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# CAPE FEAR RIVER PFAS MASS LOADING ASSESSMENT - FIRST QUARTER 2021 REPORT

## Chemours Fayetteville Works

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| | |
|---|---|
| CAP | Corrective Action Plan |
| cfs | cubic feet per second |
| CFR-TARHEEL | Cape Fear River at Tar Heel Ferry Road Bridge |
| CO | Consent Order |
| CO Addendum | Addendum to Consent Order Paragraph 12 |
| DVM | Data Verification Module |
| kg | kilograms |
| mg/s | milligrams per second |
| $MT^{-1}$ | mass per unit time |
| ng/L | nanograms per liter |
| NCDEQ | North Carolina Department of Environmental Quality |
| PFAS | pe- and polyfluoroalkyl substances |
| PFHpA | perfluoroheptanoic acid |
| Q1 | first quarter |
| Q2 | second quarter |
| Q3 | third quarter |
| Q4 | fourth quarter |
| RPD | relative percent difference |
| SOP | standard operating procedure |
| USGS | United States Geological Survey |

# 1 INTRODUCTION AND OBJECTIVES

Geosyntec Consultants of NC, P.C. (Geosyntec) has prepared this Cape Fear River PFAS Mass Loading Assessment report for The Chemours Company, FC, LLC (Chemours). Chemours operates the Fayetteville Works facility in Bladen County, North Carolina (the Site). This report provides monitoring and assessment results pursuant to the requirements of Paragraphs 1(a) and 1(b) of the Addendum to Consent Order Paragraph 12 (CO Addendum) and Paragraph 16 of the executed Consent Order (CO) dated 25 February 2019 among the North Carolina Department of Environmental Quality (NCDEQ), Cape Fear River Watch, and Chemours.

The purpose of this report is to describe the first quarter 2021 (Q1 2021) PFAS Mass Loading Assessment of the Cape Fear River based on the findings of surface water, river water, and groundwater samples collected at and surrounding the Site. This is the seventh assessment done since Q1 2020. Data collected were used to assess mass loading of total per- and polyfluoroalkyl substances (PFAS) to the Cape Fear River. Total PFAS is a term used to refer to PFAS detected in the environment for those PFAS compounds listed in Table 1 and analyzed by the Table 3+ standard operating procedure (SOP) analytical method.

There are two primary objectives for this report:

1. To assess Cape Fear River PFAS mass loads. Specifically:
    a. Mass loads measured in the Cape Fear River.
    b. Mass loads prevented from reaching the Cape Fear River by implemented remedies.
    c. The total mass load to the Cape Fear River, i.e., the sum of the two quantities above.
2. To assess the relative PFAS loadings from the different PFAS transport pathways to the Cape Fear River during the reporting period[1] using the Mass Loading Model.

The CO Addendum requires sampling the Cape Fear River for PFAS compounds listed in Attachment C of the CO (Cape Fear River Mass Loading Calculation Protocol

[1] Starting in December 2020, Chemours commenced monthly sampling of the mass loading model pathways as per CO Paragraph 1(b) and the associated protocol document Cape Fear River Mass Loading Calculation Protocol Version 2 (Geosyntec 2020d). Monthly sampling of these pathways will be conducted for one year and thereafter on a quarterly basis for the next four years.

Version 2, Geosyntec 2020d). Accordingly, this report contains data from January 2021 through March 2021, and mass loading calculations and reporting are done on the set of PFAS compounds listed in Table 1, i.e., both "Table 3+" and "Attachment C".

The remainder of this report is organized as follows:

- **Scope** – This section describes the sampling programs performed in Q1 2021.
- **PFAS Mass Load to Cape Fear River** – This section describes the assessments of Cape Fear River PFAS Mass Loads.
- **Cape Fear River PFAS Mass Loading Model** – This section describes the assessment of the relative mass loading from the various PFAS transport pathways.
- **Summary** – This section summarizes report findings.

# 2 SCOPE

The Q1 2021 sampling was completed by Parsons of NC (Parsons) and Geosyntec from January through March 2021. The scope of the sampling programs is summarized below, and complete descriptions of the field methods can be found in Appendix A.

## 2.1 Sampling Activities in Q1 2021

Q1 2021 (January to March 2021) sampling activities included:

1. The Cape Fear River PFAS Mass Load Sampling Program consisted of collecting twice weekly composite samples at Cape Fear River at Tar Heel Ferry Road Bridge (CFR-TARHEEL).
2. The Cape Fear River PFAS Mass Loading Model Sampling Program event which consisted of the following:
    a. Collecting three synoptic rounds of groundwater elevations from select on and offsite monitoring wells.
    b. Collecting water samples for PFAS from 19 onsite and offsite monitoring wells[2].
    c. Collecting seep, surface water, and river water samples for PFAS.

