SOUTHERN ENVIRONMENTAL LAW CENTER

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

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

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<u>VIA Electronic Mail</u>

Dr. Sergei Chernikov
N.C. Department of Environmental Quality
Division of Water Resources
1617 Mail Service Center
Raleigh, NC 27699-1617
publiccomments@ncdenr.gov

Re: Southern Environmental Law Center Comments Draft NPDES Permit No. NC0003719, DAK Americas LLC/Cedar Creek Site

Dear Dr. Chernikov:

The Southern Environmental Law Center offers the following comments, on behalf of Cape Fear River Watch, regarding the draft renewal National Pollutant Discharge Elimination System ("NPDES") Permit NC0003719, issued by the North Carolina Department of Environmental Quality ("the Department") to DAK Americas, LLC ("DAK").[1] DAK discharges wastewater from its polyester resins manufacturing and plastic bottle recycling operations in Fayetteville, North Carolina, into a portion of the Cape Fear River that is protected for aquatic life, secondary recreation, and agriculture.[2] Less than 10 miles downstream of DAK's discharge, the Cape Fear River serves a water supply.[3]

DAK's wastewater contains exceptionally high concentrations of 1,4-dioxane and per- and polyfluoroalkyl substances ("PFAS"), chemicals known to cause cancer.[4] Despite

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[1] N.C. Dep't of Env't Quality, Draft NPDES Permit No. NC0003719 (Apr. 27, 2023) [hereinafter "DAK Draft Permit"]. We note that the original public notice for this draft permit was published on April 27, 2023, but stated comments would be due on April 24, 2023—three days prior to the public notice date. *See* Email from John Hennessey, N.C. Dep't of Env't Quality (Apr. 27, 2023), Attachment 1. The Department subsequently confirmed that members of the public would have the "full 30-day period of time as expected." Email from Michael Montebello, N.C. Dep't of Env't Quality, to Hannah Nelson, S. Env't L. Ctr. (May 3, 2023), Attachment 2; *see also* 15A N.C. Admin. Code 2H.0109(a)(2). Later communications from the Department, however, failed to articulate or set a deadline for public comment. *See* Email from John Hennessey, N.C. Dep't of Env't Quality (May 4, 2023), Attachment 3. Given the ambiguity, the Southern Environmental Law Center submits these comments on behalf of Cape Fear River Watch within 30 days of the original public notice.

[2] DAK Americas, Permit Renewal and Modification NPDES Permit No.: NC0003719 (May 3, 2022), at PDF pg. 4 [hereinafter "DAK Permit Application"], DAK Draft Permit, *supra* note 1 at 2.

[3] 15A N.C. Admin. Code 2B.0311(p); *see also NC Surface Water Classifications*, N.C. DEP'T OF ENV'T QUALITY, <u>https://experience.arcgis.com/experience/7073e9122ab74588b8c48ded34c3df55?data_id=dataSource_1-SurfaceWaterClassifications_6584_4677%3A4191</u> (last visited May 22, 2023).

[4] *See* DAK Permit Application, *supra* note 2 at PDF pg. 273–591; *see also* DAK Americas, Discharge Monitoring Reports (2018-2023), [hereinafter "DAK 2018-2023 DMRs"], Attachment 4; N.C. Dep't of Env't Quality, Cape Fear Industrial PFAS & 1,4-dioxane Sampling (2020), at 11, Attachment 5.

longstanding knowledge of this pollution, however, the Department did not include effluent limits for these chemicals in DAK's draft permit.[5]

The draft permit here stands in stark contrast to how the Department has lawfully addressed toxic chemical pollution released from other facilities. The Department, for example, followed state and federal law when it imposed technology-based limits for certain PFAS compounds in a NPDES permit issued to The Chemours Company, FC ("Chemours") last September.[6] The Department similarly followed the law when it assessed the need for water quality-based limits for 1,4-dioxane in a NPDES permit issued to the city of Sanford in April of this year[7] and imposed water quality-based limits for 1,4-dioxane in a draft NPDES permit issued to the city of Asheboro last December.[8] Without explanation, those processes were not followed here,[9] even though DAK discharges PFAS and 1,4-dioxane upstream of the very same communities already overburdened with toxic chemical pollution from Chemours, Sanford, and Asheboro (among others).

The Cape Fear River Basin and those who rely upon it suffer from some of the highest amounts of 1,4-dioxane and PFAS pollution in the entire country.[10] The Department cannot pick and choose which polluters to control. As the U.S. Environmental Protection Agency ("EPA") made clear in guidance issued last December, state permitting agencies should use their "existing authorit[y]" to control toxic chemical pollution, including PFAS, "to the fullest extent available under state and local law."[11] In line with that guidance, and as set forth in more detail below, the Department must analyze technology-based effluent limits for DAK's discharge of 1,4-dioxane and PFAS. If technology-based limits are insufficient to ensure downstream water quality is protected, the Department must impose water-quality based limits. Should the Department need more information to craft these limits, it must demand information from DAK during the application period. These changes must be made before the permit is made final. Failure to do so is unlawful and prolongs North Carolinians' exposure to toxic pollution.

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[5] *See* DAK Draft Permit, *supra* note 1 at 3–6.
[6] N.C. Dep't of Env't Quality, Final NPDES Permit No. NC0090042 (Sept. 15, 2022), at 3 [hereinafter "Chemours Outfall 004 Permit"], Attachment 6; N.C. Dep't of Env't Quality, Fact Sheet NPDES Permit No. NC0090042 (Sept. 14, 2022), at 13–14 [hereinafter "Chemours Outfall 004 Permit Fact Sheet"], Attachment 7.
[7] N.C. Dep't of Env't Quality, Final Fact Sheet NPDES Permit No. NC0024147 (Apr. 14, 2023), at 13–14 [hereinafter "Sanford WWTP Permit Fact Sheet"], Attachment 8.
[8] N.C. Dep't of Env't Quality, Draft NPDES Permit No. NC0026123 (Dec. 6, 2022), at 3 [hereinafter "Asheboro WWTP Draft Permit"], Attachment 9; N.C. Dep't of Env't Quality, Draft Permit Fact Sheet NPDES Permit No. NC0026123 (Aug. 29, 2022), at 13–14 [hereinafter "Asheboro WWTP Permit Fact Sheet"], Attachment 10.
[9] *See* N.C. Dep't of Env't Quality, Draft Fact Sheet NPDES Permit No. NC0003719 (Feb. 27, 2023) [hereinafter "DAK Draft Permit Fact Sheet"], Attachment 11; Email from Sergei Chernikov, N.C. Dep't of Env't Quality, to Hannah Nelson, S. Env't L. Ctr. (May 4, 2023) (conveying draft permit fact sheet), Attachment 12; N.C. Dep't of Env't Quality, 3719-RPA-2023 (2023), Attachment 13 [hereinafter "DAK RPA Spreadsheet"]; Email from Sergei Chernikov, N.C. Dep't of Env't Quality, to Hannah Nelson, S. Env't L. Ctr. (May 5, 2023) (conveying RPA analysis), Attachment 14.
[10] *Data Summary of The Third Unregulated Contaminant Monitoring Rule*, U.S. Env't Prot. Agency, https://www.epa.gov/dwucmr/data-summary-third-unregulated-contaminant-monitoring-rule (last visited May 22, 2023); N.C. Div. of Water Res., *1,4-Dioxane in the Cape Fear River Basin of North Carolina: An Initial Screening and Source Identification Study* 2 (2016), Attachment 15.
[11] Memorandum from Radhika Fox, Assistant Administrator, U.S. Env't Prot. Agency, *Addressing PFAS Discharges in NPDES Permits and Through the Pretreatment Program and Monitoring Programs* (December 5, 2022), at 2 [hereinafter "EPA's PFAS NPDES Guidance"], Attachment 16.

I. DAK discharges 1,4-dioxane and PFAS, chemicals linked to cancer.

DAK owns and operates an industrial facility in Fayetteville, North Carolina, which consists of three manufacturing operations. DAK's Resins Plant manufactures polyester pellets through a polymerization process that produces polyester resin.[12] DAK also operates a Batch Plant (which it acquired from DuPont in 1975) to produce polyethylene terephthalate ("PET") polymer chips to be sold for use in the textile or plastics industries.[13] At the same site, Clear Path Recycling—a joint venture between DAK and Shaw Industries Group[14]—operates a recycling facility that produces "bottle flake," a product that can be used in textile manufacturing, packing, and packaging products.[15] All three of these facilities result in the production of wastewater that is run through an onsite wastewater treatment plant and is ultimately discharged into the Cape Fear River.[16] The sludge produced during the wastewater treatment process is disposed of in the Sampson County landfill or through a commercial contractor.[17]

In its permit application, DAK explains that it plans to expand production of both its resins manufacturing (at the resins and batch plant) and its plastics recycling operations.[18] The planned expansion will result in increased wastewater discharges from a permitted 0.5 million gallons per day ("MGD") to 0.764 MGD.[19]

Both 1,4-dioxane and PFAS are used or produced in the manufacture of polyester resins, including PET, as well as the operations of certain plastic recycling. Unsurprisingly, data collected over the past five years shows that DAK's wastewater contains high levels of both categories of toxic chemicals. The Department has known of DAK's industrial chemical pollution for a half-decade but, in the interim, has refrained from controlling these discharges.

a. DAK discharges 1,4-dioxane, a human carcinogen.

