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VIA E-MAIL

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**Re: Cape Fear River Watch Comments on Chemours' draft NPDES Permit
No. NC0090042**

Dear Dr. Chernikov:

The Southern Environmental Law Center submits these comments on draft NPDES Permit No. NC0090042 on behalf of Cape Fear River Watch. The draft permit proposes to authorize Chemours' Groundwater Treatment System (GWTS) to discharge up to 2.38 million gallons of treated groundwater, surface water, and stormwater each day. The Groundwater Treatment System is the final major piece of the consent order to be implemented and, as required by the consent order, is expected to remove at least 99% of the PFAS entering the system. Yet because the groundwater is so contaminated, a 99% reduction still results in unacceptably high levels of PFAS—120 ng/L of GenX, 640 ng/L of PFMOAA, and 130 ng/L of PMPA. The draft permit improperly and unlawfully adopts these high levels of PFAS as permit limits because the Division of Water Resources relied on the consent order as the basis for its technical analysis, rather than evaluating the performance of the best available technology, specifically the Outfall 003 treatment system. Because the Outfall 003 treatment system has nearly eliminated PFAS discharges, the final GWTS permit must include much lower limits for GenX, PFMOAA, and PMPA.

I. The Draft Permit Proposes Limits That Are Too High for Chronically Exposed Communities.

DEQ's decision to propose the draft permit must be understood in the context of the communities most directly affected. As DEQ has determined, there are numerous sources of PFAS into the Cape Fear watershed.¹ That contamination all flows downstream towards the communities that have already been heavily impacted by Chemours' toxic pollution. Retesting of 2014 and 2015 samples downstream of Chemours facility revealed that people have been drinking water with PFAS concentrations that are far higher than previously suspected. A 2014 sample below Chemours' outfall had PFAS concentrations of about 990,000 ng/L.² Another sample near the drinking water intake for people in Wilmington

¹ See *Emerging Compound Facility Sampling*, N.C. DEP'T ENV'T QUALITY, <https://perma.cc/5GBM-KWB3> (last visited Apr. 25, 2022).

² Adam Wagner, *NC State-Led Study Shows Cape Fear River Had 'Incredibly High' Levels of Chemicals*, THE NEWS&OBSERVER (Oct. 10, 2019), <https://www.newsobserver.com/article235963052.html> (last visited Apr. 25, 2022).

and Brunswick County had levels of 130,000 ng/L.³ Detlef Knappe at N.C. State University determined that these high concentrations are the “current best estimate of what people in the Wilmington area were drinking for [...] 37 years.”⁴ And that sampling may only cover the tip of the iceberg, as Chemours has determined that the facility has historically released 250 PFAS that cannot be identified by targeted analytical methods.⁵ Not only are the communities downstream particularly vulnerable, they continue to be exposed to PFAS in their drinking water⁶ because Chemours and other dischargers continue to release the chemicals. Given the ongoing pollution, the susceptibility of impacted communities, and the fact that PFAS toxicity assessments consistently reveal that the chemicals are more harmful than previously thought, DEQ must keep PFAS out of the Cape Fear watershed when possible.

The agency has recently taken action to address even lower levels of PFAS in groundwater. DEQ has required Chemours to initiate an expanded groundwater screening analysis in response to groundwater PFAS levels ranging from 30 ng/L to 390 ng/L.⁷ The agency must provide similar protection to downstream surface water users.

Last, although we have learned a lot about Chemours’ site over the last five years, there is much we do not know about the company’s release of PFAS into the Cape Fear River. In the second quarter of 2021, Chemours estimated that it released 118.5 kg of PFAS into the river.⁸ In the fourth quarter of 2021, the company estimated that it released half that total—61.1 kg.⁹ Despite that significant reduction, PFAS levels in the raw water intake for Cape Fear Public Utility Authority and Brunswick County were approximately the same, reaching more than 300 ng/L in December 2021.¹⁰ There is so much still to learn about how PFAS are entering the Cape Fear River. DEQ must take advantage of every opportunity to ensure that PFAS are kept on Chemours’ site and out of the river; the draft permit fails to do so.

II. The Draft Permit Violates Controlling Law That Requires DEQ to Impose Protective Limits Based on Performance of Control Technology.

The high limits in the draft permit are the result of DEQ’s failure to conduct a case-by-case technology-based effluent limitation (TBEL) analysis as required by law. Rather than evaluating the performance of available technology and basing the permit limits on that performance, DEQ has relied on the consent order’s 99% reduction requirement. That requirement is not based on technological performance and was instead negotiated long

³ *Id.*

⁴ *Id.*

⁵ The Chemours Company FC, LLC, *PFAS Non-Targeted Analysis And Methods Interim Report* (June 2020), available at <https://perma.cc/5XN9-7Q2Z>.

⁶ See *Latest PFAS Test Results*, CAPE FEAR PUB. UTIL. AUTH., <https://perma.cc/ZL3B-552V> (last visited Apr. 25, 2022); *Water Test Results – Unregulated Compounds*, BRUNSWICK CNTY., <https://perma.cc/SM8Y-J5BX> (last visited Apr. 25, 2022).

⁷ Geosyntec Consultants of NC, *Framework to Assess Table 3+ PFAS in New Hanover, Brunswick, Columbus, and Pender Counties* Appendix B p.2 (Feb. 2022), available at <https://perma.cc/27T9-FXRV>.

⁸ Geosyntec Consultants of NC, *Cape Fear River PFAS Mass Loading Assessment – Fourth Quarter 2021 Report* Table 4 (Mar. 2022), available at <https://perma.cc/MJ44-U267>.

⁹ *Id.*

¹⁰ *Latest PFAS Test Results*, *supra* note 6.

before Chemours submitted any sampling data from Outfall 003 or its application for the GWTS.

DEQ's decision to adopt limits based on the minimum reduction required by the consent order rather than the level of pollution control achievable by the proposed technology is contrary to the very purpose of TBELs. As EPA's NPDES Permit Writers' Manual states: "[o]ne of the major strategies of the Clean Water Act [] in making 'reasonable progress toward the national goal of eliminating the discharge of all pollutants' is to require effluent limitations based on the capabilities of the technologies available to control those discharges."¹¹ A valid TBEL analysis is essential because "[t]echnology-based treatment requirements under section 301(b) of the Act represent the minimum level of control that must be imposed in a permit."¹² DEQ's approach upends this core component of the Clean Water Act.

