Fact Sheet
NPDES Permit No. NC0089915

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Division/Branch: NC Division of Water Resources / NPDES Complex Permitting
Fact Sheet Template: Version 09Jan2017

Permitting Action:
☐ Renewal
☐ Renewal with Expansion
☒ New Discharge
☐ Modification (Fact Sheet should be tailored to mod request)

Note: A complete application should include the following:

- For New Dischargers, EPA Form 2A or 2D requirements, Engineering Alternatives Analysis, Fee
- For Existing Dischargers (POTW), EPA Form 2A, 3 effluent pollutant scans, 4 2nd species WET tests.
- For Existing Dischargers (Non-POTW), EPA Form 2C with correct analytical requirements based on industry category.

Complete applicable sections below. If not applicable, enter NA.

1. Basic Facility Information

Facility Information	
Applicant/Facility Name:	The Chemours Company / Chemours Fayetteville Works
Applicant Address:	1007 Market Street, Wilmington, DE 19899
Facility Address:	22828 NC Highway 87 W, Fayetteville, NC 28306-7332
Permitted Flow:	1.58 MGD
Facility Type/Waste:	MAJOR Industrial
Facility Class:	II
Treatment Units:	influent oxidation, coagulation, and pH adjustment, ultrafiltration, granular activated carbon (GAC) adsorption
Pretreatment Program (Y/N):	N/A
County:	Bladen
Region:	Fayetteville

Briefly describe the proposed permitting action and facility background:

A. Introduction / Permitting Action

In order to reduce PFAS loading to the Cape Fear River pursuant to the Consent Order entered by the Bladen County Superior Court on February 25, 2019 ("Consent Order"), Chemours has requested a new NPDES permit for the discharge of treated groundwater, stormwater, and surface water from a stream located on the southern portion of its property.

The flow from Outfall 003 consists primarily of contaminated surface water, stormwater, and groundwater, which must be treated to remove at least 99% of the HFPO-DA (GenX), PFMOAA, and PMPA. This stream, often referred to as "Old Outfall 002," was used to discharge process wastewater from the facility prior to June 2012, when the process wastewater discharge was relocated to the current outfall location (for permit NC0003573) above Lock and Dam #3 (also known as William O Huske Dam) in the Cape Fear River. Pursuant to the Consent Order, Chemours is required to implement a system to capture and treat the dry weather flow (baseflow) at Old Outfall 002 prior to discharge by September 30, 2020. The treatment system shall meet such discharge standards as shall be set by DEQ, and shall, in addition and at a minimum, be at least 99% effective in controlling indicator parameters, HFPO-DA, PFMOAA, and PMPA, i.e. 99% removal of these parameters. The issuance of this permit will allow Chemours to begin this remediation to meet the Consent Order requirement and reduce PFAS loading to the Cape Fear River.

Additionally, as part of the Consent Order, Chemours was required to conduct a Mass Loading Assessment. The summary report was submitted to DEQ on December 6, 2019. The report assessed all known sources of per- and polyfluoroalkyl substances (PFAS) on and around the site and their potential mass loadings to the Cape Fear River using data from the May, June, and September 2019 sampling for the facility. Chemours preliminarily estimated that remediating the baseflow (dry weather flow) from this channel will reduce overall loading of Total Table 3+ PFAS compounds to the river by 26% based on an average of these two sampling events (Cape Fear River PFAS Loading Reduction Plan – Supplemental Information Report, November 2019).

This outfall is named Outfall 003 in this new permit to allow for the potential consolidation of Chemours' other NPDES wastewater permit, NC0003573, in the future.

B. Proposed Treatment System

The proposed treatment system includes a dam to collect dry weather baseflow in the creek bed/channel (estimated to be 540 gallons per minute with a maximum flow of 610 gpm) and some seeps and groundwater, for a total flow capacity at the dam (collection system) of 670 gallons per minute (gpm). The treatment system is designed to treat a maximum flow of 750 gallons per minute (gpm), which will provide a treatment safety factor in the event Chemours has trouble getting the flow through the carbon systems. The Permitted Flow allowance of 1.58 million gallons per day (MGD) is for the addition of future flows from on-site seeps and other groundwater remediation projects expected at the site.

The system is expected to be able to remove numerous PFAS compounds, including the indicator parameters HFPO-DA (GenX), PFMOAA, and PMPA. As described above, the Consent Order specifies that HFPO-DA and PFMOAA are to be removed from the Old Outfall 002 channel by at least 99%. The Consent Order required Chemours to complete, at a minimum, monthly surface water sampling in Old Outfall 002 at designated locations, beginning no later than March 2019 to be completed by September 30, 2019 to establish baseline mass loading from Old Outfall 002. Additionally, by September 30, 2019, Chemours was required to complete pilot scale testing of treatment equipment to determine its control efficiency for all PFAS identified in Old Outfall 002. Pilot testing results, received by DWR on October 3, 2019, demonstrated that the proposed granular activated carbon (GAC) system can remove at least 99% of the total PFAS compounds reported per the NPDES permit application.

From time-to-time the Middle Cape Fear River has experienced flooding conditions which are documented to cause a significant increase in water levels below Lock and Dam #3, consistent with the location of proposed Outfall 003. During these events a backwater condition propagates upstream in the "Old Outfall 002 Stream". Historical observation indicates that the Old Outfall 002 Stream levels can rise significantly (consistent with the flooded Cape Fear River levels) and would be expected, at times, to be equal to or significantly greater than the invert elevation of the treatment system intake dam and associated pumping system. During these flooded backwater conditions elevated sediment load and reduced flow velocity gradients are expected to cause significant sediment deposition within the collection dam and pumping structure. The sediment load may cause failure of the pumping and treatment system during the flooded backwater condition. Requirement for treatment shall be suspended during these force majeure flooding events and be allowed 48 hours after the backwater stream level falls below the invert of the intake collection dam to safely maintain the influent collection structure and re-initiate collection and treatment. The triggering Cape Fear River flood elevations; event documentation and notification requirements; and procedure for treatment cessation and safe restart shall be included in the approved Dam Operation and Maintenance Plan.