DAK discharges wastewater containing 1,4-dioxane, a chemical associated with cancer.[20] 1,4-dioxane is a clear, man-made chemical that is a byproduct of many industrial processes.[21] Relevant here, 1,4-dioxane is a direct "byproduct in the manufacture of polyethylene terephthalate (PET) plastic,"[22] the manufacturing process DAK operates in Fayetteville, North Carolina.[23] The chemical is toxic to humans,[24] causing liver and kidney damage at incredibly

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[12] DAK Permit Application, *supra* note 2 at PDF pg. 4.
[13] *Id.* at PDF pg. 7.
[14] *Clear Path Recycling Starts New PET Recycling Facility*, Recycling Today (Sept. 2010), Attachment 17.
[15] DAK Permit Application, *supra* note 2 at PDF pgs. 4–5, 8–11.
[16] *Id.* at PDF pgs. 13, 81.
[17] *Id.* at PDF pg. 14.
[18] *Id.* at PDF pg. 1, 80.
[19] *Compare* DAK Permit Application, *supra* note 2 at PDF pg. 80 to *id.* at PDF pg. 81 (showing an increase in expected wastewater effluent between 2021 and 2026).
[20] *See* DAK 2018-2023 DMRs, *supra* note 4; *see also* Cape Fear Industrial PFAS & 1,4-dioxane Sampling, *supra* note 4 at 11.
[21] U.S. Env't Prot. Agency, *Technical Fact Sheet – 1,4-Dioxane* 1-2 (2017), Attachment 3 [hereinafter "EPA, *Technical Fact Sheet – 1,4-Dioxane*"], Attachment 18.
[22] *Id.* at 2.
[23] DAK Permit Application, *supra* note 2 at PDF pg. 4; *see also* DAK Draft Permit Fact Sheet, *supra* note 9 at 2.
[24] EPA, *Technical Fact Sheet – 1,4-Dioxane*, *supra* note 21 at 1.

low levels.[25] As a result of the harms caused by 1,4-dioxane, EPA established a drinking water health advisory with an associated lifetime cancer risk of one-in-one-million people at a concentration of 0.35 parts per billion ("ppb").[26] The State of North Carolina has similarly determined that 1,4-dioxane is toxic and poses a cancer risk at levels higher than 0.35 ppb.[27]

The Department has known of DAK's 1,4-dioxane pollution since at least 2018,[28] when the agency first required the company to collect and report monthly samples.[29] Since August 2018, DAK's average daily discharge of 1,4-dioxane has exceeded 5,300 ppb, a number more than 15,000 times what the state considers safe.[30] Over the past five years, DAK's discharge has reached concentrations as high as 22,000 ppb[31] and has exceeded 10,000 ppb in nearly 20 percent of the samples collected.[32] Concerningly, since 2020, DAK has increased the amount of 1,4-dioxane it dumps into the Cape Fear River,[33] a change which is unfortunately reflected in DAK's discharge monitoring reports. By way of illustration, in 2020, DAK's average discharge was 2,063 ppb.[34] But since January 2021, DAK's average discharge has exceeded 5,600 ppb, with individual samples reaching as high as 15,300 ppb.[35]

While the information about DAK's 1,4-dioxane pollution made available to the Department during the permit application process[36] demonstrates extreme pollution flowing from DAK's facility, it is possible that DAK's infrequent monitoring underrepresents the full scope of 1,4-dioxane being released into the Cape Fear River. As the Department has seen at industries and wastewater treatment plants across the state, the release of 1,4-dioxane fluctuates depending

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[25] *Id.*; U.S. Env't Prot. Agency, *Integrated Risk Information System, Chemical Assessment Summary: 1,4,-dioxane* 2 https://iris.epa.gov/static/pdfs/0326_summary.pdf (Aug. 11, 2010); Agency for Toxic Substances and Disease Registry, 1,4-dioxane – Tox FAQs CASE # 123-91-1 (Apr. 2012), *available at* https://www.atsdr.cdc.gov/toxfaqs/tfacts187.pdf; U.S. Dep't of Health and Human Servs., Report on Carcinogens, Fifteenth Edition 1,4-dioxane CAS No 123-91-1 (2021), *available at* https://ntp.niehs.nih.gov/ntp/roc/content/profiles/dioxane.pdf.

[26] *2018 Edition of the Drinking Water Standards and Health Advisories*, EPA OFFICE OF WATER 4 (2018), https://www.epa.gov/system/files/documents/2022-01/dwtable2018.pdf; EPA, *Technical Fact Sheet – 1,4-Dioxane*, *supra* note 21 at 3.

[27] N.C. Div. of Water Res., *1,4-dioxane Monitoring in the Cape Fear River Basin of North Carolina: An Ongoing Screening, Source Identification, and Abatement Verification Study* 2 (2017), Attachment 19 (affirming EPA's conclusions); *see also Managing Emerging Compounds in Water*, N.C. Dep't of Env't Quality, https://www.deq.nc.gov/news/key-issues/emerging-compounds/managing-emerging-compounds-water#GroundwaterandSurfaceWaterQualityStandardsActions-3956 (last visited May 22, 2023); N.C. Dep't of Env't Quality, Div. Water Res., Surface Water Quality Standards, Criteria & In-Stream Target Values (2019) (stating that the one-in-one million cancer risk for 1,4-dioxane is 0.35 ppb), Attachment 20.

[28] It's worth noting that DAK has reported that it releases 1,4-dioxane into the water on the toxics release inventory since at least 2012. *See TRI Toxics Tracker*, U.S. ENV'T PROT. AGENCY, https://edap.epa.gov/public/extensions/TRIToxicsTracker/TRIToxicsTracker.html#continue (last visited May 10, 2023); *see also* Dak Americas, 2012-2021 TRI Water Releases Summary (2023), Attachment 21 (spreadsheet pulled from TRI Toxics Tracker on May 2, 2023 summarizing DAK's releases of 1,4-dioxane by poundage per year).

[29] N.C. Dep't of Env't Quality, Final NPDES Permit Renewal NC0003719 (June 18, 2018), at 5.

[30] DAK 2018-2023 DMRs, *supra* note 4; Cape Fear Industrial PFAS & 1,4-dioxane Sampling, *supra* note 4 at 11.

[31] DAK 2018-2023 DMRs, *supra* note 4 at PDF pg. 14 (1,4-dioxane concentration on September 30, 2018).

[32] *See generally id.*

[33] *See* 2012-2021 TRI Water Releases Summary, *supra* note 28 (explaining in 2020, DAK released 1,892 pounds of 1,4-dioxane and in 2021, the company released 2,611 pounds).

[34] DAK 2018-2023 DMRs, *supra* note 4; Cape Fear Industrial PFAS & 1,4-dioxane Sampling, *supra* note 4 at 11.

[35] DAK 2018-2023 DMRs, *supra* note 4; Cape Fear Industrial PFAS & 1,4-dioxane Sampling, *supra* note 4 at 11.

[36] DAK Permit Application, *supra* note 2 at PDF pg. 273–591.

on the timing of manufacturing processes.[37] If samples are collected infrequently, it's possible (and likely) that the data will miss large slugs of the pollution. The extreme fluctuation in DAK's reporting—ranging from 369 ppb to 22,000 ppb—emphasizes this concern.[38] It's therefore possible that DAK's pollution is far more concerning than previously understood.

b. DAK discharges PFAS, a class of chemicals known to cause harm to human health and the environment.

DAK's permit application materials do not contain information about PFAS,[39] but in 2019, the Department instructed DAK and other municipal and industrial dischargers in the Cape Fear River Basin to collect PFAS samples over three consecutive months.[40] The results of that sampling confirm that DAK's wastewater contains PFAS at concentrations as high as 306 parts per trillion ("ppt").[41]

PFAS are a group of man-made chemicals manufactured and used broadly by industry since the 1940s.[42] PFAS pose a significant threat to human health at extremely low concentrations. Two of the most studied PFAS—perfluorooctanoic acid ("PFOA") and perfluorooctane sulfonate ("PFOS")—are bioaccumulative and highly persistent in humans.[43] These chemicals build up in the human body, and have been shown to cause developmental effects to fetuses and infants, kidney and testicular cancer, liver malfunction, hypothyroidism, high cholesterol, ulcerative colitis, obesity, decreased immune response to vaccines, reduced hormone levels, delayed puberty, and lower birth weight and size.[44] Recent literature also confirms PFAS exposure can result in decreased fertility in women.[45] And because of their impacts on the immune system, PFAS can also exacerbate the effects of Covid-19.[46] Studies show that exposure to mixtures of different PFAS can worsen these health effects.[47] Given these harms, EPA in June 2022 established interim updated lifetime health advisories for PFOA and