If DEQ had applied the case-by-case technology-based limit analysis as required, permit limits would be dramatically lower. As shown below, the Outfall 003 facility is nearly identical to the GWTS, treats similar influent, and will be operated in a similar manner. Therefore, it is the appropriate model technology for the GWTS and must be the basis for establishing permit limits.

A. DEQ is required to do a case-by-case TBEL analysis that is consistent with state rules and federal regulations.

There are two methods by which DEQ may set TBELs. One is through application of effluent limitation guidelines promulgated by the EPA. The second, which applies here, is through a case-by-case TBEL analysis. Without effluent limitation guidelines set by EPA, DEQ is required to do a case-by-case TBEL analysis using available information on control technology. This is established in both state and federal law and outlined in EPA's NPDES Permit Writers' Manual.

In the absence of established effluent limitation guidelines, North Carolina rules mandate that DEQ conduct a case-by-case TBEL analysis "using . . . available information in order to achieve the purposes of Article 21" of Chapter 143 of the North Carolina General Statutes,¹³ which are "to maintain, protect, and enhance" the state's water quality.¹⁴ As DEQ has acknowledged that effluent limitation guidelines are inapplicable here,¹⁵ the agency must implement case-by-case limits, and it does not have the discretion to ignore available, relevant information when setting such limits.

The provision of state law that mandates a case-by-case TBEL analysis implements federal law. North Carolina can only issue permits that "apply, and insure compliance with,

¹¹ U.S. ENV'T PROT. AGENCY, NPDES PERMIT WRITERS' MANUAL 5-1 (Sept. 2010), *available at* <https://perma.cc/QS7Y-X84E>, relevant chapters included as Attachment 1 ("NPDES Permit Writers' Manual").

¹² 40 C.F.R. § 125.3(a).

¹³ 15A N.C. Admin. Code 2B.0406(b)(3).

¹⁴ N.C. GEN. STAT. § 143-211(b).

¹⁵ N.C. DEP'T ENV'T QUALITY, FACT SHEET NPDES PERMIT NO. NC0090042 7 (2020), *available at* <https://perma.cc/PW2P-5HK4> ("GWTS NPDES Fact Sheet").

any applicable requirements of section[] 301” of the Clean Water Act.¹⁶ Federal regulations state that “[t]echnology-based treatment requirements under section 301(b) of the Act represent the minimum level of control that must be imposed in a permit.”¹⁷ Those regulations go on to identify factors that the “permit writer shall apply” and issues the permit writer “shall consider.”¹⁸ All state permitting programs must implement these provisions of federal law “and must be administered in conformance with” the requirements.¹⁹

The EPA’s NPDES Permit Writers’ Manual outlines the process mandated by federal regulations. As discussed in more detail below, the manual identifies specific regulatory factors that must be considered,²⁰ provides resources for developing limits,²¹ and includes guidance related to statistical analysis used to develop permit limits.²² Finally, the manual includes recommendations for how to document the development of limits in the fact sheet.²³

DEQ did not follow applicable state law, federal law, or the EPA’s NPDES Permit Writers’ Manual when establishing limits in the draft permit. That decision resulted in limits that are significantly higher than can be justified under a proper analysis, are contrary to the purpose of the permitting program, and risk exposing communities in southeastern North Carolina to high levels of avoidable PFAS contamination.

B. TBELs must be based on the performance of the applicable technology.

The central error in DEQ’s analysis is the agency’s reliance on the consent order to establish limits. There are two foundational flaws in that approach. First, the minimum reductions required by the consent order were negotiated before there was any available information about the proposed treatment system or the nearly identical Outfall 003 treatment system. Second, DEQ omitted any analysis of how much PFAS the proposed technology can remove—an analysis that is central to setting limits based on best available technology.

The consent order’s minimum reduction requirement is an inappropriate substitute for the required TBEL analysis because it was adopted in October 2020—before Chemours had even proposed a design for the GWTS,²⁴ and before there was any available data on the effectiveness of the proposed technology at Chemours’ site. Since the addendum’s requirement was negotiated, Chemours has applied the proposed technology (granular activated carbon) in multiple applications to treat for PFAS throughout the site. The

¹⁶ 33 U.S.C. § 1342(b)(1)(A).

¹⁷ 40 C.F.R. § 125.3(a).

¹⁸ *Id.* § 125.3(c)(2).

¹⁹ *Id.* § 123.25(a)(36) (requiring state programs to have legal authority to implement Subpart A of part 125, criteria and standards for imposing technology-based requirements).

²⁰ See NPDES Permit Writers’ Manual, *supra* note 11 at 5-46–5-47.

²¹ *Id.* at 5-47–5-48.

²² *Id.*

²³ *Id.* at 5-48.

²⁴ Geosyntec Consultants of NC, *Engineering Report – Treatment of Groundwater and Upgradient Seeps Waters* 5 (June 2021), available at <https://perma.cc/5XY6-Y628> (report included as Attachment A.5 in Chemours’ GWTS application and begins on PDF page 81) (“2021 Engineering Report”).

parties to the addendum did not have the benefit of (now available) data demonstrating the effectiveness of that technology. At the time the consent order addendum was negotiated, no data was available from the Outfall 003 treatment system.²⁵ The flow-through cells had not yet been installed in Seeps A through D.²⁶ The stormwater treatment system had not been designed or constructed.²⁷ The minimum reduction requirement was based on a theoretical system without knowledge of what technology Chemours would implement, much less the effectiveness of the technology.