[2] Bladen-1D (damaged) and PW-11 (being pumped as part of the Pre-design Investigation activities) could not be sampled in Q1 2021.

d. Measuring flow rates at specified seep and surface water locations.

Each program is described in further detail below.

## 2.2 Cape Fear River PFAS Mass Load Sampling Program

The Cape Fear River PFAS Mass Load Sampling Program consists of collecting twice weekly composite samples from the sampling location at CFR-TARHEEL, approximately 7 miles downstream of the Site (Figure 2). This location is situated downstream of the Site such that water from the seeps, onsite groundwater, Outfall 002, Old Outfall 002 and Georgia Branch Creek are well mixed in the river.

Composite samples were collected using an autosampler and were generally composited over 24 hours with aliquots collected at one-hour intervals yielding seven samples per week. Two samples per week were selected based on sample completeness and sent for analysis. Collected samples were evaluated for the PFAS compounds listed in Table 1.

Interruptions to the sampling program may occur due to events such as vandalism, equipment malfunction or a high river stage, which will flood the platform and necessitates sampler removal. During interruptions, field protocol is to collect a grab sample from the river twice per week at the CFR-TARHEEL location to continue establishing a record of river concentrations over time.

During the reporting period between January 1, 2021 and March 31, 2021, high river stages were recorded for 43 out of 89 total days. This resulted in 14 grab samples and 18 composite samples collected over the reporting period. The following provides further details on the interruptions that occurred in the scheduled sampling program:

- January 1, 2021 to January 21, 2021 – High river stage was experienced at the sampling location between these dates necessitating the removal of the autosampler to prevent damage. Instead, seven grab sampling events were conducted on January 6, 7, 11 and 14, 2021.
- January 28, 2021 to March 5, 2021 – High river stage was experienced at the sampling location between these dates necessitating the removal of the autosampler to prevent damage. Instead, seven grab sampling events were conducted on February 1, 4, 8, 16, 19, 22, 24 and 25 2021.

The data collected from the PFAS Mass Load Sampling Program were used to estimate PFAS mass load in the Cape Fear River using concentrations from the CFR-TARHEEL location and flows as reported by the United States Geological Survey (USGS) river gauging station at the W.O. Huske Dam (Figure 2). Details of the sample collection methods, flow measurement methods, and calculation methods were reported in the *Cape*

*Fear River PFAS Mass Loading Calculation Protocol Version 2* (Geosyntec, 2020d). Mass load calculations are provided in Section 3 and sampling results are presented in Appendix A.

## 2.3 Cape Fear River PFAS Mass Loading Model Sampling Program

The Mass Loading Model Sampling Program for this reporting period consisted of collecting concentration and flow data from the various PFAS transport pathways in January 2021, February 2021 and March 2021. Environmental media sampled include surface water (seeps, creeks, Old Outfall, Outfall 002, and Cape Fear River) and groundwater. Surface and river water sampling and flow gauging locations for the Q1 2021 Events are shown on Figures 4A, 4B, 4C and 5 and listed in Table 2. Groundwater sampling locations for the Q1 2021 Events are shown on Figure 6 and listed in Table 3. Collected samples were evaluated for the PFAS compounds listed in Table 1.

Due to high river flows and above average precipitation[3] during Q1 2021, samples and flows were collected at alternate surface water locations as close as possible to the designated location. These alternate locations are noted in Figures 4A, 4B, 4C and Table 2.

The data collected from these Q1 2021 field activities were then incorporated into the Mass Loading Model to estimate PFAS mass discharge from the nine potential transport pathways to the Cape Fear River (Figure 3), as identified in the Conceptual Site Model (Geosyntec, 2019b) and discussed in more detail in Section 4. These Mass Loading Model estimates were compared to mass loading observed downstream at CFR-TARHEEL.

Details of the sample collection methods, flow measurement methods, and calculation methods were reported in the *Cape Fear River PFAS Mass Loading Calculation Protocol Version 2* (Geosyntec, 2020d). Mass Loading Model results are provided in Section 4.2 and sampling results are presented in Appendix A.