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[37] *See, e.g.*, City of High Point, Discharge Monitoring Report (Mar. 2023), Attachment 22 (indicating that 1,4-dioxane discharges ranged from 2.16 ppb to 123 ppb within 20 days of sample collection).
[38] DAK 2018-2023 DMRs, *supra* note 4.
[39] *See generally* DAK Permit Application, *supra* note 2 (not disclosing information about PFAS discharges).
[40] *See* Letter from Linda Culpepper, Director, N.C. Division of Water Res. re PFAS and 1,4-dioxane sampling (Apr. 30, 2019), Attachment 23.
[41] Cape Fear Industrial PFAS & 1,4-dioxane Sampling, *supra* note 4 at 11.
[42] *Lifetime Drinking Water Health Advisories for Four Perfluoroalkyl Substances*, 87 Fed. Reg. 36,848, 36,849 (June 21, 2022); *Our Current Understanding of the Human Health and Environmental Risks of PFAS*, U.S. ENV'T PROT. AGENCY, https://perma.cc/V6PX-2PNK (last visited Mar. 8, 2023).
[43] 87 Fed. Reg. at 36,849; U.S. Env't Prot. Agency, Interim Drinking Water Health Advisory: Perfluorooctanoic Acid (PFOA) CASRN 335-67-1 (June 2022), at 3–4, Attachment 24; U.S. Env't Prot. Agency, Interim Drinking Water Health Advisory: Perfluorooctane Sulfonic Acid (PFOS) CASRN 1763-23-1 (June 2022), at 3–4, *available at* Attachment 25.
[44] Arlene Blum et al., *The Madrid Statement on Poly- and Perfluoroalkyl Substances (PFASs)*, 123 ENV'T HEALTH PERSP. 5, A 107 (May 2015); U.S. Env't Prot. Agency, Drinking Water Health Advisories for PFAS: Fact Sheet for Communities, at 1–2 (June 2022), *available at* https://perma.cc/T7FQ-EKD6.
[45] Nathan J. Cohen, *Exposure to Perfluoroalkyl Substances and Women's Fertility Outcomes in a Singaporean Population-Based Preconception Cohort*, 873 SCI. TOTAL ENV'T 162267 (May 15, 2023).
[46] *See* Lauren Brown, *Insight: PFAS, Covid-19, and Immune Response–Connecting the Dots*, BLOOMBERG LAW (July 13, 2020, 4:00 AM), https://perma.cc/QM9H-7ZT6.
[47] Emma V. Preston et al., *Prenatal Exposure to Per- and Polyfluoroalkyl Substances and Maternal and Neonatal Thyroid Function in the Project Viva Cohort: A Mixtures Approach*, 139 ENV'T INT'L 1 (2020), https://perma.cc/DJK3-87SN.

PFOS in drinking water of 0.004 parts per trillion ("ppt") and 0.02 ppt, respectively.[48] These health advisories demonstrate that no level of these chemicals are safe.

Epidemiological studies show that many of the negative health outcomes associated with PFOA and PFOS can result from exposure to other PFAS, including, but not limited to, perfluorohexane sulfonic acid ("PFHxS"),[49] perfluorobutanesulfonic acid ("PFBS"),[50] perfluorobutanoic acid ("PFBA"),[51] perfluorohexanoic acid ("PFHxA"),[52] perfluorononanoic acid ("PFNA"),[53] perfluorodecanoic acid ("PFDA"),[54] and hexafluoropropylene oxide dimer acid ("GenX Chemicals").[55]

Building upon its understanding of the harms caused by PFAS, on March 14, 2023, EPA proposed national drinking water standards for six PFAS compounds.[56] The drinking water standards, once finalized, will provide enforceable limits on the concentration of PFAS that can be present in drinking water systems. As drafted, EPA proposes to limit concentrations of PFOA and PFOS in drinking water systems to below 4 ppt, with a public health goal of 0 ppt.[57] EPA also proposed to limit PFNA, PFBS, PFHxS, and GenX as a mixture, utilizing a formula called a hazard index.[58] In light of the proposed drinking water standards, it is clear we must prevent as much of this pollution from entering our rivers, creeks, and streams as possible.

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[48] 87 Fed. Reg. at 36,848–49.

[49] U.S. Env't Prot. Agency, DRAFT Systematic Review Protocol for the PFBA, PFHxA, PFHxS, PFNA, and PFDA (anionic and acid forms) IRIS Assessments (updated Jan. 2021), at 2-22, https://perma.cc/32DL-AAQK [hereinafter "DRAFT Toxicological Data PFBA, PFHxA, PFHxS, PFNA, and PFDA"] (explaining that studies indicate that PFHxS is associated with developmental, endocrine, hepatic, immune, reproductive, and urinary effects); Minn. Dep't of Health, Toxicological Summary for: Perfluorohexane sulfonate (Aug. 2020), at 7 https://perma.cc/4CWG-9UQB (stating that exposure to PFHxS has been associated with detrimental endocrine and reproductive impacts).

[50] U.S. Env't Prot. Agency, Drinking Water Health Advisory: Perfluorobutane Sulfonic Acid (CASRN 375-73-5) and Related Compound Potassium Perfluorobutane Solfonate (CASRN 29420-49-3) (June 2022), https://perma.cc/X74T-EQ83 (explaining that literature confirms exposure to PFBS impacts to thyroid, reproductive systems, development, kidneys, liver, and lipid and lipoprotein homeostasis).

[51] U.S. Env't Prot. Agency, IRIS Toxicological Review of Perfluorobutanoic Acid (PFBA, CASRN 375-22-4) and Related Salts (Dec. 2022), at xii, https://perma.cc/HD3F-78VJ (explaining "available evidence indicates that developmental, thyroid, and liver effects in humans are likely caused by PFBA exposure in utero or during adulthood").

[52] DRAFT Toxicological Data PFBA, PFHxA, PFHxS, PFNA, and PFDA, *supra* note 49 at 2-22.

[53] *Id.*; N.J. Drinking Water Quality Inst., Health-Based Maximum Contaminant Level Support Document: Perfluorononanoic acid ("PFNA"), at 35 (June 22, 2015), https://perma.cc/JU9Z-AG9T (explaining exposure to PFNA has been associated with developmental issues, including neonatal mortality, and liver functions).

[54] DRAFT Toxicological Data PFBA, PFHxA, PFHxS, PFNA, and PFDA, *supra* note 49 at 2-22.

[55] U.S. Env't Prot. Agency, Drinking Water Health Advisory: Hexafluoropropylene Oxide (HFPO) Dimer Acid (CASRN 13252-13-6) and HFPO Dimer Acid Ammonium Salt (CASRN 62037-80-3), Also Known as "GenX Chemicals" (June 2022), at vii, https://perma.cc/9F6H-5BBY (explaining that exposure to GenX increases harms to liver, reproductive, and developmental functions).

[56] *See PFAS National Primary Drinking Water Regulation Rulemaking*, 88 Fed. Reg. at 18,638 (Mar. 29, 2023); *see also Biden-Harris Administration Proposes First-Ever National Standard to Protect Communities from PFAS in Drinking Water*, U.S. ENV'T PROT. AGENCY (Mar. 14, 2023), https://www.epa.gov/newsreleases/biden-harris-administration-proposes-first-ever-national-standard-protect-communities.

[57] 88 Fed. Reg. at 18,639.

[58] *Id.* at 18,639–40.

While the harms to human health are extreme, PFAS are also detrimental to wildlife and the environment. The chemicals have been shown to cause damaging effects in fish,[59] amphibians,[60] reptiles,[61] mollusks,[62] and other aquatic invertebrates[63]—resulting in developmental and reproductive impacts, behavioral changes, adverse effects to livers, disruption to endocrine systems, and weakened immune systems.[64]

PFAS are extremely resistant to breaking down in the environment.[65] Once released, the chemicals can travel long distances and bio-accumulate in organisms.[66] PFAS have been found in fish tissue across all 48 continental states,[67] and PFOS—a particularly harmful PFAS

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[59] Chen et al., *Perfluorobutanesulfonate Exposure Causes Durable and Transgenerational Dysbiosis of Gut Microbiota in Marine Medaka*, 5 ENV'T SCI. & TECH LETTERS 731–38 (2018); Chen et al., *Accumulation of Perfluorobutane Sulfonate (PFBS) and Impairment of Visual Function in the Eyes of Marine Medaka After a LifeCycle Exposure*, 201 AQUATIC TOXICOLOGY 1–10 (2018); Du et al., *Chronic Effects of Water-Borne PFOS Exposure on Growth, Survival and Hepatotoxicity in Zebrafish: A Partial Life-Cycle Test*, 74 CHEMOSPHERE 723–29 (2009); Hagenaars et al., *Structure–Activity Relationship Assessment of Four Perfluorinated Chemicals Using a Prolonged Zebrafish Early Life Stage Test*, 82 CHEMOSPHERE 764–72 (2011); Huang et al., *Toxicity, Uptake Kinetics and Behavior Assessment in Zebrafish Embryos Following Exposure to Perfluorooctanesulphonicacid (PFOS)*, 98 AQUATIC TOXICOLOGY 139–47 (2010); Jantzen et al., *PFOS, PFNA, and PFOA Sub-Lethal Exposure to Embryonic Zebrafish Have Different Toxicity Profiles in terms of Morphometrics, Behavior and Gene Expression*, 175 AQUATIC TOXICOLOGY 160–70 (2016); Liu et al., *The Thyroid-Disrupting Effects of Long-Term Perfluorononanoate Exposure on Zebrafish (Danio rerio)*, 20 ECOTOXICOLOGY 47–55 (2011); Chen et al., *Multigenerational Disruption of the Thyroid Endocrine System in Marine Medaka after a Life-Cycle Exposure to Perfluorobutanesulfonate*, 52 ENV'T SCI. & TECH. 4432–39 (2018); Rotondo et al., *Environmental Doses of Perfluorooctanoic Acid Change the Expression of Genes in Target Tissues of Common Carp*, 37 ENV'T TOXICOLOGY & CHEM. 942–48 (2018).