The negotiations that resulted in the addendum's 99% reduction requirement cannot substitute for compliance with state and federal law on TBELs. Case-by-case TBELs for PFAS must be based on a specific analysis of best available technology. When setting such limits, the permit writer is required to consider certain factors, including:

- The age of equipment and facilities involved;
- The process employed;
- The engineering aspects of the control techniques;
- Process changes;
- The cost of achieving such effluent reduction; and
- Non-water quality environmental effects.²⁸

These factors are to be used “to select a model treatment technology and derive effluent limitations on the basis of that treatment technology.”²⁹ As discussed below, conducting this required analysis would result in much more protective limits in Chemours' permit.

C. Permit limits based on control technology performance would be much more stringent than the proposed limits.

1. The Outfall 003 treatment system is the model facility for the GWTS.

The proposed GWTS process is functionally identical to the Outfall 003 treatment system. The GWTS includes a process of chemical oxidation to precipitate metals, including iron,³⁰ as does the Outfall 003 treatment system.³¹ After oxidation, the GWTS will separate

²⁵ Discharge monitoring reports for the Outfall 003 treatment system were not available until the end of November 2020. See CHEMOURS OUTFALL 003, NPDES NO. NC0089915 DISCHARGE MONITORING REPORTS (2020–2022), available at <https://perma.cc/8YND-XT5M> (“Outfall 003 DMRs”).

²⁶ The earliest seep data was submitted in April 2021, and the treatment technology had only been installed for seep C. See Geosyntec Consultants of NC, *Interim Seep Remediation Seep C Effectiveness Demonstration Report* Table 1 (Apr. 2021), available at <https://perma.cc/96B5-MPVG>. Since then, there have been at least six reports reporting seep data, including monitoring data for treatment technology installed at the remaining seeps. See, e.g., Geosyntec Consultants of NC, *Interim Seep Remediation Operation and Maintenance Report #7* (Mar. 2022), available at <https://perma.cc/53JR-QYZZ>.

²⁷ See Geosyntec Consultants of NC, *Stormwater Treatment System Capture and Removal Efficiency Report 1* (Sept. 2021), available at <https://perma.cc/63J5-X9PG>.

²⁸ 40 C.F.R. § 125.3(d)(3).

²⁹ NPDES Permit Writers' Manual, *supra* note 11 at 5-46.

³⁰ See 2021 Engineering Report, *supra* note 24 at 16.

³¹ N.C. DEP'T ENV'T QUALITY, FACT SHEET NPDES PERMIT NO. NC0089915 3 (2020), included as Attachment 2 (“Outfall 003 Fact Sheet”).

solids through ultrafiltration or similar technology;³² the Outfall 003 treatment system includes this as well.³³ Next, the filtrate will be pumped to the GAC adsorption process as solids are treated separately,³⁴ similar to the Outfall 003 system.³⁵ Chemours acknowledges the similarity between the two systems. In its application, the company stated: “The design of the GWTS is similar to the design of the treatment system for Outfall 003.”³⁶

Chemours has also recognized that the Outfall 003 treatment system is the model system for establishing effluent limits for the GWTS. The company stated in its application that because the two treatment systems are similar, “[t]he effluent data that has been submitted to NCDEQ with EPA Form 2C for permit number NC0089915” for Outfall 003 “is therefore considered to be suitable to estimate the expected effluent data for the GWTS.”³⁷

The best available technology regulatory factors³⁸ further support using the Outfall 003 treatment system and the sampling data from that system as the basis for setting technology-based effluent limits for the GWTS. Both are newly constructed, built for the purpose of controlling PFAS. They employ the same processes. The engineering aspects of the control techniques are identical. Neither Chemours nor DEQ has identified any difference in cost associated with the GWTS that could serve as the basis for distinguishing between the two facilities.

2. Permit limits based on demonstrated performance of the Outfall 003 system would be dramatically lower than those in the draft permit.

The EPA’s NPDES Permit Writers’ Manual provides guidance on how to derive permit limits once a model treatment technology is selected. Applying EPA’s method to Outfall 003 effluent data supports setting PFAS limits for the GWTS near detection levels. Chemours’ proposed operation of the GWTS further supports those limits.

The Outfall 003 treatment system has been extraordinarily successful by any metric. The table below summarizes the data available from discharge monitoring reports submitted by the company from October 2020 through January 2022.

³² 2021 Engineering Report, *supra* note 24 at 16.

³³ Outfall 003 Fact Sheet, *supra* note 31 at 3.

³⁴ 2021 Engineering Report, *supra* note 24 at 16.

³⁵ Outfall 003 Fact Sheet, *supra* note 31 at 3–4.

³⁶ Chemours Company, Chemours Fayetteville Works NPDES Permit Application for the Groundwater Treatment System 3 (June 13, 2021), *available at* <https://perma.cc/5XY6-Y628>. (“GWTS NPDES Application”).

³⁷ *Id.*

³⁸ *See* 40 C.F.R. § 125.3(d)(3).

Outfall 003 Treatment System Performance				
	GenX	PFMOAA	PMPA	Total Table 3+ (17 compounds)
Total Sampling events ³⁹	62	62	62	15
Total Non-Detect Sampling Events ⁴⁰	59	46	62	15
Percent Non-Detect	95%	74%	100%	100%
Minimum Daily Effluent (ng/L)	<2	<2	<10	<42
Maximum Daily Effluent (ng/L)	2.3	16	<10	<42
Average Daily Effluent (ng/L)	2.01	2.65	<10	<42
Minimum Monthly Effluent (ng/L)	0.42	0.55	<10	<42
Maximum Monthly Effluent (ng/L)	2	2.925	<10	<42
Average Monthly Effluent (ng/L)	1.715	2.166	<10	<42

Although the effluent levels for Outfall 003 have been remarkably consistent, there is some slight variability. The EPA NPDES Permit Writers' Manual explains how permit writers can provide for such variability by establishing daily and monthly limits that are higher than the long-term average. The manual describes EPA's approach of evaluating the performance of the model technology and setting limits based on the 95th and 99th percentile of effluent levels to establish monthly average and daily maximum limits, respectively.⁴¹ Setting limits based on these percentiles is reasonable because facilities can be expected to "design and operate their treatment systems to achieve the long-term average performance level consistently because facilities with well-designed and operated model technologies have demonstrated that it can be done."⁴² When necessary, a variability factor can be applied to provide additional assurance that permit limits are achievable.⁴³

Due to the consistency of the Outfall 003 data and Chemours' statement that the effluent of the Outfall 003 treatment system and GWTS will be similar, DEQ would be justified in applying EPA's approach to Outfall 003 data to set effluent limits for the GWTS based solely on the 99th and 95th percentiles for daily max and monthly average limits.⁴⁴ But the agency could also apply a variance factor to those values to provide additional assurance. As part of its application for the Outfall 003 treatment system, Chemours identified a variance factor of 1.46 as appropriate for assessing expected effluent levels from

³⁹ Chemours' discharges on October 29, 2020 violated the terms of the permit and are, therefore, excluded from this analysis. See CHEMOURS OUTFALL 003, NPDES NO. NC0089915 DISCHARGE MONITORING REPORT (Oct. 2020), available at <https://perma.cc/N9C3-63DP>.