## 2.4 Laboratory Analyses

Samples were analyzed for PFAS by Table 3+ Laboratory SOP. The focus of this report is on the set of PFAS originating from manufacturing activities at the Site; therefore, results of sampling activities and assessments of mass loading were performed and

[3] USGS rain gauge 02105500 indicated approximately 1.5, 0.20, and 0.25 inches of precipitation during the January, February, and March 2021 sample collection events, respectively.

presented with respect to the PFAS groupings presented in Table 1: (i) Attachment C, (ii) Table 3+ (17 compounds)[4], and (iii) Table 3+ (20 compounds).

For clarity, the text, tables and figures of this report describe the Total Table 3+ (17 compounds), though the report tables also include results for Total Attachment C and Total Table 3+ (20 compounds).

The calculations for Total Attachment C PFAS concentrations include the fluoroether PFAS on the Attachment C list, i.e., excludes perfluoroheptanoic acid (PFHpA). As presented in the Cape Fear River PFAS Mass Loading Assessment – Third Quarter 2020 Report (Geosyntec, 2020e), the presence of PFHpA upstream and offsite are unrelated to the Site and is already present in the upstream river from other sources and is therefore excluded from the attachment C sum. This represents a modification to the *Cape Fear River PFAS Mass Loading Calculation Protocol Version 2* submitted to NCDEQ on November 18, 2020 (Geosyntec, 2020d).

## 3 PFAS MASS LOAD TO CAPE FEAR RIVER

This section presents results of the Cape Fear River PFAS mass loads for the present Q1 2021 reporting period of January 1, 2021 to March 31, 2021. Specifically, this section discusses three types of mass loads defined in Equation 1.

***Equation 1: Total PFAS Mass Load***

$$M_{CFR} = m_{CFR} + m_{Remedies}$$

where,

$M_{CFR}$ = is the Mass Load of PFAS compounds in the Cape Fear River, including the mass load prevented from reaching the Cape Fear River by implemented remedies, measured in kilograms (kg).

$m_{CFR}$ = is the In-River Mass Load estimated using PFAS concentrations in samples taken in the Cape Fear River downstream of the Site where the river is well mixed and using measured river flow volumes.

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[4] As reported in the *Matrix Interference During Analysis of Table 3+ Compounds* memorandum (Geosyntec, 2020a), matrix interference studies conducted by the analytical laboratory (TestAmerica, Sacramento) have shown that the quantitation of three compounds (R-PSDA, Hydrolyzed PSDA, and R-EVE) is inaccurate due to interferences by the sample matrix in both groundwater and surface water. Total Table 3+ PFAS concentrations are calculated and presented two ways in this report: (i) summing over 17 of the 20 Table 3+ compounds "Total Table 3+ (17 compounds)", i.e., excluding results of R-PSDA, Hydrolyzed PSDA, and R-EVE, and (ii) summing over 20 of the Table 3+ compounds "Total Table 3+ (20 compounds)"

$m_{Remedies}$ = is the Captured Mass Load prevented from reaching the Cape Fear River by remedies implemented by Chemours.

Remedies that have been implemented by Chemours through Q1 2021[5] include:

- Old Outfall 002 treatment system (October 1, 2020)
- Seep C flow through cell (December 16, 2020)

Both remedies prevent PFAS mass loads from reaching the Cape Fear River and were quantified in the $m_{Remedies}$ term of Equation 1. The specific methodology for estimating the prevented mass per remedy was developed on a per remedy basis and details of these calculations are provided in the *Cape Fear River PFAS Mass Loading Calculation Protocol Version 2* (Geosyntec, 2020d). The goal of such calculations was to estimate the Total PFAS mass diverted from reaching the Cape Fear River by the remedy that would have otherwise reached the Cape Fear River.

## 3.1 Q1 2021 Total PFAS Mass Load

During the Q1 2021 reporting period, the Total Table 3+ mass load in the Cape Fear River, including the mass load prevented from reaching the Cape Fear River by implemented remedies, was estimated to be 122.5 kg (Tables 4, 5A, 5B, and 5C). The total in-river mass load was estimated to be 93.8 kg, and the total remedy captured load was 28.7 kg.

The total measured and estimated in-river mass load (122.5 kg) was based on the 43 mass loading estimation intervals presented in Table 5A. The total measured and estimated mass load captured by remedies implemented by Chemours (28.7 kg) was based on the concentrations in samples collected at the influent and effluent (as reported in Appendix A) and measured flows at the Old Outfall 002 treatment system and the Seep C flow through cell (Tables 5B and 5C).