This proposed treatment system will consist of the following components:

1) Influent Oxidation, Coagulation & pH Adjustment

This treatment system includes an influent oxidation/coagulation /pH adjustment tank for pretreatment of the ultrafiltration (UF) feed (pH adjustment/oxidation/coagulation). The pH adjustment will be done using sodium hydroxide. Additional iron oxidation will be done with sodium hypochlorite. Poly-aluminum chloride (PAC) will be used for coagulation and contribute to help maintain the UF membranes. Partially treated water will be conveyed to the UF units via dual booster pumps. Safety Data Sheets (SDSs) are attached for the chemicals to be utilized at the wastewater treatment system.

Iron hydroxide particles precipitated in the oxidation process and total suspended solids (TSS) will be coagulated and settled in the tank. The settled solids will be transferred by a solids transfer pump to a weir tank (back pulse waste recycle tank) and filtered in downstream removal processes (thickener and rotary-fan filter press).

2) Ultrafiltration

This design includes UF pretreatment before the Granular Activated Carbon (GAC) stage. The UF will perform the role of solids removal upstream of the GAC units. The UF will provide an absolute barrier to solids at 0.04 - 0.1 µm range. Per the manufacturing vendor, the UF membrane will provide additional TOC removal as well.

The UF back pulse waste recycle will be captured in a weir tank to allow solids to settle and then will be recycled through the system after being pumped back to the influent oxidation/coagulation /pH adjustment tank. The settled solids in the weir tank (the back-pulse waste recycle tank) will be drawn off by a sludge pump and filtered in downstream removal processes (thickener and rotary-fan filter press).

The UF units will intermittently need to be cleaned with a low concentration of citric acid. The cleaning solution will be captured in a Clean-In Place (CIP) tank and neutralized in it. Following neutralization, the CIP water will be recycled through the treatment system after being pumped back by CIP neutralization pumps to the influent oxidation/coagulation /pH adjustment tank.

3) Granular Activated Carbon (GAC) Adsorption

Based on GAC adsorption studies, PFAS removal to meet discharge requirements (per the CO), is expected to be accomplished using GAC adsorption. The system design for this application includes a total of six (6) 12' diameter x 5' diameter straight side vessels in a three (3) pass configuration capable of swapping lead/middle/lag. Each GAC vessel can hold up to 20,000 lbs. of GAC. The GAC beds will be sluiced out upon exhaustion and the new bed sluiced back into the vessel. The GAC vessels have backwashing capability. Sizing, quantities and configuration may be modified during process optimization.

Chemours' initial process control sampling plan consists of sampling the influent to the GAC system once per week, sampling the lead, middle, and lag units twice a month, and additional sampling as needed when nearing GAC unit replacement criteria. These samples will be analyzed by Chemours inhouse laboratory. The lead GAC bed will be changed out when PFMOAA in the lead GAC unit equals PFMOAA out of the lead GAC unit. This will ensure full utilization of the carbon bed. Chemours will test for PFMOAA between each GAC unit to determine when units need to be rotated or disposed because this compound's affinity to carbon is a bit less than HFPO-DA. This was tested out during Chemours' pilot scale study and a 99% reduction was maintained for both compounds in the lag (or third) GAC bed effluent.

4) Solids Handling and Treatment

The treatment system includes a containerized sludge handling system with sludge pump, polymer make down/injection system, in-line mixer and a thickener unit and rotary fan press skid. The rotary fan press will be mounted on a sump with a pump to return filtrate from the process to the head of the plant into the influent oxidation/coagulation /pH adjustment tank. Additionally, the solids handling system will include a screw conveyor to move the sludge out of the container/press and into a roll off for storage, until the sludge accumulates enough to be hauled off site. Solid waste is to be shipped to an approved waste management facility for disposal per Federal and State Regulations.

5) Discharge

The treated water will be discharged and reintroduced to Outfall 003. The discharge location will be downstream of the capture dam, and will flow from the channel into the Cape Fear River. On October 16, 2019, the division issued a 401 Certification for the construction of a weir to create a small in-stream reservoir, DWR Project #2019-1146. The purpose of the project was to create a pool from which to withdraw water, treat it in an upland facility and discharge below the weir. The permanent impacts for the project were 270 Linear Feet of stream (Old Outfall 002). Most of the impacts were associated with the stabilization of the stream bed and bank with rip-rap behind the weir. No mitigation was triggered as the project did not exceed the state threshold of 300 LF of stream. The Army Corps of Engineers issued a 404 (NWP 38) for the project on October 29, 2019.

C. Facility Background

Currently, no process wastewater from Chemours is discharged. The only process wastewater discharged comes from Chemours' tenants DuPont and Kuraray. That wastewater is covered under the NPDES discharge permit #NC0003573. This permit #NC0089915 is for the collection and treatment of the contaminated dry weather flow (groundwater and surface water) in Chemours Old Outfall 002 channel. Renewal of Chemours'permit NC0003573 will be addressed separately from this permit.

2. Receiving Waterbody Information

Receiving Waterbody Information	
Outfalls/Receiving Stream(s):	Outfall 003 – Cape Fear River
Stream Segment:	18-(26.25)
Stream Classification:	C, WS-IV
Drainage Area (mi^2):	4852

Summer 7Q10 (cfs):	467 (17.14 – used in limit calculations to account for dilution, the number is based on the modeling)
Winter 7Q10 (cfs):	603
30Q2 (cfs):	900
Average Flow (cfs):	4220
IWC (% effluent):	12.5% (based on the model)
303(d) listed/parameter:	No, the segment is not listed on the 2018 303(d) list
Subject to TMDL/parameter:	Yes – State-wide Mercury TMDL implementation.
Sub-basin/HUC:	Outfall 002: 03-06-16 /
USGS Topo Quad:	Duart

3. Effluent Data Summary

N/A – New Discharge

This is a new permit for the collection and treatment of contaminated dry weather flow in a channel leading to the Cape Fear River. Previously, DuPont used this channel to discharge process wastewater and referred to it as "Old Outfall 002".