⁴⁰ The reporting levels for GenX, PFMOAA, and PMPA are 2 ng/L, 2 ng/L, and 10 ng/L, respectively.

⁴¹ NPDES Permit Writers' Manual, *supra* note 11 at 5-20 (summarizing ELG process); see *id.* at 5-47 (describing detailed statistical analysis for complex data sets).

⁴² *Id.* at 5-19.

⁴³ *Id.*

⁴⁴ In its application to discharge thermal oxidizer wastewater, Chemours applied the 95th percentile analysis to calculate a proposed limit using BAT. After concluding that "[g]ranular activated carbon (GAC) is generally regarded as [BAT] for removal of PFAS compounds from water," the company calculated the 95th percentile of the available data. See CHEMOURS, BEST AVAILABLE TECHNOLOGY FOR OUTFALL 102 1 (January 22, 2020), included as Attachment 3. DEQ must use a similar process here.

a GAC treatment system.⁴⁵ Even if DEQ were to apply Chemours’ 1.46 variance factor to daily max and monthly average values identified through the process described in the Permit Writers’ Manual, the permit limits would be much lower than proposed. The following chart includes limits based on the EPA’s process alone and with Chemours’ variability factor.

Comparison of TBEL-Derived Limits and Proposed Limits			
	GenX	PFMOAA	PMPA
Daily Max (99th percentile) (ng/L)	2.23 ng/L	10.14 ng/L	10 ng/L
Monthly Average (95th percentile) (ng/L)	2.0 ng/L	2.16 ng/L	10 ng/L
Daily Max (99th percentile w/ Chemours’ variance factor) (ng/L)	3.27 ng/L	14.81 ng/L	14.6 ng/L
Monthly Average (95th percentile w/ Chemours’ variance factor) (ng/L)	2.92 ng/L	3.19 ng/L	14.6 ng/L
DEQ’s proposed permit limits	120 ng/L	640 ng/L	130 ng/L

DEQ has previously misinterpreted the EPA’s statistical analysis when setting permit limits for Chemours. In the final fact sheet for the Outfall 003 permit, the agency stated that “the proposed limits are even tighter [than EPA’s 95th percentile recommendation] since Monthly Average and Daily Maximum limits in this permit are based on the 99th percentile.”⁴⁶ But DEQ’s limits were not based on the 99th percentile. Requiring 99% of PFAS to be removed from influent is not the same as setting effluent limits based on the 99th percentile of effluent concentrations. As shown in the chart above, the 99% reduction requirement relied on by DEQ for the draft permit limits is far more lenient than EPA’s approach of using the 95th percentile or the 99th percentile to establish limits, even when Chemours’ variance factor is applied.

3. The GWTS’s increased volume and influent PFAS concentrations do not negate the use of Outfall 003 effluent data to set limits.

The primary difference between Outfall 003 treatment system and GWTS is the influent that they treat. The pollutants are the same—GenX, PFMOAA, and PMPA remain the most significant PFAS among the Table 3+ chemicals analyzed.⁴⁷ The influent into the GWTS, however, is a higher volume and has a higher concentration of PFAS generally. But

⁴⁵ Parsons, *Chemours Fayetteville Engineering Report on Wastewater Treatability* 10 (July 2019), included as [Attachment 4](#).

⁴⁶ Outfall 003 Fact Sheet, *supra* note 31 at 16.

⁴⁷ See GWTS NPDES Application, *supra* note 36 at Appendix A.1.

although these factors may require a larger facility, they do not affect the suitability of the Outfall 003 system as the best available technology for setting permit limits.

The GWTS is designed to treat higher volumes of water than the Outfall 003 system, but there is no evidence that the larger system will be less efficient at controlling PFAS discharges. As designed, the GWTS will treat an average flow of 1.756 million gallons per day (mgd) compared to the Outfall 003 system's average of 0.72–1.44 mgd.⁴⁸ This slight variation simply means that the chemical precipitation, flocculation, sedimentation, filtration, and carbon adsorption processes are designed to process more water for the GWTS (1,000–1,500 gallons per minute (gpm)) than for the Outfall 003 system (500–1,000 gpm).⁴⁹

Higher PFAS influent concentrations also do not justify deviating from the Outfall 003 effluent data. An analysis of Outfall 003 data shows that influent concentration did not have a significant effect on effluent concentration. The system removed all GenX whether the influent was 1,300 ng/L or 17,000 ng/L.⁵⁰ PFMOAA was completely removed at influent levels of 14,000 ng/L and 66,000 ng/L.⁵¹ PMPA was eliminated in every sample even though influent ranged from 1,900 ng/L to 6,000 ng/L.⁵² Variability in influent concentration is therefore not a basis for distinguishing between the treatment systems.

The data from Chemours' flow-through cells further demonstrate that higher influent concentrations for the GWTS cannot justify the proposed limits. Although the flow-through cells use a more basic design, sampling data from the cells demonstrates that granular activated carbon can reduce PFAS discharges to much lower levels than proposed in the draft permit even considering higher concentrations. Sampling data from the flow-through cell in Seep B is particularly relevant because it processes the most water of the four flow-through cells, has been less affected by sedimentation than other cells, and treats one of the two seeps with flow that will be treated by the GWTS. Data from July 2021 to March 2022 is included in the chart below.