For the Old Outfall 002 treatment system, a total of 23.4 kg was captured and prevented from reaching the Cape Fear River. This estimate was based on three mass loading estimation intervals between January 1, 2021 and March 31, 2021 (Table 5B). For the Seep C flow through cell, a total of 5.4 kg was captured and prevented from reaching the

[5] There have been numerous other interim and permanent actions taken to limit PFAS reaching the Cape Fear River prior to Q1 2021, i.e., air abatement measures (installation of the thermal oxidizer and carbon beds, etc.), grouting of the terracotta pipe, sediment removal from onsite channels, among others, and these may not be captured in these captured mass load calculations but should be considered in the overall assessment of PFAS reductions.

Cape Fear River. This estimate was based on 6 mass loading estimation intervals between January 1, 2021 and March 31, 2021 (Table 5C).

The in-river Total PFAS mass discharges calculated from samples collected in Q1 2021 are provided in Table 6, while those from previous quarters are presented in Appendix A. For Q1 2021, the Total Table 3+ mass discharge among samples with detected Total Table 3+ PFAS concentrations ranged from 3.7 milligrams per second (mg/s) (CFR-TARHEEL-010721) to 36 mg/s (CAP0221-CFR-TARHEEL-022421).

The plots of Total Table 3+ concentrations over time are presented in Figure 7 and indicate that, generally, concentrations in the Cape Fear River are inversely correlated to river flow rate. That is, concentrations were higher when flow rates were lowest, while concentrations were lower when river flow rates were higher. This trend is consistent with higher river flow volumes diluting Table 3+ mass discharge into the river. Higher river flows lead to a greater volume of water that the mass loads are distributed over leading to a lower concentration value.

The plots of Total Table 3+ mass discharge since the beginning of the sampling program (March 28, 2020) are shown on Figure 8. Similar to the Q1 2021 mass discharges, the range of mass discharge across all samples with detected concentrations of Table 3+ PFAS was 2.7 mg/s (CFR-TARHEEL-9-100620) to 50.7 mg/s (CFR-TARHEEL-20-111220), though the mass discharges are typically between 5 and 20 mg/s with approximately 86% of the data falling within this range.

## 3.2 Mass Discharge at Bladen Bluffs, Tar Heel Ferry Road Bridge and Kings Bluff Intake Canal

The Total Table 3+ concentrations and mass discharge values from the Q1 2021 events are shown in the table below. Total Table 3+ concentrations at the three downstream river locations ranged from 14 ng/L (CFR-BLADEN, CFR-TARHEEL) to 94 ng/L (CFR-TARHEEL)..

The Total Table 3+ mass discharge ranged from 4.4 mg/s (CFR-BLADEN in January 2021) to 24.4 mg/s (CFR-KINGS in January 2021). In previous assessments, CFR-KINGS is sampled approximately three days after CFR-TARHEEL and CFR-BLADEN to account for travel time between these two locations and CFR-KINGS. During the Q1 2021 events, CFR-KINGS was sampled before the three days due to rising river levels and rain events constraining field sampling activities. This sample collection change may contribute to the difference in mass discharges observed between CFR-KINGS and the other two locations. Additionally, there is inherent variability associated with river sample collection due to changing flow rates, precipitation, sample collection location, and grab sampling methods.

| Sample Location | Sample Collection Date | Flow Rate (cfs) | Total Table 3+ | |
|---|---|---|---|---|
| | | | Concentration (ng/L) | Mass Discharge (mg/s) |
| CFR-BLADEN | 01/26/2021 | 4,960 | 31 | 4.4 |
| CFR-TARHEEL | 01/26/2021 | 4,910 | 94 | 13.1 |
| CFR-KINGS | 01/28/2021 | 11,200 | 77 | 24.4 |
| CFR-BLADEN | 02/24/2021 | 17,000 | 17 | 8.2 |
| CFR-TARHEEL | 02/24/2021 | 16,900 | 26 | 12.4 |
| CFR-KINGS | 02/25/2021 | 20,900 | 30 | 17.8 |
| CFR-BLADEN | 03/29/2021 | 14,000 | 14 | 5.6 |
| CFR-TARHEEL | 03/29/2021 | 14,000 | 14 | 5.6 |
| CFR-KINGS | 03/30/2021 | 14,200 | 24 | 9.7 |

# 4 CAPE FEAR RIVER PFAS MASS LOADING MODEL

Where Section 3 presented the Total Table 3+ PFAS mass load in the Cape Fear River, this section presents an analysis evaluating the relative loadings from the identified PFAS transport pathways to the observed in-river PFAS mass discharge. This evaluation supports remediation planning to reduce the PFAS loading from the Transport Pathways to the Cape Fear River. This evaluation was performed using the Mass Loading Model. The following subsections describe the transport pathways and the results of the Mass Loading Model assessment, including the sensitivity and the limitations of the Mass Loading Model.