4. Instream Data Summary

Instream monitoring may be required in certain situations, for example: 1) to verify model predictions when model results for instream DO are within 1 mg/l of instream standard at full permitted flow; 2) to verify model predictions for outfall diffuser; 3) to provide data for future TMDL; 4) based on other instream concerns. Instream monitoring may be conducted by the Permittee, and there are also Monitoring Coalitions established in several basins that conduct instream sampling for the Permittee (in which case instream monitoring is waived in the permit as long as coalition membership is maintained).

If applicable, summarize any instream data and what instream monitoring will be proposed for this permit action: As part of the Consent Order (Paragraph 11(d)), Chemours is required to sample its intake, discharge (Outfall 002), and a multitude of additional on-site locations for PFAS compounds. These sampling efforts are detailed in the Updated PFAS Characterization Plan, dated May 1, 2019. This plan and the sampling locations were conditionally approved by DWR on June 19, 2019.

Chemours' existing NPDES permit, NC0003573, has instream monitoring requirements for temperature, dissolved oxygen, and conductivity on a weekly basis to evaluate the effects of its discharge on the receiving stream. Chemours is a member of the Middle Cape Fear Basin Association, with upstream coalition station B8290000 (approximately 1 mile upstream of Outfall 002) and downstream coalition station B8302000 (approximately 4 miles downstream of Outfall 002). As part of this permit, instream monitoring for PFAS compounds will be required.

Is this facility a member of a Monitoring Coalition with waived instream monitoring (Y/N): Y

Name of Monitoring Coalition: Middle Cape Fear Basin Association

5. Compliance Summary

Summarize the compliance record with permit effluent limits (past 5 years): This is a new permit.

Summarize the compliance record with aquatic toxicity test limits and any second species test results (past 5 years): This is a new permit.

Summarize the results from the most recent compliance inspection: This is a new permit.

6. Water Quality-Based Effluent Limitations (WQBELs)

Dilution and Mixing Zones

In accordance with 15A NCAC 2B.0206, the following stream flows are used for dilution considerations for development of WQBELs: 1Q10 streamflow (acute Aquatic Life); 7Q10 streamflow (chronic Aquatic Life; non-carcinogen HH); 30Q2 streamflow (aesthetics); annual average flow (carcinogen, HH).

If applicable, describe any other dilution factors considered (e.g., based on CORMIX model results):

Geosyntec Consultants of NC has submitted CORMIX model results on behalf of The Chemours Company FC, LLC for the primary discharge Outfall 002 of their Fayetteville Works site discharging to the Cape Fear River, classified WS-IV, approximately 1,500 feet above the William O Huske Dam aka Lock and Dam 3 in Bladen County. The discharge was modeled because of concerns over incomplete mixing due to the presence of the lock and dam system and background concentrations from site runoff, aerial deposition, seepage, and groundwater flow containing per-and polyfluoralkyl substances (PFAS) into the river.

The CORMIX model river schematization used The Army Corps of Engineers 2016 bathymetric survey data which showed a consistent river cross-section profile from the point of discharge to just above Lock and Dam 3. Critical river flows were obtained from the USGS in June 2019, which showed a marked decrease in critical flow statistics from those used in prior permits. The lower flows reflect changes in the B. Everett Jordan Lake Drought Contingency Plan formally approved in 2008 and operationally in effect since 2007. Water levels in the model were determined from the continuous record USGS stream gage (Station 02105500) located at the lock and dam. Outfall parameters in the model were based on the existing outfall configuration.

The model showed continued mixing up to 21.2 m from the outfall where the plume begins to exhibit passive ambient diffusion with little additional dilution. At this point the effluent plume dilution is 8:1 until model end. The 8:1 dilution is used to establish dilution based effluent limitations for parameters with little to no background concentrations. The 8:1 dilution is both more conservative than and supported over instream waste concentration (IWC) based limitations normally performed under 15A NCAC 2B. The IWC from using standard procedures under 7Q10 flow conditions of 467 cubic feet per second (cfs) would be 9% versus 12.5% at an 8:1 dilution. The 8:1 dilution factor, modeled and established for Chemours' upstream discharge at Outfall 002 was used as a conservative estimate to assess effluent limits and monitoring requirements for the discharge (Outfall 003) regulated in this permit.

It should be noted that the model produced an effective summer 7Q10 (7Q10s) value of 17.14 cfs. This is a very conservative assumption, as it is substantially lower than the USGS estimate of 467.0 cfs for the 7Q10s. Because the CORMIX model provides a very high level of protection for the receiving stream and the downstream water users, the effective 7Q10s was be used in the Reasonable Potential Analysis (RPA) for Outfall 003.

If applicable, describe any mixing zones established in accordance with 15A NCAC 2B.0204(b): N/A.

Oxygen-Consuming Waste Limitations

Limitations for oxygen-consuming waste (e.g., BOD) are generally based on water quality modeling to ensure protection of the instream dissolved oxygen (DO) water quality standard. Secondary TBEL limits (e.g., BOD= 30 mg/l for Municipals) may be appropriate if deemed more stringent based on dilution and model results.

If permit limits are more stringent than TBELs, describe how limits were developed: See "Dilution and Mixing Zones" Section above.

Ammonia and Total Residual Chlorine Limitations

Limitations for ammonia are based on protection of aquatic life utilizing an ammonia chronic criterion of 1.0 mg/l (summer) and 1.8 mg/l (winter). Acute ammonia limits are derived from chronic criteria, utilizing a multiplication factor of 3 for Municipals and a multiplication factor of 5 for Non-Municipals.