⁴⁸ Chemours Company, Chemours Fayetteville Works NPDES NC0003573 Permit Application Update, Attachment D-Form2D 1 (July 9, 2019), included as [Attachment 5](#) ("NPDES NC0003573 Form2D").

⁴⁹ See GWTS NPDES Application, *supra* note 36 at Appendix A.1; see also NPDES NC0003573 Form2D, *supra* note 48 at 1.

⁵⁰ Influent to the Outfall 003 system measured 1,300 ng/L GenX on October 12, 2021 and 17,000 ng/L on October 5, 2021. See Outfall 003 DMRs, *supra* note 25 at 479.

⁵¹ Influent to the Outfall 003 system measured 14,000 ng/L PFMOAA on October 19, 2021 and 66,000 ng/L on January 26, 2021. See *id.* at 479, 90.

⁵² Influent to the Outfall 003 system measured 1,900 ng/L PMPA on January 25, 2022 and 6,000 ng/L on November 5, 2020. See *id.* at 616, 4.

Seep B Flow-Through Cell Performance					
Date ⁵³	Total Table 3+ Influent (20 PFAS) (ng/L)	Total Table 3+ Effluent (20 PFAS) (ng/L)	GenX Effluent (ng/L)	PFMOAA Effluent (ng/L)	PMPA Effluent (ng/L)
07/14/2021	230,000	2.4	<2	<2	<10
07/31/2021	210,000	3.4	3.4	<2	<10
08/17/2021	250,000	ND	<2	<2	<10
08/20/2021	270,000	ND	<2	<2	<10
08/28/2021	220,000	ND	<2	<2	<10
09/09/2021	230,000	4.9	2.6	2.3	<10
09/23/2021	460,000	530	30	260	130
10/01/2021	510,000	200	17	100	61
10/15/2021	270,000	140	8.7	76	40
10/29/2021	270,000	75	5.2	36	27
11/12/2021	260,000	49	5.1	20	19
11/28/2021	270,000	39	3.2	17	16
12/15/2021 ⁵⁴	250,000	3,300	310	850	440
12/29/2021 ⁵⁵	240,000	44	4.9	21	13
01/08/2022	190,000	32	2.3	13	14
01/15/2022	220,000	48	5.6	22	14
01/31/2022	200,000	480	24	260	83
02/15/2022	240,000	200	12	96	37
03/01/2022	270,000	520	34	250	110

These data show that even with no pretreatment, granular activated carbon removes nearly all PFAS from highly concentrated seeps. Except for the sample taken on December 15, 2021, which was marked as “may not be precise or accurate” by the lab processing the sample, every sample from the flow-through cells would meet the proposed limits for the GWTS. GenX has not exceeded 34 ng/L, nearly 75% less than the proposed limit. PFMOAA has not exceeded 260 ng/L, 60% less than the proposed limit. PMPA matched the proposed limit for the GWTS in one sample, though 15 of the 17 remaining samples were less than half the proposed limit, and no PMPA was detected in 6 samples. The GWTS’s higher influent concentrations therefore do not justify higher proposed limits.

⁵³ See Geosyntec Consultants of NC, *Interim Seep Remediation Operation and Maintenance Report #4* Table 3b (Sept. 2021), available at <https://perma.cc/YTB9-G6EB>; Geosyntec Consultants of NC, *Interim Seep Remediation Operation and Maintenance Report #5* Table 3b (Nov. 2021), available at <https://perma.cc/F5B5-KEAZ>; Geosyntec Consultants of NC, *Interim Seep Remediation Operation and Maintenance Report #6* Table 3b (Jan. 2022), available at <https://perma.cc/E3F2-5UKQ>; *Interim Seep Remediation Operation and Maintenance Report #7*, *supra* note 26 at Table 3b. The tables referenced are included as a combined document in [Attachment 6](#).

⁵⁴ Data from 12/15/2021 are included for completeness. The Operation and Maintenance Report notes, however, that these data “may not be accurate or precise.” See *Interim Seep Remediation Operation and Maintenance Report #6*, *supra* note 53 at Table 3b.

⁵⁵ PFMOAA and PMPA Data from 12/29/2021 are included for completeness. The Operation and Maintenance Report notes, however, that these data “may not be accurate or precise.” *Id.*

4. Chemours' application supports setting limits at or near the detection level for at least GenX, PFMOAA, and PMPA.

Although Chemours' application did not apply the regulatory factors for evaluating best available technology, the company's submission supports setting permit limits at or near detection levels for GenX, PFMOAA, and PMPA. As described in the application, the treatment system will consist of three GAC adsorption trains consisting of three GAC columns each.⁵⁶ Critically, "the lead column will act as the primary contaminant remover" and will be monitored to determine when breakthrough occurs.⁵⁷ When breakthrough occurs, the middle column will become the lead, the lag column will become the middle, and the former lead column will be filled with new GAC and placed in the lag position.⁵⁸

If operated as intended, the treatment system will likely reduce GenX, PFMOAA, and PMPA to non-detectable levels after treatment in the middle column. The lag column, which will always contain new GAC, will treat water that enters the column with no detectable GenX, PFMOAA, or PMPA. The system is designed to achieve non-detect levels of the indicator PFAS after just two-thirds of treatment. The permit limits must reflect that design.

5. None of DEQ's previous rationales for declining to adopt protective TBELs have merit in this permitting process.

In response to comments on the Outfall 003 draft permit, DEQ identified several reasons for not adopting protective limits in the final permit. The agency stated that more stringent limits could not be imposed because (1) bench studies showed that "effluent concentrations of indicator PFAS compounds . . . are highly variable," (2) the treatability study was conducted under controlled conditions for a short period of time and that there could be complications when the technology is implemented in the field, (3) treatment below 99% reduction would be more difficult as influent concentrations decline, and (4) there was not an "implemented and successfully operating" facility to use for comparison.⁵⁹ None of these explanations are valid under the current circumstances.

