permit ("General Permit") (Apr. 12, 2019)
60	Letter from B. Hildebrand, et al. to DEQ (March 2019)
61	Swine Biogas permit Modifications: Public Meeting Report and Recommendations (Jan. 26, 2021)
62	Compliance History for [redacted] (Farm [redacted] (Jan. 2019-Mar. 2021)
63	Compliance History for [redacted] Operation (Mar. 2018-Mar. 2021)
64	Compliance History for [redacted] Operation
65	Compliance History for [redacted] Operation
66	Letter from [redacted] and [redacted] to Ramesh Ravella, DEQ (Jan. 29, 2021)
67	Jiele Xu et al, *Performance Evaluation of a full-scale innovative swine waste-to-energy system*, 216 BIORESOURCE TECH. 494 (2016)
68	Matias Vanotti et al, *High-rate solid-liquid separation coupled with nitrogen and phosphorus treatment of swine manure: effect on water quality*, 2 Frontiers Sustainable Food Sys. 49 (Aug. 16, 2018)
69	Kyoung S. Ro, *High-Rate Solid-Liquid Separation Coupled with Nitrogen and Phosphorous Treatment of Swine Manure: Effect on Ammonia Emission*, 2 Frontiers in Sustainable Food Sys. 62 (Sept. 28, 2018)