Limitations for Total Residual Chlorine (TRC) are based on the NC water quality standard for protection of aquatic life (17 ug/l) and capped at 28 ug/l (acute impacts). Due to analytical issues, all TRC values reported below 50 ug/l are considered compliant with their permit limit.

Describe any proposed changes to ammonia and/or TRC limits for this permit renewal: The facility conducted a comprehensive evaluation of the dry weather flow in the creek bed (channel) and submitted results on the EPA Form 2D to the Division. The analysis indicates that there is no ammonia or TRC.

Reasonable Potential Analysis (RPA) for Toxicants

If applicable, conduct RPA analysis and complete information below.

The need for toxicant limits is based upon a demonstration of reasonable potential to exceed water quality standards, a statistical evaluation that is conducted during every permit renewal utilizing the most recent effluent data for each outfall. The RPA is conducted in accordance with 40 CFR 122.44 (d) (i). The NC RPA procedure utilizes the following: 1) 95% Confidence Level/95% Probability; 2) assumption of zero background; 3) use of ½ detection limit for "less than" values; and 4) stream flows used for dilution consideration based on 15A NCAC 2B.0206. Effective April 6, 2016, NC began implementation of dissolved metals criteria in the RPA process in accordance with guidance titled *NPDES Implementation of Instream Dissolved Metals Standards*, dated June 10, 2016.

A reasonable potential analysis was conducted on effluent toxicant data provided by the facility in the permit application. Pollutants of concern included toxicants with positive detections and associated water quality standards/criteria. Based on this analysis, the following permitting actions are proposed for this permit:

- Effluent Limit with Monitoring. The following parameters will receive a water quality-based effluent limit (WQBEL) since they demonstrated a reasonable potential to exceed applicable water quality standards/criteria: Silver and Cobalt.

- Monitoring Only. The following parameters will receive a monitor-only requirement since they did not demonstrate reasonable potential to exceed applicable water quality standards/criteria, but the maximum predicted concentration was >50% of the allowable concentration: Cadmium, Copper, Cyanide, Lead, Thallium, Selenium, Mercury.
- No Limit or Monitoring: The following parameters will not receive a limit or monitoring, since they did not demonstrate reasonable potential to exceed applicable water quality standards/criteria and the maximum predicted concentration was <50% of the allowable concentration: Aluminum, Arsenic, Barium, Beryllium, Total Phenolic Compounds, Total Chromium, Fluoride, Molybdenum, Nickel, Sulfate, Zinc, Nitrate/nitrite.

Attached are the RPA results and a copy of the guidance entitled "NPDES Implementation of Instream Dissolved Metals Standards – Freshwater Standards."

Toxicity Testing Limitations

Permit limits and monitoring requirements for Whole Effluent Toxicity (WET) have been established in accordance with Division guidance (per WET Memo, 8/2/1999). Per WET guidance, all NPDES permits issued to Major facilities or any facility discharging "complex" wastewater (contains anything other than domestic waste) will contain appropriate WET limits and monitoring requirements, with several exceptions. The State has received prior EPA approval to use an Alternative WET Test Procedure in NPDES permits, using single concentration screening tests, with multiple dilution follow-up upon a test failure.

Describe proposed toxicity test requirement: This is a Major Industrial facility, and a chronic WET limit at 12.5% with quarterly frequency is established in the permit.

Mercury Statewide TMDL Evaluation

There is a statewide TMDL for mercury approved by EPA in 2012. The TMDL target was to comply with EPA's mercury fish tissue criteria (0.3 mg/kg) for human health protection. The TMDL established a wasteload allocation for point sources of 37 kg/year (81 lb/year), and is applicable to municipals and industrial facilities with known mercury discharges. Given the small contribution of mercury from point sources (~2% of total load), the TMDL emphasizes mercury minimization plans (MMPs) for point source control. Municipal facilities > 2 MGD and discharging quantifiable levels of mercury (>1 ng/l) will receive an MMP requirement. Industrials are evaluated on a case-by-case basis, depending if mercury is a pollutant of concern. Effluent limits may also be added if annual average effluent concentrations exceed the WQBEL value (based on the NC WQS of 12 ng/l) and/or if any individual value exceeds a TBEL value of 47 ng/l.

Describe proposed permit actions based on mercury evaluation: This is a new permit and the Division has no historic data to conduct a comprehensive evaluation. The RPA does not indicate the need for a limit and the effluent demonstrated compliance with the annual average Technology Based Effluent Limit for mercury of 47.0 ng/L. No limit is required but quarterly monitoring is recommended.

Other TMDL/Nutrient Management Strategy Considerations

If applicable, describe any other TMDLs/Nutrient Management Strategies and their implementation within this permit: N/A.

Other WQBEL Considerations

If applicable, describe any other parameters of concern evaluated for WQBELs:

The Technology Based Effluent Limits were the guiding criteria used to develop permit limitations for HFPO-DA, PFMOAA, and PMPA.

When EPA develops PFAS criteria or the State adopts standards for any of the compounds generated by Chemours, the Division will conduct a reasonable potential analysis and reopen the permit to include the new limits, if they are more stringent than the TBELs.

If applicable, describe any special actions (HQW or ORW) this receiving stream and classification shall comply with in order to protect the designated waterbody.

If applicable, describe any compliance schedules proposed for this permit renewal in accordance with 15A NCAC 2H.0107(c)(2)(B), 40CFR 122.47, and EPA May 2007 Memo.

If applicable, describe any water quality standards variances proposed in accordance with NCGS 143-215.3(e) and 15A NCAC 2B.0226 for this permit renewal: N/A.

7. Technology-Based Effluent Limitations (TBELs)

Describe what this facility produces: This is a surface/groundwater remediation permit for the Chemours facility that produces organic chemicals.

List the federal effluent limitations guideline (ELG) for this facility: N/A.

If the ELG is based on production or flow, document how the average production/flow value was calculated: N/A.

For ELG limits, document the calculations used to develop TBEL limits: N/A.