The agency's previous concerns about bench studies showing variability are no longer valid. There has been very little variability in the effluent concentrations from the Outfall 003 system. Moreover, both the flow-through cells installed in seeps A through D and the stormwater treatment system have shown similar potential to control PFAS. The flow-through cells are far less sophisticated than the GWTS, with essentially no pretreatment of influent, yet have consistently reduced PFAS levels significantly below the proposed limits.⁶⁰ The stormwater treatment system's early results are similar to Outfall

⁵⁶ 2021 Engineering Report, *supra* note 24 at 19–20.

⁵⁷ *Id.* at 20.

⁵⁸ *Id.* at 20–21.

⁵⁹ N.C. DEPT ENV'T QUALITY, RESPONSES TO COMMENTS CHEMOURS PERMIT NC0089915 1–2 (Sept. 2020), included as [Attachment 7](#) (emphasis in original).

⁶⁰ See *Interim Seep Remediation Operation and Maintenance Report #7*, *supra* note 26 at Tables 3a, 3b, 3c, 3d.

003, reducing GenX, PFMOAA, and PMPA levels below detection levels for the significant majority of samples.⁶¹

Similarly, DWR's concerns that treatability studies were conducted under controlled environments and not at full scale are no longer applicable given the success of the Outfall 003 treatment system. Even the flow-through cells, which are subject to environmental fluctuations that will not exist with the GWTS, regularly remove 99.99% of PFAS and rarely achieve less than 99% removal efficiency.⁶²

The agency's concerns regarding the difficulty in removing more than 99% of PFAS as concentrations decrease is premised on an improper connection between the permit limits and the consent order. As discussed above, permit limits must be based on the concentrations that the technology can achieve. Chemours' ability to meet a limit based on the concentration that the technology can achieve is not hindered by decreasing concentrations in groundwater. For instance, if DEQ were to implement a limit of 10 ng/L for PMPA (given Outfall 003 treatment system's ability to achieve non-detect for all 62 samples taken), Chemours should be able to meet that limit regardless of diminishing levels in the influent or groundwater. In fact, it would become easier over time for Chemours to achieve that limit because the granular activated carbon filters would simply take longer to become saturated, and the company would need to change out the filters less often. Although under the consent order Chemours must reduce PFAS by 99%, Condition A(6) in the draft permit already provides an exception if influent concentrations drop to a level that the 99% requirement cannot be mathematically demonstrated.

Finally, there is plainly an "implemented and successfully operating" facility that can be used to establish the permit limits. The Outfall 003 treatment system has essentially eliminated GenX, PFMOAA, and PMPA from its discharge; the nearly identical GWTS must be held to that standard.

6. Final permit limits must be based on a lawful TBEL analysis.

Based on the available data, there is no legal basis for the proposed limits. DEQ must conduct a lawful TBEL analysis and cannot include limits higher than those described above. Specifically, daily maximum limits for GenX, PFMOAA, and PMPA cannot exceed 4 ng/L, 15 ng/L, and 15 ng/L, respectively. Likewise, monthly average limits for GenX, PFMOAA, and PMPA cannot exceed 3 ng/L, 4 ng/L, and 15 ng/L, respectively.

III. DEQ Has Not Properly Analyzed Compliance With the Toxic Substances Standard.

In addition to including valid technology-based effluent limits in the permit, DEQ must ensure that water quality standards will not be violated. If there is a "reasonable potential" that water quality standards will be exceeded, DEQ must also include water

⁶¹ *Stormwater Treatment System Capture and Removal Efficiency Report*, *supra* note 27 at 13.

⁶² *See Interim Seep Remediation Operation and Maintenance Report #7*, *supra* note 26 at Tables 3a, 3b, 3c, 3d, 4a, 4b, 4c, 4d.

quality-based effluent limits in the permit.⁶³ In particular, DEQ must assess compliance with the toxic substances standard for Chemours' permit.

A. DEQ is required to implement limits to prevent PFAS from entering the Cape Fear River at levels that will harm public health.

Chemours PFAS discharges, which contain mixtures of many PFAS, threatens to violate the state toxic substances standard, which requires that:

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, public health, or impair the waters for any designated uses.⁶⁴

North Carolina defines toxic substances as:

any substance or combination of substances [...], which after discharge and upon exposure [...], either directly from the environment or indirectly [...], *has the potential* to cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions (including malfunctions or suppression in reproduction or growth) or physical deformities in [...] organisms or their offspring.⁶⁵

PFAS are toxic substances under state law. PFAS are known to harm human health. They have been found to cause developmental effects to fetuses and infants, kidney and testicular cancer, liver malfunction, hypothyroidism, high cholesterol, ulcerative colitis, lower birth weight and size, obesity, decreased immune response to vaccines, reduced hormone levels, delayed puberty, and other harmful health effects.⁶⁶ Studies have further indicated that exposure to mixtures of various PFAS can cause more severe health effects.⁶⁷

DEQ has stated in its lawsuit against Chemours that PFAS “meet the definition of ‘toxic substance’” under North Carolina rules.⁶⁸ DEQ therefore must thoroughly analyze

⁶³ 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 DWR must “reasonably ensure compliance with applicable water quality standards and regulations”).

⁶⁴ 15A N.C. Admin. Code 2B.0208(a).

⁶⁵ 15A N.C. Admin. Code 2B.0202(54) (emphasis added).

⁶⁶ Arlene Blum et al., *The Madrid Statement on Poly- and Perfluoroalkyl Substances (PFASs)*, 123(5) ENVTL. HEALTH PERSPECTIVES A-107 (2015), <https://perma.cc/V5EV-4LQH>; *see also* U.S. DEP’T OF HEALTH & HUM. SERVS., TOXICOLOGICAL PROFILE FOR PERFLUOROALKYLS 5–7, fig. 2-1, fig. 2-2 (2021), <https://perma.cc/NJ8A-PFP9>; AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY, PERFLUOROALKYLS - TOXFAQS™ 1 (Mar. 2020), *available at* <https://perma.cc/N948-CHME>.

⁶⁷ *See, e.g.*, 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 105728 1–2 (2020), <https://perma.cc/DJK3-87SN>.