[60] Ankley et al., *Partial Life-Cycle Toxicity and Bioconcentration Modeling of Perfluorooctanesulfonate in the Northern Leopard Frog (Rana Pipiens)*, 23 ENV'T TOXICOLOGY & CHEM. 2745 (2004); Cheng et al., *Thyroid Disruption Effects of Environmental Level Perfluorooctane Sulfonates (PFOS) in Xenopus Laevis*, 20 ECOTOXICOLOGY 2069–78 (2011); Lou et al., *Effects of Perfluorooctanesulfonate and Perfluorobutanesulfonate on the Growth and Sexual Development of Xenopus Laevis*, 22 ECOTOXICOLOGY 1133–44 (2013).

[61] Guillette et al., *Blood Concentrations of Per- and Polyfluoroalkyl Substances Are Associated with Autoimmune-like Effects in American Alligators From Wilmington, North Carolina*, FRONTIER TOXICOLOGY 4:1010185 (Oct. 20, 2022).

[62] Liu et al., *Oxidative Toxicity of Perfluorinated Chemicals in Green Mussel and Bioaccumulation Factor Dependent Quantitative Structure-Activity Relationship*, 33 ENV'T TOXICOLOGY & CHEM. 2323–32 (2014); Liu et al., *Immunotoxicity in Green Mussels under Perfluoroalkyl Substance (PFAS) Exposure: Reversible Response and Response Model Development*, 37 ENV'T TOXICOLOGY & CHEM. 1138–45 (2018).

[63] Houde et al., *Endocrine-Disruption Potential of Perfluoroethylcyclohexane Sulfonate (PFECHS) in Chronically Exposed Daphnia Magna*, 218 ENV'T POLLUTION 950–56 (2016); Liang et al., *Effects of Perfluorooctane Sulfonate on Immobilization, Heartbeat, Reproductive and Biochemical Performance of Daphnia Magna*, 168 CHEMOSPHERE 1613–18 (2017); Ji et al., *Oxicity of Perfluorooctane Sulfonic Acid and Perfluorooctanoic Acid on Freshwater Macroinvertebrates (Daphnia Magna and Moina Macrocopa) and Fish (Oryzias Latipes)*, 27 ENV'T TOXICOLOGY & CHEM. 2159 (2008); MacDonald et al., *Toxicity of Perfluorooctane Sulfonic Acid and Perfluorooctanoic Acid to Chironomus Tentans*, 23 ENV'T TOXICOLOGY & CHEM. 2116 (2004).

[64] *See supra* notes 59–63.

[65] Carol F. Kwiatkowski, et al., *Scientific Basis for Managing PFAS as a Chemical Class*, ENV'T SCI. & TECH. LETTERS 8–9 (2020).

[66] *See What are PFAS?*, AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY, https://www.atsdr.cdc.gov/pfas/health-effects/overview.html (last visited May 22, 2023); *see also Our Current Understanding of the Human Health and Environmental Risks of PFAS*, *supra* note 42.

[67] Nadia Barbo, et al., *Locally Caught Freshwater Fish Across the United States Are Likely A Significant Source of Exposure to PFOS and Other Perfluorinated Compounds*, 220 ENV'T RES. 115165 3 (2023), *available at* https://perma.cc/SB8F-C3Y6.

compound—is one of the most prominent PFAS found in freshwater fish.[68] As a result, the primarily low-income and minority communities that rely heavily on subsistence fishing have been found to have elevated PFAS levels in their blood.[69] In fact, researchers conclude that "[w]idespread PFAS contamination of freshwater fish in surface waters in the U.S. is likely a significant source of exposure to PFOS and potentially other perfluorinated compounds for all persons who consume freshwater fish, but especially for high frequency freshwater fish consumers."[70]

In 2019 DAK's sampling confirmed that the facility discharged PFAS at concentrations ranging between 177 ppt and 306 ppt.[71] DAK's discharge contains PFOA and PFOS at concentrations as high as 17.7 ppt and 6.91 ppt, respectively.[72] The company also releases high concentrations of PFHxA, PFBS, PFHxS, and perfluoropentanoic acid ("PFPeA").[73] And while these levels are alarming, it is possible that DAK's PFAS pollution is far more extreme than presently understood. Scientists have confirmed that some PFAS (called PFAS precursors) cannot be detected by targeted sampling at the effluent pipe, but—once oxidized like occurs in the natural environment—form detectable PFAS.[74] Because this occurs naturally, the very limited set of targeted PFAS data available to the Department and the public likely underrepresents the full scope of DAK's PFAS pollution into the Cape Fear River.[75]

Even though the most recent, publicly available sampling for PFAS was completed in 2019, its almost certain that these chemicals remain present in DAK's wastewater. DAK's industrial processes includes the manufacture of polyester pellets at its resin and batch plants (SIC Code 2821), and the recycling of certain plastic materials to create bottle flake (SIC Code 5162).[76] EPA has acknowledged that industries that work with organic chemicals, plastics, and synthetic fibers—like DAK—are a suspected point source category for PFAS pollution, [77] and lists one of the aforementioned SIC Codes as industries likely to handle PFAS.[78] EPA notes that companies, like DAK, "use PFAS feedstocks as polymerization or processing aids or in the

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[68] *Id.* at 4.
[69] Patricia A. Fair et al., *Perfluoralkyl Substances (PFASs) in Edible Fish Species from Charleston Harbor and Tributaries, South Carolina, United States: Exposure and Risk Assessment*, 171 ENV'T. RES. 266, 273–75 (April 2019), https://perma.cc/7976-XAVU; Chloe Johnson, *Industrial chemicals in Charleston Harbor taint fish – and those who eat them*, POST & COURIER (June 4, 2022), https://perma.cc/Z5TM-MB83.
[70] Barbo, *supra* note 67 at 9.
[71] Cape Fear Industrial PFAS & 1,4-dioxane Sampling, *supra* note 4 at 11.
[72] *Id.*
[73] *Id.*
[74] Erika F. Houtz, *Oxidative Conversaion as a Means of Detecting Precursors to Perfluoroalkyl Acids in Urban Runoff*, 46 ENV'T SCI. & TECH 9342 (2012). Mohamed Ateia, et al., *The Overlooked Shore- and Ultrashort-Chain Poly- and Perfluorinated Substances: A Review*, 220 CHEMOSPHERE 866 (Jan. 4, 2019). Total Oxidizable Precursor (TOP) Assay─Best Practices, Capabilities and Limitations for PFAS Site Investigation and Remediation, U.S. ENV'T PROT. AGENCY, https://cfpub.epa.gov/si/si_public_record_Report.cfm?Lab=CESER&dirEntryId=357816 (last visited May 18, 2023).
[75] Houtz, *supra* note 74.
[76] Dak Permit Application, *supra* note 2 at PDF pg. 17.
[77] U.S. Env't Prot. Agency, Multi-Industry Per- and Polyfluoroalkyl Substances (PFAS) Study – 2021 Preliminary Report (Sept. 2021), at 5-1 [hereinafter "EPA Preliminary Industry Report"], Attachment 26; U.S. Env't Prot. Agency. Effluent Guidelines Program Plan 15 (Jan. 2023), at 7-3, Attachment 27.
[78] U.S. Env't Prot. Agency, Metadata for Data Sources within PFAS Analytic Tools (Jan. 2023), at 34–37, Attachment 28 (listing "Potential PFAS-Handling Industry Sectors").

production of plastic, rubber, resin, coatings, and commercial cleaning products."[79] Given these characteristics, EPA has found that this industry category is likely to generate wastewater containing long-chain and short-chain PFAS including those that are well-studied and known to be harmful to humans.[80]

II. DAK's pollution threatens downstream drinking water supplies as well as commercial and recreational fishing opportunities.