If any limits are based on best professional judgement (BPJ), describe development: N/A.

Document any TBELs that are more stringent than WQBELs: Initially, HFPO-DA and PFMOAA were chosen as the two PFAS compounds that would be used to indicate reductions of Total PFAS in the remediated surface water. As additional studies have been performed since the Consent Order, PMPA has been added as an indicator parameter since the laboratory experiments demonstrated its low affinity for GAC absorption. Therefore, TBELs for HFPO-DA, PFMOAA, and PMPA were calculated while recognizing the Consent Order's requirement that the treatment system removes at least 99% of HFPO-DA and PFMOAA.

The 99% removal is also consistent with the NPDES permitting procedure for establishing BAT for waste streams that don't have promulgated Effluent Guidelines.

The facility provided an Engineering Report on Wastewater Treatability. The Report demonstrated that the proposed Granular Activated Carbon (GAC) system is able to remove 99% of the total Table 3+ PFAS compounds (as listed in NPDES permit application) present in the wastewater based on current analytical reporting limits and influent concentrations. The GAC system showed that when indicator compounds PFMOAA, PMPA, and HFPO-DA are removed at the rate of 99%, the Total Table 3+ compounds (as listed in NPDES application) were also removed at the rate of 99% based on current analytical detection levels.

Data provided in the application showed dry weather baseflow to have influent concentrations for the two indicator parameters at 6.0 µg/L for HFPA-DA, 85 µg/L for PFMOAA, and 5.4 µg/L for PMPA. This was based on a single 24-hour composite influent sample. The dry weather flow (baseflow) will be treated utilizing three GAC units in series versus the typical two GAC unit in series to assure compliance with permit limitations. The lead GAC bed will be changed out when PFMOAA in the influent to the lead GAC unit equals PFMOAA effluent of the lead GAC unit. This will ensure full utilization of the carbon

bed. Chemours will test for PFMOAA between each GAC unit to determine when units need to be rotated or disposed because this compound's affinity to carbon is a bit less than HFPO-DA. This was tested out during Chemours' pilot scale study and a 99% reduction was maintained for all three compounds in the lag (or third) GAC bed effluent. In accordance with the Engineering Report, the expected effluent at 99% removal would be as follows:

HFPO-DA = (6.0 µg/L/100%) * 1% = 0.06 µg/L
PFMOAA = (85.0 µg/L/100%) * 1% = 0.85 µg/L
PMPA = (5.4 µg/L/100%) * 1% = 0.054 µg/L

Therefore, three limits will be placed on the PFAS indicator parameters in the new permit. First, HFPO-DA, PFMOAA, and PMPA TBELs of 0.06 µg/L, 0.85 µg/L, and 0.054 µg/L respectively. This is based on Chemours data provided in the application and pilot study.

In addition, and as required by the Consent Order, the treatment system will have to demonstrate 99% removal for HFPO-DA, PFMOAA, and PMPA based on monthly average concentration data.

$$\%\ Removal = \frac{Influent - Effluent}{Influent}$$

Where: Influent = monthly average influent concentration
Effluent = monthly average effluent concentration

This percent removal will be reported monthly with Chemours electronic Discharge Monitoring Report (eDMR) data. If the influent HFPO-DA or PFMOAA concentrations to the water treatment system are equal to or less than 200 ng/L and 500 ng/L, respectively, then the water treatment system effluent concentrations of less than the current reporting limits (2 ng/L and 5 ng/L, respectively) shall be considered as achieving 99% removal.

The addition of PMPA as an indicator parameter may require additional carbon treatment units and Chemours has committed to making the necessary improvements to the treatment system and complying with the PMPA technology based effluent permit limits by Jan. 31, 2021. All other limits are effective upon commencement of discharge. Furthermore, since these are technology based effluent limits, if appropriate, after 3 years of treatment system operation the division will evaluate effluent limits and adjust the limits if the analysis indicates an improved performance.

Document any TBELs that are less stringent than previous permit: N/A. This is a new permit.

8. Antidegradation Review (New/Expanding Discharge)

The objective of an antidegradation review is to ensure that a new or increased pollutant loading will not degrade water quality. Permitting actions for new or expanding discharges require an antidegradation review in accordance with 15A NCAC 2B.0201. Each applicant for a new/expanding NPDES permit must document an effort to consider non-discharge alternatives per 15A NCAC 2H.0105(c)(2). In all cases, existing instream water uses and the level of water quality necessary to protect the existing use is maintained and protected.

If applicable, describe the results of the antidegradation review, including the Engineering Alternatives Analysis (EAA) and any water quality modeling results: The facility provided an EAA to justify the

chosen disposal alternative for this new discharge; the complete EAA document can be found within the application in DWR's Laserfiche files.

The facility reviewed the following available alternatives: Connection to the Existing Publicly Owned Treatment Works (POTW), Land Application, Wastewater Reuse in the Facility, Trucking Offsite, and Direct Discharge.

Connection to the existing POTW was not available since the nearest Rockfish Creek Water Reclamation Facility refused to accept this wastewater. Reuse is currently not a feasible option, because, including but not limited to, - the Consent Order requires Chemours to accelerated reduction of PFAS contamination in the Cape Fear River and downstream water intakes within a two-year period, and it would be difficult for Chemours to implement this in an accelerated manner. Chemours may evaluate this alternative more closely in the future.

The Present Value Costs for the next 20 years was calculated for the following alternatives using an EPA discount factor of 3.5%; the Costs are presented below:

Land Application – $86,000,000
Wastewater Reuse in the Facility - $69,600,000 (includes riparian restoration; Concerns with this alternative include the riparian damage and distance from the capture dam to the facility)
Trucking Offsite - $8,710,000,000
Direct Discharge- $67,000,000

As compared to other alternatives, and in accordance with 15A NCAC 2H .0105(c)(2), the Engineering Alternatives Analysis provided justification for a direct discharge to surface water alternative and indicated that the direct discharge is the most environmentally sound alternative selected from all reasonably cost-effective options.