⁶⁸ N.C. DEQ Amended Complaint at 32, *North Carolina v. Chemours*, 17 CVS 580 (2018), included as Attachment 8 (stating that “the process wastewater from [Chemours] Fluoromonomers/Nafion® Membrane Manufacturing Area contains and has contained substances or combinations of

whether Chemours' discharges have a reasonable potential to "render waters injurious to aquatic life or wildlife, recreational activities, public health, or impair the waters for any designated uses."⁶⁹ DEQ failed to do so here—particularly in determining whether the proposed permit will protect public health.

B. DEQ did not appear to conduct any analysis on compliance with the toxic substances standard.

As justification for the proposed PFAS permit limits, DEQ states in the fact sheet, "No toxics in toxic amounts."⁷⁰ But the permitting documents do not include any analysis of whether Chemours' discharge could result in toxic amounts of PFAS in the Cape Fear River. DEQ did not assess whether discharges of GenX, PFMOAA, and PMPA at 120 ng/L, 640 ng/L, and 130 ng/L—along with the numerous other PFAS discharged by Chemours⁷¹—could harm public health under the toxic substances standard.⁷²

DEQ instead appears to admit that it did not consider water quality-based effluent limits for PFAS. DEQ or the Fact Sheet states that "The Technology Based Effluent Limits were the guiding criteria used to develop permit limitations for HFPO-DA, PFMOAA, and PMPA," and suggests that it needs EPA to develop PFAS criteria or the state to adopt standards before it can implement water quality-based effluent limits.⁷³ But DEQ cannot wait for numeric standards or criteria to act. The toxic substances standard is a narrative standard, which, unlike numeric standards, "do not specify numerical limitations on the concentration of a particular pollutant in the water."⁷⁴ That does not mean they can be ignored. Permit limits "must control all pollutants" which "have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."⁷⁵ EPA has emphasized that "narrative standards have the same force and effect as other state water quality standards."⁷⁶ And courts have affirmed that "permits must incorporate discharge limitations necessary to ensure that the water quality standards are met," including "narrative criteria."⁷⁷ EPA has issued rules explaining how permit writers must implement limits "[w]here a State has not established

substances which meet the definition of 'toxic substance' set forth in 15A N.C.A.C. 2B .0202," referring to GenX and other PFAS).

⁶⁹ 15A N.C. Admin. Code 2B.0208(a). To be clear, capturing and treating the contaminated groundwater will reduce PFAS levels in the Cape Fear River. That does not necessarily mean that the levels allowed by the discharge will not cause or contribute to a violation of the toxic substances standard.

⁷⁰ GWTS NPDES Fact Sheet, *supra* note 15 at 10.

⁷¹ See Chemours Company – Fayetteville Works, *List of PFAS Compounds* (June 2021), available at <https://perma.cc/3JW5-WGZA> (list included as Attachment F-3 of Chemours' 2021 Application for NPDES Permit NC0003573 and begins on PDF page 225).

⁷² 15A N.C. Admin. Code 2B.0208(a).

⁷³ GWTS NPDES Fact sheet, *supra* note 15 at 7.

⁷⁴ *Am. Iron & Steel Inst. v. E.P.A.*, 115 F.3d 979, 989 (D.C. Cir. 1997).

⁷⁵ 40 C.F.R. § 122.44(d)(1)(i).

⁷⁶ National Pollutant Discharge Elimination System; Surface Water Toxics Control Program, 54 Fed. Reg. 23868, 23872 (June 2, 1989).

⁷⁷ *Am. Iron & Steel Inst.*, 115 F.3d at 989; see also *Am. Paper Inst., Inc. v. E.P.A.*, 996 F.2d 346, 350 (D.C. Cir. 1993) ("[P]ermits must incorporate limitations necessary to meet standards that rely on narrative criteria to protect a designated use as well as standards that contain specific numeric criteria for particular chemicals.").

a water quality criterion for a specific chemical pollutant that is present in an effluent at a concentration that causes, has the reasonable potential to cause, or contributes to an excursion above a narrative criterion.”⁷⁸ DEQ must assess limits for PFAS in order to ensure compliance with the toxic substances standard.

C. The limited analysis of in-stream concentrations cited by DEQ is flawed.

DEQ appears to rely on Chemours’ modeling for GenX in the Cape Fear River⁷⁹ for part of its permitting analysis. It is unclear whether DEQ used this modeling to assess compliance with the toxic substances standard. EPA has stated that “[t]he permit writer should clearly identify the information and procedures used to determine the need for [water quality-based effluent limits]” in order to provide “the public a transparent, reproducible, and defensible description of how each pollutant was evaluated, including the basis (i.e., reasonable potential analysis) for including or not including a [water quality based effluent limit] for any pollutant of concern.”⁸⁰ The permit and fact sheet lack the required transparent explanation for PFAS.

If DEQ has in fact relied on Chemours’ modeling to determine the need for a water quality-based effluent limit for PFAS, then its analysis is inherently flawed. First, the modeling was submitted as part of the application for Outfall 002 and does not address the additional pollution proposed to be discharged from Outfall 004.

Second, Chemours only modeled GenX, a single compound. Chemours acknowledges in its application and other submissions that it has found more than 100 additional PFAS in wastewater and groundwater, and that many more could be found in this discharge.⁸¹ As DEQ is aware, other PFAS outside of GenX are harmful to human health. The agency therefore cannot rely on Chemours’ modeling of a single compound to assess compliance with the toxic substances standard unless the company can show that the rest of the class of chemicals behaves similarly. Chemours has not shown that here.

Third, Chemours’ modeling relies on the outdated health goal for GenX of 140 ng/L, finding that the company’s release of GenX would be “diluted to below” the health goal.⁸² But as DEQ has recently acknowledged, EPA’s final toxicity assessment for GenX now has a much lower reference dose for the chemical.⁸³ In other words, GenX is far more harmful than previously thought—as is the case with other PFAS that have been studied more closely.⁸⁴ Modeling based on the outdated health goal cannot justify protection of public health and compliance with the toxic substances standard.

⁷⁸ 40 C.F.R. § 122.44(d)(1)(vi).