PFAS and 1,4-dioxane do not break down in the environment and are not removed by conventional treatment technology.[81] That means that if released upstream, these chemicals can and will pollute downstream recreational waters and drinking water supplies. This has been confirmed before by drinking water crises in North Carolina. PFAS pollution from the Chemours Fayetteville Works Facility has contaminated drinking water intakes nearly 80 miles downstream,[82] and 1,4-dioxane pollution from the city of Greensboro's wastewater plant has reached the intake for Pittsboro approximately 50 miles downstream.[83]

DAK's discharge is less than 10 river miles upstream of the nearest water supply boundary.[84] Further down the Cape Fear River lies the drinking water intakes for the city of Wilmington and surrounding Brunswick and Pender counties. Each of these water utilities reports PFAS and 1,4-dioxane in their drinking water supplies. Cape Fear Public Utilities Authority, for example, recently reported their drinking water supply contains 1,4-dioxane at concentrations as high as 4 ppb and total PFAS at concentrations nearing 200 ppt.[85] Brunswick County[86] similarly reports 1,4-dioxane and PFAS in its water supply and Pender County[87] reports the presence of PFAS.

The Cape Fear River downstream of DAK is also a popular recreational and fishing destination. As one of the most biologically diverse rivers in the country, the Cape Fear River hosts a variety of ecologically and recreationally important fish species, including largemouth bass, spotted bass, sunfish (particularly bluegill and redbreast), catfish, American shad, and

[79] EPA Preliminary Industry Report, *supra* note 77 at 5-2.
[80] *Id.* at 5-8 to 5-9.
[81] *See What are PFAS?*, *supra* note 66; *see also Our Current Understanding of the Human Health and Environmental Risks of PFAS*, *supra* note 42; EPA, *Technical Fact Sheet – 1,4-Dioxane*, *supra* note 21, at 1–2; *see also* Yuyin Tang and Xinwei Mao, *Recent Advances in 1,4-dioxane Removal Technologies for Water and Wastewater Treatment*, 15 WATER 1535 (2023), *available at* https://www.mdpi.com/2073-4441/15/8/1535.
[82] *See* Lisa Sorg, *Breaking: New Analysis Indicates That Toxics Were Present in Wilmington Drinking Water at Extreme Levels*, N.C. POLICY WATCH (Oct. 9, 2019), https://pulse.ncpolicywatch.org/2019/10/09/breaking-new-analysis-indicates-that-toxics-were-present-in-wilmington-drinking-water-at-extreme-levels/#sthash.OtzCYiv3.dpbs.
[83] *See* Lisa Sorg, PW Special Report Part Two: Lax Local Regulation Allows Toxic Carcinogen to Infiltrate Drinking Water Across the Cape Fear River Basin, N.C. POLICY WATCH (July 23, 2020), https://ncpolicywatch.com/2020/07/23/pw-special-report-part-two-lax-local-regulation-allows-toxic-carcinogen-to-infiltrate-drinking-water-across-the-cape-fear-river-basin/.
[84] 15A N.C. Admin. Code 2B.0311(p); *see also NC Surface Water Classifications*, *supra* note 3.
[85] *Latest PFAS Test Results*, CAPE FEAR PUB. UTIL. AUTH., https://www.cfpua.org/779/Latest-PFAS-Test-Results (last visited May 10, 2023); *Emerging Contaminants*, CAPE FEAR PUB. UTIL. AUTH., https://www.cfpua.org/761/Emerging-Compounds (last visited May 10, 2023).
[86] County of Brunswick, Water Quality Report – 2021 (2022), at 6–7, *available at* https://www.brunswickcountync.gov/wp-content/uploads/2022/04/2021-CCR-for-Website.pdf.
[87] Pender County Util., 2021 Annual Water Quality Report (2022), at 16–17, *available at* https://www.pendercountync.gov/utl/wp-content/uploads/sites/14/2022/06/Final-2021-CCR-.pdf.

hickory shad.[88] According to the U.S. Department of Commerce, fisheries in the Cape Fear River support upward of $14.2 million in annual income and $35.7 million in business sales.[89] The Cape Fear River also plays an essential role in the preservation of endangered species. Endangered Atlantic and shortnose sturgeon, for instance, spawn in the upper portions of the Cape Fear River. In fact, less than 40 miles downstream of DAK's discharge, the Cape Fear River is protected as Atlantic sturgeon critical habitat—meaning the river serves an essential role in the continued existence of the species.[90] In addition, the Southeast Conservation Adaption Strategy designates the portion of the river that DAK discharges into as "highest priority," meaning that the natural and cultural resources present in the river are of such significance that conservation and protection in the area would yield significant impact.[91]

Dating back to at least 2013, researchers have documented PFAS contamination in fish along the Cape Fear River.[92] Most recently, the Department has documented extreme PFAS in fish caught downstream of DAK's discharge.[93] Fish, including bluegill sunfish, largemouth bass, blue catfish, flathead catfish, redear sunfish, and American shad, have been documented to contain elevated levels of PFOS, PFNA, and PFHxS, among other PFAS, in their tissue.[94]

III. DAK's 1,4-dioxane and PFAS pollution reaches beyond its direct discharges.

Unfortunately, DAK's pollution is not limited to direct discharges into the Cape Fear River. DAK produces sludge as a byproduct of its wastewater treatment process.[95] The sludge produced is either disposed of in the Sampson County Landfill in Roseboro, North Carolina, or sent to McGill Environmental, an industrial composting facility in New Hill, North Carolina.[96] Because the wastewater treatment system DAK utilizes cannot remove 1,4-dioxane or PFAS, it is likely that the sludge produced contains both categories of toxic chemicals.

The pollution in DAK's sludge reaches the landfill and surrounding environment. Sampling results at the Sampson County landfill demonstrate that groundwater downgradient of

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[88] *Fishing Opps in the Coastal Region of NC*, N.C. WILDLIFE RES. COMM'N, https://www.ncwildlife.org/Fishing/Where-to-Fish/Fishing_Opps_in_the_Coastal_Region_of_NC#:~:text=The%20Cape%20Fear%20River%20provides,between%201%C2%BD%20to%203%20pounds (last visited May 22, 2023); Kyle T. Rachels, *Fisheries Resources of the Cape Fear River*, N.C. WILDLIFE RES. COMM'N (2021), *available at* https://www.ncwildlife.org/Portals/0/Fishing/documents/2021/Fisheries-Resources-of-the-Cape-Fear-River.pdf?ver=1wTKmylDzckZMSdwMlXkIw%3D%3D.

[89] NOAA Fisheries, Community Benefits of Conserving the Cape Fear River Basin (2017), *available at* https://onslow.ces.ncsu.edu/wp-content/uploads/2017/01/CapeFear-final.pdf?fwd=no.

[90] *Endangered and Threatened Species; Designation of Critical Habitat for the Endangered New York Bight, Chesapeake Bay, Carolina and South Atlantic Distinct Population Segments of Atlantic Sturgeon and the Threatened Gulf of Maine Distinct Population Segment of Atlantic Sturgeon*, 82 Fed. Reg. 39,160, 39,223–22, 39,227 (Aug. 17, 2017).

[91] *The Southeast Conservation Blueprint*, SE. CONSERVATION ADAPTATION STRATEGY, https://secas-fws.hub.arcgis.com/pages/blueprint (last visited May 22, 2023).

[92] U.S. Env't Prot. Agency, National Rivers and Streams Assessment 2013-2014: A Collaborative Survey (2020), *available at* https://www.epa.gov/system/files/documents/2021-10/nrsa_13-14_report_508_ci_2021-10-15.pdf.

[93] Frannie Nilsen, N.C. Dep't of Env't Quality, *2022 Water and Fish Collection Project – Status Update* (Dec. 5, 2022), at slides 12–24, Attachment 29.

[94] *Id.*

[95] DAK Permit Application, *supra* note 2 at PDF 14.

[96] *Id.*

the landfill is contaminated with 1,4-dioxane above the North Carolina groundwater standard of 3 ppb.[97] 1,4-dioxane has also been detected in the surface water sampling sites surrounding the landfill.[98] In addition, the leachate from that landfill is sent to Harnett County and the city of Lumberton,[99] both of which document elevated levels of PFAS and 1,4-dioxane in the effluent leaving their municipal WWTPs.[100] The community adjacent to the Sampson County landfill is comprised predominantly of people of color, and the population experiences lower income and education rates than the state average.[101] The community additionally suffers from air toxics pollution higher than both the state and national average—compounding on the fear associated with a leaking landfill.[102]

IV. The Department must require DAK to disclose any discharges of PFAS.

DAK's permit application materials contain sampling data for 1,4-dioxane but do not disclose that the facility also discharges PFAS. As discussed above, however, sampling conducted in 2019 confirms the company is, in fact, releasing the toxic chemicals into the Cape Fear River. Because DAK did not disclose PFAS in this permit application[103] (or its earlier applications[104]), it is not authorized to release the chemicals, and any discharge of PFAS is unlawful.