9. Antibacksliding Review

Sections 402(o)(2) and 303(d)(4) of the CWA and federal regulations at 40 CFR 122.44(l) prohibit backsliding of effluent limitations in NPDES permits. These provisions require effluent limitations in a reissued permit to be as stringent as those in the previous permit, with some exceptions where limitations may be relaxed (e.g., based on new information, increases in production may warrant less stringent TBEL limits, or WQBELs may be less stringent based on updated RPA or dilution).

Are any effluent limitations less stringent than previous permit (YES/NO): N/A. This is a new permit.

If YES, confirm that antibacksliding provisions are not violated: N/A.

10. Monitoring Requirements

Monitoring frequencies for NPDES permitting are established in accordance with the following regulations and guidance: 1) State Regulation for Surface Water Monitoring, 15A NCAC 2B.0500; 2) NPDES Guidance, Monitoring Frequency for Toxic Substances (7/15/2010 Memo); 3) NPDES Guidance, Reduced Monitoring Frequencies for Facilities with Superior Compliance (10/22/2012 Memo); 4) Best Professional Judgement (BPJ). Per US EPA (Interim Guidance, 1996), monitoring requirements are not considered effluent limitations under Section 402(o) of the Clean Water Act, and therefore anti-backsliding prohibitions would not be triggered by reductions in monitoring frequencies.

For instream monitoring, refer to Section 4.

11. Electronic Reporting Requirements

The US EPA NPDES Electronic Reporting Rule was finalized on December 21, 2015. Effective December 21, 2016, NPDES regulated facilities are required to submit Discharge Monitoring Reports (DMRs) electronically. Effective December 21, 2020, NPDES regulated facilities will be required to submit additional NPDES reports electronically. This permit contains the requirements for electronic reporting, consistent with Federal requirements.

12. Summary of Proposed Permitting Actions

Parameter	Current Permit	Proposed Change	Basis for Condition/Change
Flow	N/A (new permit)	MA 1.58 MGD	15A NCAC 2B .0505
BOD5	N/A (new permit)	MA 30.0 mg/L DM 45.0 mg/L	WQBEL. Based on protection of DO standard. 15A NCAC 2B.0200
TSS	N/A (new permit)	MA 30.0 mg/L WA 45.0 mg/L	TBEL. Best Professional Judgement.
Temperature	N/A (new permit)	The ambient water temperature to exceed 32°C	WQBEL. State WQ standard, 15A NCAC 2B .0200
DO	N/A (new permit)	Weekly upstream/downstream Monitoring Only	WQBEL. State WQ standard, 15A NCAC 2B .0200
HFPO-DA (GenX)	N/A (new permit)	MA 0.06 µg/L DM 0.06 µg/L	TBEL, based on the Consent Order and BPJ/BAT
PFMOAA	N/A (new permit)	MA 0.85 µg/L DM 0.85 µg/L	TBEL, based on the Consent Order and BPJ/BAT
PMPA	N/A (new permit)	MA 0.054 µg/L DM 0.054 µg/L	TBEL, based on the Consent Order and BPJ/BAT
PFAS compounds (Table 3+ and/or EPA Method 357 mod)	N/A (new permit)	Effluent and Intake Monitoring Only (variable frequencies)	Based on the Consent Order
pH	N/A (new permit)	6.0 – 9.0 SU	WQBEL. State WQ standard, 15A NCAC 2B .0200

Parameter	Current Permit	Proposed Change	Basis for Condition/Change
Total Phosphorus	N/A (new permit)	Monthly Effluent Monitoring Only	State WQ Rule, 15A NCAC 2B .0500
Conductivity	N/A (new permit)	Monthly upstream/downstream Monitoring Only	State WQ Rule, 15A NCAC 2B .0500
Toxicity Test	N/A (new permit)	Chronic limit, 12.5% effluent	WQBEL. No toxics in toxic amounts. 15A NCAC 2B.0200 and 15A NCAC 2B.0500
Total Hardness	N/A (new permit)	Quarterly Effluent Monitoring Only	State WQ standard, 15A NCAC 2B .0200
Total Selenium	N/A (new permit)	Quarterly Effluent Monitoring Only	State WQ standard, 15A NCAC 2B .0200
Total Silver	N/A (new permit)	MA 0.48 µg/L DM 2.01 µg/L	State WQ standard, 15A NCAC 2B .0200
Total Cobalt	N/A (new permit)	MA 23.9 µg/L DM 23.9 µg/L	State WQ standard, 15A NCAC 2B .0200
Total Cadmium	N/A (new permit)	Quarterly Effluent Monitoring Only	State WQ standard, 15A NCAC 2B .0200
Total Copper	N/A (new permit)	Quarterly Effluent Monitoring Only	State WQ standard, 15A NCAC 2B .0200
Total Cyanide	N/A (new permit)	Quarterly Effluent Monitoring Only	State WQ standard, 15A NCAC 2B .0200
Total Lead	N/A (new permit	Quarterly Effluent Monitoring Only	State WQ standard, 15A NCAC 2B .0200
Total Thallium	N/A (new permit)	Quarterly Effluent Monitoring Only	State WQ standard, 15A NCAC 2B .0200
Mercury	N/A (new permit)	Quarterly Effluent Monitoring Only	2012 State TMDL and NPDES Implementation Guidance.
Electronic Reporting	N/A (new permit)	Required	In accordance with EPA Electronic Reporting Rule 2015.

MGD – Million gallons per day, MA – Monthly Average, DM – Daily Max

13. Public Notice Schedule

Permit to Public Notice: xx/xx/2020

Per 15A NCAC 2H .0109 & .0111, The Division will receive comments for a period of 30 days following the publication date of the public notice. Any request for a public hearing shall be submitted to the Director within the 30 days comment period indicating the interest of the party filing such request and the reasons why a hearing is warranted.