⁷⁹ GWTS NPDES Fact sheet, *supra* note 15 at 5.

⁸⁰ NPDES Permit Writers’ Manual, *supra* note 11 at 6-30.

⁸¹ *List of PFAS Compounds*, *supra* note 71.

⁸² Geosyntec Consultants of NC, *Mixing Zone Report* 13–14, 19 (Oct. 2019), available at <https://perma.cc/3JW5-WGZA>, included as Attachment 9 (“Cormix Report Addendum”).

⁸³ See Letter from Sushma Masemore, N.C. Dep’t Env’t Quality to Dawn Hughes, Chemours Fayetteville Works (Nov. 3, 2021), included as Attachment 10.

⁸⁴ In 2016, EPA established a lifetime health advisory of 70 parts per trillion (“ppt”) for the combined concentrations of PFOA and PFOS in drinking water. EPA has since updated toxicity assessments for the chemicals, suggesting that the health values for the chemicals should be magnitudes lower. The updated toxicity assessments would translate to health advisories of .006 ppt for PFOA and .029

Fourth, Chemours improperly attempts to include its own PFAS contamination as “background concentrations” in its modeling.⁸⁵ Occasionally in permitting decisions, DEQ will consider background concentrations of the pollutant at issue so that dischargers are not saddled with cleaning up pollution caused by upstream sources. This is not the situation here. Chemours is responsible for the PFAS contamination in Willis Creek, aerial deposition on the Cape Fear River and its tributaries, on-site and off-site groundwater contamination, and PFAS coming from the seeps. But in its modeling, Chemours labels the PFAS contamination from all of these sources as “background concentration in the river.”⁸⁶ Chemours then subtracted the background concentration from its discharge concentration so that it would only model (and therefore be held accountable for) the “excess concentration” over background levels.⁸⁷ DEQ cannot allow the company to get credit during the permitting process for its widespread contamination.

To the extent that DEQ has relied on Chemours’ modeling for any assessment of water quality-based effluent limits for PFAS, such reliance is improper.

D. DEQ must also consider Chemours’ ongoing PFAS through Outfall 002 from other sources of contamination.

As Outfall 004 is only an internal outfall to Outfall 002, DEQ must also consider other sources of PFAS from the Chemours facility into Outfall 002 and how the flows combined will affect downstream communities. Chemours’ Outfall 002 levels, even without the GWTS discharge, remain significant. In September and December of 2021, the open channel to Outfall 002 had concentrations of 2,500 and 3,200 ng/L of just Table 3+ PFAS alone⁸⁸—not to mention the hundreds of PFAS at the facility that are not measured by targeted methods.⁸⁹ Adding on the maximum amount of PFAS allowed by the proposed permit could significantly increase the amount of PFAS leaving Outfall 002. DEQ must therefore take these other sources of PFAS into consideration when assessing compliance with the toxic substances standard.

IV. DEQ Must Address Technical Issues.

There are several technical issues that DEQ must address in the final permit. Specifically, DEQ or Chemours should clarify the following.

ppt for PFOS. Garret Ellison, *No Safe PFAS Exposure Level? EPA Toxicity Drafts Point That Way*, MLIVE (Nov. 20, 2021), <https://perma.cc/8FYG-NRJP>; see ENV’T PROT. AGENCY, PROPOSED APPROACHES TO THE DERIVATION OF A DRAFT MAXIMUM CONTAMINANT LEVEL GOAL FOR PERFLUOROOCCTANOIC ACID (PFOA) (CASRN 335-67-1) IN DRINKING WATER, External Peer Review Draft (2021), <https://perma.cc/K3DN-7BHU>; ENV’T PROT. AGENCY, PROPOSED APPROACHES TO THE DERIVATION OF A DRAFT MAXIMUM CONTAMINANT LEVEL GOAL FOR PERFLUOROOCCTANE SULFONIC ACID (PFOS) (CASRN 1763-23-1) IN DRINKING WATER, External Peer Review Draft (2021), <https://perma.cc/8L5B-YUNA>.

⁸⁵ Cormix Report Addendum, *supra* note 82 at 6–7.

⁸⁶ *Id.* at 6.

⁸⁷ *Id.* at 7.

⁸⁸ When all 20 compounds were measured, PFAS levels reached 2,800 ppt in September 2021 and 3,300 ppt in December 2021. See Geosyntec Consultants of NC, *Characterization of PFAS in Process and Non-Process Wastewater and Stormwater* Table A1 (Mar. 2022), available at <https://perma.cc/XQY2-9J3F>.

⁸⁹ *PFAS Non-Targeted Analysis*, *supra* note 5.

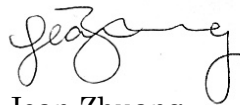
- Ultrafiltration pore size. Successful removal of total organic carbon and dissolved organic carbon will depend on the pore size of the ultrafiltration membrane pore size. Because dissolved organic carbon can cause desorption of short-chain PFAS, ensuring that the ultrafiltration system removes carbon <45 µm will promote better GAC performance. DEQ should clarify the required filtration pore size.
- GAC disposal/regeneration. Certain methods of GAC regeneration and disposal, specifically incineration, can result in widespread dispersal of PFAS—similar to the effects of Chemours’ prior air emissions. DEQ should ensure in the permit that used GAC is disposed of responsibly.
- Breakthrough threshold. Chemours has not identified the specific breakthrough threshold that it will use to determine when to change GAC in the first treatment container. Chemours should specify the threshold it will use to trigger changeover.
- Unit consistency. DEQ uses both µg/L and ng/L in the draft permit. DEQ should use consistent units throughout. We recommend use of ng/L.

Thank you for your consideration of these comments. Please do not hesitate to contact us at 919-967-1450 or via email (ggisler@selcnc.org, jzhuang@selcnc.org) to discuss this matter further.

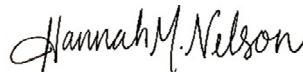
Sincerely,



Geoff Gisler
Senior Attorney



Jean Zhuang
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Hannah Nelson
Associate Attorney

cc:
Dana Sargent, CFRW
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Sushma Masemore, NCDEQ
Bill Lane, NCDEQ