The Clean Water Act prohibits the discharge of any pollutant, including PFAS and 1,4-dioxane, without a NPDES permit.[105] The discharge of a specific pollutant (or group of pollutants) cannot be permitted if it is not disclosed in a NPDES permit application. For decades, EPA has stressed the need for disclosure of pollutants during the permitting process:

> [D]ischargers have a duty to be aware of any significant pollutant levels in their discharge. […] Most important, [the disclosure requirements] provide the information which the permit writers need to determine what pollutants are likely to be discharged in significant amounts and to set appropriate permit limits. […] [P]ermit writers need to know what pollutants are present in an effluent to determine appropriate permit limits in the absence of applicable effluent guidelines.[106]

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[97] Golder Associates NC, Inc., First Semi-Annual 2022 Sampling Event: Sampson County Disposal, LLC (July 19, 2022), at Table 4, Table 6, Attachment 30.
[98] *Id.* at Table 8.
[99] Hart & Hickman, North Carolina Collective Study Report: Collective Study of PFAS and 1,4-dioxane in Landfill Leachate and Estimated Influence on Wastewater Treatment Plant Facility Influent (Mar. 10, 2020), at Table 2, Attachment 31.
[100] N.C. Dep't of Env't Quality, Cape Fear Municipal PFAS & 1,4-dioxane Sampling (2020), at 17, Attachment 32 (showing PFAS and 1,4-dioxane sampling results for North Harnett Regional WWTP); Verdantas, Phoenix Lumberton Industrial Investors, LLC NPDES Permit Application (Dec. 19, 2022), at PDF page 247–50 (containing PFAS sampling collected by the Department at Lumberton WWTP, NPDES No. NC0024571), Attachment 33.
[101] U.S. Env't Prot. Agency, EJScreen Report Sampson County Landfill (Jan. 11, 2023), Attachment 34.
[102] *Id.*
[103] *See generally* DAK Permit Application, *supra* note 2.
[104] *See, e.g.*, DAK Americas, LLC NPDES Permit No. NC0003719 Renewal Application (May 6, 2016), Attachment 35.
[105] 33 U.S.C. § 1311(a).
[106] Consolidated Permit Application Forms for EPA Programs, 45 Fed. Reg. 33,526–31 (May 19, 1980).

In December 2022, EPA confirmed that these disclosure requirements apply to PFAS, stating that "no permit may be issued to the owner or operator of a facility unless the owner or operator submits a complete permit application" providing all information "that the permitting authority may reasonably require to assess the discharges of the facility" including information regarding PFAS.[107] The Department has similarly made clear that disclosure of toxic PFAS is required by the Clean Water Act and state water quality laws. In its enforcement action against Chemours for the company's discharge of PFAS into the Cape Fear River, the agency concluded that because Chemours had not disclosed its PFAS pollution, the discharges violated the law.[108]

Disclosure is considered adequate under the Clean Water Act when the applicant provides enough information for a permitting agency to "be[] able to judge whether the discharge of a particular pollutant constitutes a significant threat to the environment."[109] To meet this burden, an applicant must include all relevant information, including the concentration, volume, and frequency of the discharge.[110] The Clean Water Act places the burden of disclosure on the permit applicant because they are in the best position to know what is in their discharge.[111]

Importantly, if a NPDES permit applicant does not adequately disclose its release of a pollutant, the applicant does not have the approval to discharge the pollutant.[112] The EPA Environmental Appeals Board's decision in *In re: Ketchikan Pulp Company* emphasized this result,[113] and that decision has been adopted by the Fourth Circuit.[114] The Department recognized this is the law in its enforcement action against Chemours,[115] and other states have reached the similar conclusion.[116]

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[107] EPA's PFAS NPDES Guidance, *supra* note 11 at 2.
[108] Amended Complaint, N.C. Dept. of Environmental Quality v. Chemours, 17 CVS 580, 6–7 (N.C. Super. 2018) (citing 33 U.S.C. § 1342(k); *Piney Run Pres. Ass'n v. Cty. Comm'rs of Carroll Cty., Maryland*, 268 F.3d. 255, 265 (4th Cir. 2001)) [hereinafter "DEQ v. Chemours, Amended Complaint"], Attachment 36.
[109] *Piney Run*, 268 F.3d. at 268 ("Because the permitting scheme is dependent on the permitting authority being able to judge whether the discharge of a particular pollutant constitutes a significant threat to the environment, discharges not within the reasonable contemplation of the permitting authority during the permit application process, whether spills or otherwise, do not come within the protection of the permit shield.").
[110] *See In re Ketchikan Pulp Co.*, 7 E.A.D. 605 (EPA) (1998) ("In explaining the provisions of 40 C.F.R. § 122.53(d)(7)(iii), which required dischargers to submit quantitative data relating to certain conventional and nonconventional pollutants that dischargers know or have reason to believe are present in their effluent, the [EPA] stated: 'permit writers need to know what pollutants are present in an effluent to determine appropriate limits in the absence of effluent guidelines.'").
[111] *S. Appalachian Mountain Stewards v. A & G Coal Corp.*, 758 F.3d 560, 566 (4th Cir. 2014). ("The statute and regulations purposefully place the burden of disclosure on the permit applicant.").
[112] *See In re Ketchikan Pulp Co.*, 7 E.A.D. 605; *Piney Run*, 268 F.3d. at 268; *S. Appalachian Mountain Stewards*, 758 F.3d at 567.
[113] *See In re Ketchikan Pulp Co.*, 7 E.A.D. 605.
[114] *Piney Run*, 268 F.3d. at 268 ("The *Ketchikan* decision, therefore, made clear that a permit holder is in compliance with the [Clean Water Act] even if it discharges pollutants that are not listed in its permit, as long as it only discharges pollutants that have been adequately disclosed to the permitting authority. […] To the extent that a permit holder discharges a pollutant that it did not disclose, it violates the NPDES permit and the [Clean Water Act].").
[115] DEQ v. Chemours, Amended Complaint, *supra* note 108 at 6–7 (N.C. Super. 2018) (citing 33 U.S.C. § 1342(k); *Piney Run*, 268 F.3d at 265).
[116] For example, the Tennessee Department of Environment and Conservation has made clear in at least one NPDES permit that undisclosed discharges of PFAS are unpermitted, stating, "The facility's application did not report any

Because DAK failed to disclose that it discharges PFAS, each and every release of PFAS into the Cape Fear River is a violation of the Clean Water Act subject to enforcement by the Department or a citizen suit brought pursuant to 33 U.S.C. § 1365.

For the purposes of this draft permit, comprehensive disclosure is vitally important. The Department knows the facility releases PFAS because the sampling it ordered in 2019 proved as much. What the Department and the public do not know, however, is how much PFAS DAK releases and what impact the discharge has on the Cape Fear River. As discussed above, limited sampling taken nearly four years ago is likely not indicative of the levels of pollution DAK is releasing today. Moreover, it is possible—if not likely—that DAK's effluent contains PFAS precursors that, once released into the natural environment, will transform into detectable PFAS. In order to fully understand the nature of DAK's pollution, the Department must instruct the company to sample, using a comprehensive analytical method, and disclose the presence of PFAS in its wastewater discharge.

V. The Department must impose effluent limits to control DAK's 1,4-dioxane and PFAS pollution.

In December 2022, EPA released guidance instructing state agencies on how to address PFAS through existing NPDES authorities.[117] The guidance points to technology-based and water quality-based effluent limits as effective tools for eliminating toxic pollution at the source before it reaches our rivers, creeks, and streams. While the PFAS guidance is new, the central tenets of the Clean Water Act embodied within are well established, grounded in state and federal law, and pervasive through longstanding NPDES permit writing guidance. The Department has lawfully applied these tools in other NPDES permits issued across the Cape Fear River Basin.[118] DAK should be treated no differently. The Department must make the following changes before finalizing DAK's NPDES permit.

a. The Department must analyze technology-based limits for 1,4-dioxane and PFAS.

The Clean Water Act and North Carolina rules require permitting agencies to, at the very least, incorporate technology-based effluent limitations on the discharge of pollutants.[119] When EPA has not issued a national effluent limitation guideline for a particular industry or pollutant,[120] permitting agencies must implement technology-based effluent limits on a case-by-case basis using their "best professional judgment."[121] EPA has confirmed that technology-based

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forms of PFAS as chemicals that there was the potential to discharge. *The permittee has no permit shield for the discharge of PFAS compounds because no such chemicals were disclosed in the permit application* or otherwise…" TDEC, NPDES Permit NO. TN0002330 (2020), Holliston Holdings, LLC, Addendum to Rationale, https://perma.cc/4RKY-PKFG (emphasis added).

[117] EPA's PFAS NPDES Guidance, *supra* note 11.

[118] *See, e.g.*, Chemours Outfall 004 Permit, *supra* note 6; Sanford WWTP Permit Fact Sheet, *supra* note 7 at 13–14; Asheboro WWTP Draft Permit, *supra* note 8 at 3.

[119] 40 C.F.R. § 125.3(a) ("Technology-based treatment requirements under section 301(b) of the Act represent the *minimum* level of control that *must* be imposed in a permit…" (emphasis added)); *see also* 33 U.S.C. § 1311; *see also* EPA's PFAS NPDES Guidance, *supra* note 11 at 2.

[120] 33 U.S.C. § 1314(b); U.S. Env't Prot. Agency, NPDES Permit Writers' Manual: Chapter 5. Technology Based Effluent Limitations (Sept. 2010), at 5-14, Attachment 37.