14. NPDES Division Contact

If you have questions regarding any of the above information or on the attached permit, please contact Sergei Chernikov at (919) 707-3606 or via email at sergei.chernikov@ncdenr.gov.

15. Fact Sheet Attachments (if applicable)

- RPA Sheets
  - Input Sheet
  - Data Sheets
  - RPA Sheet
  - Dissolved to Total Metal Calculator Sheet
- NPDES Implementation of Instream Dissolved Metals Standards – Freshwater Standards
- Safety Data Sheets (SDSs) for the chemicals to be utilized at the wastewater treatment system

NPDES Implementation of Instream Dissolved Metals Standards – Freshwater Standards

The NC 2007-2015 Water Quality Standard (WQS) Triennial Review was approved by the NC Environmental Management Commission (EMC) on November 13, 2014. The US EPA subsequently approved the WQS revisions on April 6, 2016, with some exceptions. Therefore, metal limits in draft permits out to public notice after April 6, 2016 must be calculated to protect the new standards - as approved.

Table 1. NC Dissolved Metals Water Quality Standards/Aquatic Life Protection

Parameter	Acute FW, µg/l (Dissolved)	Chronic FW, µg/l (Dissolved)	Acute SW, µg/l (Dissolved)	Chronic SW, µg/l (Dissolved)
Arsenic	340	150	69	36
Beryllium	65	6.5	---	---
Cadmium	Calculation	Calculation	40	8.8
Chromium III	Calculation	Calculation	---	---
Chromium VI	16	11	1100	50
Copper	Calculation	Calculation	4.8	3.1
Lead	Calculation	Calculation	210	8.1
Nickel	Calculation	Calculation	74	8.2
Silver	Calculation	0.06	1.9	0.1
Zinc	Calculation	Calculation	90	81

Table 1 Notes:

1. FW= Freshwater, SW= Saltwater
2. Calculation = Hardness dependent standard
3. Only the aquatic life standards listed above are expressed in dissolved form. Aquatic life standards for Mercury and selenium are still expressed as Total Recoverable Metals due to bioaccumulative concerns (as are all human health standards for all metals). It is still necessary to evaluate total recoverable aquatic life and human health standards listed in 15A NCAC 2B.0200 (e.g., arsenic at 10 µg/l for human health protection; cyanide at 5 µg/L and fluoride at 1.8 mg/L for aquatic life protection).

Table 2. Dissolved Freshwater Standards for Hardness-Dependent Metals

The Water Effects Ratio (WER) is equal to one unless determined otherwise under 15A NCAC 02B .0211 Subparagraph (11)(d)

Metal	NC Dissolved Standard, µg/l
Cadmium, Acute	WER*{1.136672-[*ln* hardness](0.041838)} · *e*^{0.9151 [*ln* hardness]-3.1485}
Cadmium, Acute Trout waters	WER*{1.136672-[*ln* hardness](0.041838)} · *e*^{0.9151[*ln* hardness]-3.6236}
Cadmium, Chronic	WER*{1.101672-[*ln* hardness](0.041838)} · *e*^{0.7998[*ln* hardness]-4.4451}
Chromium III, Acute	WER*0.316 · *e*^{0.8190[*ln* hardness]+3.7256}
Chromium III, Chronic	WER*0.860 · *e*^{0.8190[*ln* hardness]+0.6848}
Copper, Acute	WER*0.960 · *e*^{0.9422[*ln* hardness]-1.700}

Copper, Chronic	WER*0.960 · *e*^{0.8545[*ln* hardness]-1.702}
Lead, Acute	WER*{1.46203-[*ln* hardness](0.145712)} · *e*^{1.273[*ln* hardness]-1.460}
Lead, Chronic	WER*{1.46203-[*ln* hardness](0.145712)} · *e*^{1.273[*ln* hardness]-4.705}
Nickel, Acute	WER*0.998 · *e*^{0.8460[*ln* hardness]+2.255}
Nickel, Chronic	WER*0.997 · *e*^{0.8460[*ln* hardness]+0.0584}
Silver, Acute	WER*0.85 · *e*^{1.72[*ln* hardness]-6.59}
Silver, Chronic	Not applicable
Zinc, Acute	WER*0.978 · *e*^{0.8473[*ln* hardness]+0.884}
Zinc, Chronic	WER*0.986 · *e*^{0.8473[*ln* hardness]+0.884}

General Information on the Reasonable Potential Analysis (RPA)

The RPA process itself did not change as the result of the new metals standards. However, application of the dissolved and hardness-dependent standards requires additional consideration in order to establish the numeric standard for each metal of concern of each individual discharge.

The hardness-based standards require some knowledge of the effluent and instream (upstream) hardness and so must be calculated case-by-case for each discharge.

Metals limits must be expressed as 'total recoverable' metals in accordance with 40 CFR 122.45(c). The discharge-specific standards must be converted to the equivalent total values for use in the RPA calculations. We will generally rely on default translator values developed for each metal (more on that below), but it is also possible to consider case-specific translators developed in accordance with established methodology.

RPA Permitting Guidance/WQBELs for Hardness-Dependent Metals - Freshwater

The RPA is designed to predict the maximum likely effluent concentrations for each metal of concern, based on recent effluent data, and calculate the allowable effluent concentrations, based on applicable standards and the critical low-flow values for the receiving stream.

If the maximum predicted value is greater than the maximum allowed value (chronic or acute), the discharge has reasonable potential to exceed the standard, which warrants a permit limit in most cases. If monitoring for a particular pollutant indicates that the pollutant is not present (i.e. consistently below detection level), then the Division may remove the monitoring requirement in the reissued permit.

1. To perform a RPA on the Freshwater hardness-dependent metals the Permit Writer compiles the following information:
    - Critical low flow of the receiving stream, 7Q10 (the spreadsheet automatically calculates the 1Q10 using the formula 1Q10 = 0.843 (s7Q10, cfs) $^{0.993}$
    - Effluent hardness and upstream hardness, site-specific data is preferred
    - Permitted flow

- Receiving stream classification

2. In order to establish the numeric standard for each hardness-dependent metal of concern and for each individual discharge, the Permit Writer must first determine what effluent and instream (upstream) hardness values to use in the equations.