[121] 40 C.F.R. § 125.3(2)(i)(B); *see also* 33 U.S.C. § 1342(a)(1)(B); 15A N.C. Admin. Code 2B.0406.

limits are the "minimum level of control that must be imposed in NPDES permits" and that they should be calculated for PFAS.[122] The same is true for 1,4-dioxane. In light of these requirements, the Department's decision to impose lenient monitoring conditions[123] instead of limits violates the law.

The Department is aware of its obligation to impose technology-based limits to address chemicals like PFAS in NPDES permits as it did so in a permit issued to Chemours last September.[124] In that permit, the Department implemented "the procedure established in Chapter 5 of USEPA NPDES Permit Writers' Manual" and set limits for perfluoro-2-methoxypropanoic acid ("PMPA") and perfluoro-2-methoxyacetic acid ("PFMOAA") at concentrations based on what technology could achieve, which were 10 ppt and 20 ppt, respectively.[125] We appreciate and commend the Department for the limits set forth in Chemours' permit. But Chemours is not the only company discharging these toxic chemicals. That evaluation should have been done here for DAK's discharge of PFAS and 1,4-dioxane.

As the Department knows, effective treatment technologies for PFAS are available. Granular activated carbon is a cost-effective and efficient technology that can reduce PFAS concentrations to virtually nondetectable levels. A granular activated carbon treatment system at the Chemours' facility, for example, has reduced PFAS concentrations as high as 345,000 ppt from a creek contaminated by groundwater beneath the facility to nearly nondetectable concentrations.[126] Here, where DAK's discharge volume is significantly less than Chemours, treatment would be more affordable. The Department must treat DAK the same way that it treated Chemours—it must consider the feasibility of using granular activated carbon or similar technologies to control the PFAS pollution being released from this facility.

As with PFAS, treatment technologies for 1,4-dioxane are available. For instance, the chemical can be removed using advanced oxidation processes, such as using ultraviolet light in combination with hydrogen peroxide.[127] Such a process has been used at the Tucson International Airport Area Superfund Site to remove legacy 1,4-dioxane contamination.[128] That

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[122] EPA's PFAS NPDES Guidance, *supra* note 11 at 3.
[123] DAK Draft Permit, *supra* note 1 at 3, 5.
[124] Chemours Outfall 004 Permit, *supra* note 6 at 3.
[125] Chemours Outfall 004 Permit Fact Sheet, *supra* note 6 at 13–14.
[126] *See* Parsons, Engineering Report – Old Outfall 002 GAC Pilot Study Results (Sept. 2019), *available at* https://www.chemours.com/ja/-/media/files/corporate/12e-old-outfall-2-gac-pilot-report-2019-09-30.pdf?rev=6e1242091aa846f888afa895eff80e2e&hash=040CAA7522E3D64B9E5445ED6F96B0FB; *see also* Chemours Outfall 003, NPDES No. NC0089915 Discharge Monitoring Reports (2020–2022), *available at* https://perma.cc/8YND-XT5M.
[127] Amie C. McElroy, et al., *1,4-Dioxane in drinking water: emerging for 40 years and still unregulated*, 7 CURRENT OPINION IN ENV'T SCIENCE & HEALTH 117, 119 (2019), *available at* https://agris.fao.org/agris-search/search.do?recordID=US201900256076; TrojanUV, Update on Emerging Contaminants: 1,4-dioxane: Advanced Oxidation Processes (2022), *available at* https://cdn.brandfolder.io/MA3415EC/at/9xxcn88kxgbnk985p2kmt/TUV_1_4_Dioxane_Fact_Sheet_EN.pdf.
[128] *See Advanced Treatment for 1,4-Dioxane – Tucson Removes Contamination Through UV-oxidation*, TROJANUV CASESTUDIES (2019), *available at* https://www.resources.trojanuv.com/wp-content/uploads/2018/05/Treatment-of-Groundwater-Contaminated-with-14-Dioxane-Tucson-Arizona-Case-Study-Environmental-Contaminant-Treatment.pdf.

treatment system can remove over 97 percent of the chemical from polluted water.[129] Other treatment options are effective, including ozone-based and catalytic advanced oxidation processes.[130] Treatment technology for 1,4-dioxane has been installed at industries in North Carolina,[131] and the Department must similarly assess treatment technology available to control DAK's 1,4-dioxane waste.

Importantly, the burden of analyzing the efficacy of treatment technology to remove the pollutants in the company's discharge should fall on DAK. Because the Department knows that DAK discharges significant levels of these toxic chemicals, the agency should demand the company analyze the treatment technology available and provide information regarding how it intends to limit its toxic pollution. This analysis should be completed during the permit application process *before* the Department issues a final permit here. The Department cannot refuse to ask for information and then refuse to act, feigning lack of knowledge.

b. The Department must ensure DAK's discharge does not threaten water quality.

If technology-based limits are not enough to ensure compliance with water quality standards, the Department must include water quality-based effluent limits in DAK's permit.[132] This obligation "may not be waived" and requires the agency to incorporate a permit limit protective of water quality standards regardless of "treatability" or analytical method detection levels.[133] EPA permit writing guidance explains that these requirements are mandatory and that monitoring requirements "may not be substituted" for water quality-based permit limits.[134]

For particular toxins, like PFAS and 1,4-dioxane, that do not have numeric water quality standards, the Department has the authority and obligation to control discharges to surface water using the narrative toxic substances standard.[135] The toxic substances standard mandates that the "the concentration of toxic substances, either alone or in combination with other wastes, in surface waters shall not render waters injurious to aquatic life or wildlife, recreational activities, or public health, nor shall it impair the waters for any designated uses."[136] For cancer-causing chemicals, the rule requires concentrations to not result in "unacceptable health risks," defined as "more than one case of cancer per one million people exposed."[137]

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[129] *Id.* at 2; *see also Educational Brochure,* TUCSON AIRPORT AREA REMEDIATION PROJECT, *available at* https://www.tucsonaz.gov/files/water/docs/AOP_TARP_educational_signs.pdf.
[130] *See* Tang, *supra* note 81 at 4–5.
[131] *See, e.g.*, City of Greensboro, EMC SOC WQ S19-010 Year One Report: May 1, 2021 – April 30, 2022 4 (June 13, 2022), *available at* https://www.greensboro-nc.gov/home/showpublisheddocument/53017/637908166316270000.
[132] 40 C.F.R. § 122.44(d)(1)(i); *see also* 33 U.S.C. § 1311(b)(1)(C); 15A N.C. Admin. Code 2H.0112(c) (stating that Department must "reasonably ensure compliance with applicable water quality standards and regulations").
[133] U.S. Env't Prot. Agency, Central Tenets of NPDES Permitting Program, at 3, Attachment 38.
[134] *Id.*
[135] 15A N.C. Admin. Code 2B.0208.
[136] *Id.* at 2B.0208(a).
[137] *Id.* at 2B.0208(a)(2)(B).

i. If technology-based limits are insufficient to protect water quality, the Department must set water quality-based limits for 1,4-dioxane.

Since at least 2010, the Department has acknowledged that it has the authority to control 1,4-dioxane in NPDES permits using the narrative toxic substances standard, which limits the chemical based on the one-in-one million cancer risk.[138] Both EPA and the Department agree that the concentration of 1,4-dioxane associated with the one-in-one million cancer risk is 0.35 ppb.[139] Using that evaluation, the Department has determined that concentrations of 1,4-dioxane in water supplies should not exceed 0.35 ppb, and concentrations in non-water supplies should not exceed 80 ppb.[140]

While the requisite concentrations are distinct for the different designated uses, North Carolina law mandates that water quality-based effluent limitations "be developed by the Division such that the water quality standards and best usage of receiving waters *and all downstream waters* will not be impaired."[141] The Department, therefore, is required to consider whether the discharge of 1,4-dioxane will exceed the 80 ppb standard applicable to the river where DAK directly discharges *and* the 0.35 ppb standard applicable to the downstream water supply water.[142] The Department recently acknowledged that it has the obligation to consider downstream drinking water supplies in factsheet accompanying the city of Sanford's final NPDES permit in April 2023[143] and a draft permit issued to the city of Asheboro in December 2022.[144] In the permitting materials accompanying Asheboro's draft permit, for example, the Department explained that "1,4-dioxane is completely miscible in water and resistant to biodegradation" and it is therefore "assumed that concentrations of 1,4-dioxane discharged from the [wastewater plant] will be equivalent at the direct discharge…and the nearest downstream water supply (WS-V) boundary."[145] The same assumption should have been made here.