   The permit writer reviews DMR's, Effluent Pollutant Scans, and Toxicity Test results for any hardness data and contacts the Permittee to see if any additional data is available for instream hardness values, upstream of the discharge.

   If no hardness data is available, the permit writer may choose to do an initial evaluation using a default hardness of 25 mg/L (CaCO3 or (Ca + Mg)). Minimum and maximum limits on the hardness value used for water quality calculations are 25 mg/L and 400 mg/L, respectively.

   If the use of a default hardness value results in a hardness-dependent metal showing reasonable potential, the permit writer contacts the Permittee and requests 5 site-specific effluent and upstream hardness samples over a period of one week. The RPA is rerun using the new data.

   The overall hardness value used in the water quality calculations is calculated as follows:

   Combined Hardness (chronic)

   $$= \frac{\text{(Permitted Flow, cfs *Avg. Effluent Hardness, mg/L) + (s7Q10, cfs *Avg. Upstream Hardness, mg/L)}}{\text{(Permitted Flow, cfs + s7Q10, cfs)}}$$

   The Combined Hardness for acute is the same but the calculation uses the 1Q10 flow.

3. The permit writer converts the numeric standard for each metal of concern to a total recoverable metal, using the EPA Default Partition Coefficients (DPCs) or site-specific translators, if any have been developed using federally approved methodology.

   EPA default partition coefficients or the "Fraction Dissolved" converts the value for dissolved metal at laboratory conditions to total recoverable metal at in-stream ambient conditions. This factor is calculated using the linear partition coefficients found in *The Metals Translator: Guidance for Calculating a Total Recoverable Permit Limit from a Dissolved Criterion* (EPA 823-B-96-007, June 1996) and the equation:

   $$\frac{C_{diss}}{C_{total}} = \frac{1}{1 + \{ [K_{po}] [ss^{(1+a)}] [10^{-6}] \}}$$

   Where:

   ss = in-stream suspended solids concentration [mg/l], minimum of 10 mg/L used,

4. The numeric standard for each metal of concern is divided by the default partition coefficient (or site-specific translator) to obtain a Total Recoverable Metal at ambient conditions.

   In some cases, where an EPA default partition coefficient translator does not exist (ie. silver), the dissolved numeric standard for each metal of concern is divided by the EPA conversion factor to obtain a Total Recoverable Metal at ambient conditions. This method presumes that the metal is dissolved to the same extent as it was during EPA's criteria development for metals. For more information on conversion factors see the June, 1996 EPA Translator Guidance Document.

5. The RPA spreadsheet uses a mass balance equation to determine the total allowable concentration (permit limits) for each pollutant using the following equation:

$$Ca = \frac{(s7Q10 + Qw)\ (Cwqs) - (s7Q10)\ (Cb)}{Qw}$$

   Where: Ca = allowable effluent concentration (µg/L or mg/L)

   Cwqs = NC Water Quality Standard or federal criteria (µg/L or mg/L)

   Cb = background concentration: assume zero for all toxicants except NH_3* (µg/L or mg/L)

   Qw = permitted effluent flow (cfs, match s7Q10)

   s7Q10 = summer low flow used to protect aquatic life from chronic toxicity and human health through the consumption of water, fish, and shellfish from noncarcinogens (cfs)

   * Discussions are on-going with EPA on how best to address background concentrations

   Flows other than s7Q10 may be incorporated as applicable:

   1Q10 = used in the equation to protect aquatic life from acute toxicity

   QA = used in the equation to protect human health through the consumption of water, fish, and shellfish from carcinogens

   30Q2 = used in the equation to protect aesthetic quality

6. The permit writer enters the most recent 2-3 years of effluent data for each pollutant of concern. Data entered must have been taken within four and one-half years prior to the date of the permit application (40 CFR 122.21). The RPA spreadsheet estimates the 95th percentile upper concentration of each pollutant. The Predicted Max concentrations are compared to the Total allowable concentrations to determine if a permit limit is necessary. If the predicted max exceeds the acute or chronic Total allowable concentrations, the discharge is considered to show reasonable potential to violate the water quality standard, and a permit limit (Total allowable concentration) is included in the permit **in accordance with the U.S. EPA Technical Support Document for Water Quality-Based Toxics Control published in 1991.**

7. When appropriate, permit writers develop facility specific compliance schedules in accordance with the EPA Headquarters Memo dated May 10, 2007 from James Hanlon to Alexis Strauss on 40 CFR 122.47 Compliance Schedule Requirements.

8. The Total Chromium NC WQS was removed and replaced with trivalent chromium and hexavalent chromium Water Quality Standards. As a cost savings measure, total chromium data results may be used as a conservative surrogate in cases where there are no analytical results based on chromium III or VI. In these cases, the projected maximum concentration (95th %) for total chromium will be compared against water quality standards for chromium III and chromium VI.

9. Effluent hardness sampling and instream hardness sampling, upstream of the discharge, are inserted into all permits with facilities monitoring for hardness-dependent metals to ensure the accuracy of the permit limits and to build a more robust hardness dataset.

10. Hardness and flow values used in the Reasonable Potential Analysis for this permit included:

Parameter	**Value**	**Comments (Data Source)**
Average Effluent Hardness (mg/L) [Total as, $CaCO_3$ or (Ca+Mg)]	25.0	Default value
Average Upstream Hardness (mg/L) [Total as, $CaCO_3$ or (Ca+Mg)]	25.0	Default value
7Q10 summer (cfs)	17.14	CORMIX model, 8:1dilution
1Q10 (cfs)	14.16	RPA calculation
Permitted Flow (MGD)	1.58	Design flow of treatment system