In contrast to how the Department has addressed 1,4-dioxane in other permits, the reasonable potential analysis included in the permitting materials for DAK's draft permit suggests[146] that the Department only considered whether DAK's waste would cause the instream

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[138] N.C. Env't Mgmt. Comm'n, Regulatory Impact Analysis: 2020-2022 Triennial Review – Surface Water Quality Standards (May 13, 2021), at D-13, [hereinafter "1,4-dioxane Numeric Standard RIA"], https://perma.cc/Z89U-R9GX.
[139] EPA, *Technical Fact Sheet – 1,4-Dioxane*, *supra* note 21; Surface Water Quality Standards, Criteria & In-Stream Target Values, *supra* note 27.
[140] Surface Water Quality Standards, Criteria & In-Stream Target Values, *supra* note 27; 1,4-dioxane Numeric Standard RIA, *supra* note 138 at D-13.
[141] 15A N.C. Admin. Code 2B.0203 (emphasis added).
[142] It's worth noting that hexachlorobenzene is limited in the draft permit based on its expected impact to downstream water quality even though North Carolina has not adopted a numeric water quality standard for the chemical. *See* 15A N.C. Admin. Code 2B.0212, .0214, .0215, .0216, .0218.
[143] Sanford WWTP Permit Fact Sheet, *supra* note 7 at 13–14.
[144] Asheboro WWTP Permit Fact Sheet, *supra* note 8 at 13–14.
[145] *Id.* at 13.
[146] There is ambiguity regarding whether the Department undertook an updated reasonable potential analysis. The fact sheet states "[a] reasonable potential analysis was conducted on effluent toxicant data collected between January 2012 and July 2017," and concluded—without evaluation—that 1,4-dioxane "will not receive a limit since [it] did not demonstrate reasonable potential to exceed applicable water quality." DAK Draft Permit Fact Sheet, *supra* note 9 at 5. An RPA provided during the comment period, however, suggests the analysis may have been undertaken, albeit incorrectly.

concentration of 1,4-dioxane to exceed 80 ppb at the point of discharge.[147] The Department failed to take the next step and analyze whether DAK's discharge would have the reasonable potential to violate the water quality standard at the water supply boundary less than 10 river miles downstream.[148]

As shown in the following calculation, adjusting the Department's analysis to accommodate the average annual stream flow[149] at the downstream water supply boundary[150] (approximately 4,290 cubic feet per second, or cfs[151]), and the appropriate water quality standard for that downstream water (0.35 ppb), yields a chronic allowable discharge concentration of approximately 1,937 ppb.

Water Quality Limit Calculation

$$C_a = \frac{(Q_a + Q_w)(C_{wqs}) - (Q_a)(C_b)}{Q_w}$$

$$C_a\ \mu g/L = \frac{(4{,}290\ cfs^{152} + 0.775\ cfs^{153})(0.35\ \mu g/L) - (4{,}290\ cfs)(0)}{0.774\ cfs}$$

$$C_a\ \mu g/L = 1{,}937\ ppb$$

Legend for Calculation

C_a = allowable concentration (µg/L)

Q_a = average annual stream flow in cfs, per 15A N.C. Admin. Code 2B.0206(a)(4)(B)

Q_w = permitted flow in cfs

C_{wqs} = water quality standard (µg/L)

C_b = background concentrations, assumed to be 0 for this letter

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147 DAK RPA Spreadsheet, *supra* note 9.

148 *See id.* (utilizing the water quality standard of 80 ppb in the Department's "input" tab); *see generally* DAK Draft Permit Fact Sheet, *supra* note 9 (not discussing or documenting analysis of impact on downstream water supplies).

149 15A N.C. Admin. Code 2B.0206(a)(4)(B).

150 15A N.C. Admin. Code 2B.0311(p).

151 *Cape Fear R at Wilm O Huske Lock NR Tarheel, NC – 02105500*, U.S. GEOLOGICAL SURVEY, https://waterdata.usgs.gov/monitoring-location/02105500/#parameterCode=00060&period=P365D (data pulled on May 10, 2023).

152 *Cape Fear R at Wilm O Huske Lock NR Tarheel, NC – 02105500*, *supra* note 151.

153 DAK Draft Permit, *supra* note 1 at 2 (translating 0.500 MGD into cfs). This calculation assumes that DAK maintains a permitted discharge of 0.500 MGD. If the company intends to expand its wastewater discharge flow, the calculation should accommodate that increased flow, before the permit is made final.

Assuming the permit continues to authorize DAK to discharge 0.5 million gallons per day, the permit should ensure that DAK's discharge does not exceed 1,937 ppb. If the company is authorized to increase its discharge to 0.764 million gallons per day, as anticipated by DAK's permit application materials,[154] the appropriate limit should decrease to 1,272 ppb. Additionally, in this letter, it is assumed that background concentrations are 0 ppb, given the lack of upstream data in the permit application materials. The Department and the public are aware, however, that there are multiple sources of 1,4-dioxane upstream of DAK, including, but not limited, to the cities of Greensboro, Reidsville, Asheboro, High Point, Burlington, Sanford, Holly Springs, Randleman, Ramseur, Fayetteville, as well as industries like Brenntag Mid-South.[155] Therefore, before the Department finalizes this permit, it must evaluate the background concentration of 1,4-dioxane and incorporate that level into this calculation.[156] Finally, the proposed allowable concentration above relies on the average annual flow of the downstream waters. Should the Department elect to utilize the 7Q10 flow (in order to protect water quality standards throughout the year), the resulting permit limit would be significantly lower. In that situation, using a 7Q10 flow of 791 cfs[157] and the appropriate water quality standard of 0.35 ppb, the allowable concentration would fall to 358 ppb.

As discussed in Section I (a), DAK's average discharge of 1,4-dioxane is 5,301 ppb,[158] far above this allowable concentration. In fact, the facility has exceeded 1,937 ppb in more than 65 percent of the samples collected, and since January 2022, DAK's discharge has only been recorded below 1,937 ppb once. It is thus clear that DAK's 1,4-dioxane pollution has "the reasonable potential to cause, or contribute to an excursion above…State narrative criteria for water quality."[159] Before DAK's permit is finalized, the Department must evaluate and, if necessary, given achievable technology-based limits, impose a water quality-based limit for 1,4-dioxane.

ii. <u>If technology-based limits are insufficient to protect water quality, the Department must set water quality-based limits for PFAS.</u>

EPA has made clear that NPDES permits for facilities that release PFAS "must include water quality-based effluent limits (WQBELs) as derived from state water quality standards," including narrative water quality standards.[160] Similar to 1,4-dioxane, the Department has stated that PFAS "meet the definition of 'toxic substance'" and has included limits for PFAS referencing the toxic substances standard and EPA's health advisory for GenX in at least one

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[154] DAK Permit Application, *supra* note 2 at PDF pg. 80.
[155] Cape Fear Municipal PFAS & 1,4-dioxane Sampling, *supra* note 100; Cape Fear Industrial PFAS & 1,4-dioxane Sampling, *supra* note 4.
[156] U.S. Env't Prot. Agency, NPDES Permit Writers' Manual: Chapter 6. Water Quality-Based Effluent Limitations (Sept. 2010), at 6-23, Attachment 39 ("[A] reasonable potential analysis is used to determine whether a discharge, alone or in combination with other sources of pollutants to a waterbody and under a set of conditions arrived at by making a series of reasonable assumptions, could lead to an excursion above an applicable water quality standard." (citing 40 C.F.R. §122.44(d)(1)(i))).
[157] DAK RPA Spreadsheet, *supra* note 9.
[158] DAK 2018-2023 DMRs, *supra* note 4.
[159] 40 C.F.R. 122.44(d)(1)(i).
[160] EPA's PFAS NPDES Guidance, *supra* note 11 at 3.

NPDES permit.[161] The Department should similarly assess water quality-based effluent limits in DAK's permit. The Department should require the facility to sample its effluent for PFAS and utilize existing health information to inform appropriate water quality-based limits. EPA's health advisories and proposed drinking water standards for PFAS, as well as countless toxicity studies, indicate that the chemicals pose unacceptable health risks at extremely low levels, and these health advisories and toxicity information should inform the Department's effluent limit analysis for DAK's permit.

VI. Conclusion.

We acknowledge that the Department has taken impressive steps to control PFAS and 1,4-dioxane from other facilities in the Cape Fear River Basin. But the Department cannot selectively focus on certain sources of toxic pollution while allowing others to contaminate our rivers, streams, and creeks freely. DAK currently releases high concentrations of 1,4-dioxane and PFAS. The Department has an obligation to control these discharges through technology-based and, if necessary, water quality-based effluent limits. Because the Department did not do so here, this draft permit violates the law and must be withdrawn and amended.

Thank you in advance for considering these comments. Please contact me at 919-967-1450 or *hnelson@selcnc.org* if you have any questions regarding this letter.

Sincerely,

Hannah M. Nelson

Geoff Gisler

SOUTHERN ENVIRONMENTAL LAW CENTER
601 W. Rosemary Street, Suite 220
Chapel Hill, NC 27516

cc: Kemp Burdette, Cape Fear River Watch, *kemp@cfrw.us*
Dana Sargent, Cape Fear River Watch, *dana@cfrw.us*

[161] DEQ v. Chemours, Amended Complaint, *supra* note 108 at ¶ 152 (stating that "the process wastewater from [Chemours'] Fluoromonomers/Nafion® Membrane Manufacturing Area contains and has contained substances or combinations of substances which meet the definition of "toxic substance" set forth in 15A N.C.A.C. 2B.0202," referring to GenX and other PFAS); Chemours Outfall 004 Permit, *supra* note 6 at 3; Chemours Outfall 004 Permit Fact Sheet, *supra* note 6 at 13–14.