## 4.1 PFAS Mass Loading Model Pathways

The nine potential pathways representing compartments to the PFAS Mass Loading Model are briefly described below and described in more detail in the *Cape Fear River PFAS Mass Loading Calculation Protocol Version 2* (Geosyntec, 2020d). The following pathways were identified as potential contributors of PFAS to the river PFAS concentrations:

- **Transport Pathway 1**: Upstream Cape Fear River and Groundwater – This pathway is comprised of contributions from non-Chemours related PFAS sources on the Cape Fear River and tributaries upstream of the Site, and upstream offsite groundwater with PFAS present from aerial deposition.
- **Transport Pathway 2**: Willis Creek – Groundwater and stormwater discharge and aerial deposition to Willis Creek and then to the Cape Fear River.
- **Transport Pathway 3**: Direct aerial deposition of PFAS on the Cape Fear River (see Appendix H for further details).

- **Transport Pathway 4**: Outfall 002 – Comprised of (i) water drawn from the Cape Fear River and used as non-contact cooling water, (ii) treated non-Chemours process water, (iii) Site stormwater, (iv) steam condensate, and (v) power neutralization discharge, which are then discharged through Outfall 002.
- **Transport Pathway 5**: Onsite Groundwater – Direct upwelling of onsite groundwater to the Cape Fear River from the Black Creek Aquifer (see Appendix G for further details).
- **Transport Pathway 6**: Seeps – Onsite groundwater seeps A, B, C and D and offsite Lock and Dam Seep above the Cape Fear River water level on the bluff face from the facility that discharge into the Cape Fear River.
- **Transport Pathway 7**: Old Outfall 002 – Groundwater discharge to Old Outfall 002 and stormwater runoff that flows into the Cape Fear River.
- **Transport Pathway 8**: Adjacent and Downstream Offsite Groundwater – Offsite groundwater adjacent and downstream of the Site upwelling to the Cape Fear River (see Appendix I for further details).
- **Transport Pathway 9**: Georgia Branch Creek – Groundwater, stormwater discharge and aerial deposition to Georgia Branch Creek and then to the Cape Fear River.
- For the Q1 2021 Mass Loading Model assessments, data sources used as model inputs for each potential pathway are described in Table 7. These data sources included flow measurements, water levels and analytical results from the Q1 2020 sampling events (as discussed in Appendix A) and supplemental data provided in Appendices B, E, and F.

## 4.2 Mass Loading Model Results

For each monthly sampling event, the Total PFAS mass discharges are summarized in Tables 8A, 8B, 9A, 9B, 10A, and 10B. Analyte-specific mass discharges estimated from the Mass Loading Model and measured at CFR-TARHEEL are provided in Appendix A. A comparison of relative contributions per pathway for the Q1 MLM assessments is provided in Table 11.

### 4.2.1 Reductions in Modeled Mass Discharge

The model-estimated Before Remedies and After Remedies Total PFAS mass discharge values from the Q1 2021 monthly events are provided in Tables 8A, 8B, 9A, 9B, 10A, and 10B. The reduction in Total Table 3+ mass discharges after remedies is summarized

in the table below. The mass discharges across the months are similar and relatively stable. Additionally, the operation of the Old Outfall 002 treatment system and Seep C flow through cell was effective at reducing the Total Table 3+ mass discharge, which ranged from 2.7 to 3.6 mg/s across the three months. More specifically, the reductions of mass discharge from Old Outfall 002 ranged from 2.1 mg/s to 3.0 mg/s, while the reduction from Seep C ranged from 0.24 mg/s to 0.64 mg/s. The variability in reductions at the Old Outfall and Seep C are expected due to variability in influent flows and concentrations. For example, at Seep C, the difference in reduction in February compared to January and March is due to the lower concentrations observed at the influent of the flow through cell (47,000 ng/L compared to 150,000 ng/L).

| Pathway | After Remedies Reduction in Model-Estimated Total Table 3+ Mass Discharge (mg/s) | | |
|---|---|---|---|
| | Jan-21 | Feb-21 | Mar-21 |
| All Pathways | **3.6** | **2.8** | **2.7** |
| Old Outfall 002 | **3.0** | **2.6** | **2.1** |
| Seep C | **0.62** | **0.24** | **0.63** |

### 4.2.2 Modeled versus Measured Mass Discharge

The model-estimated After Remedies Total Table 3+ mass discharge values were compared to the measured mass discharge at CFR-TARHEEL shown in the table below (Tables 8B, 9B, and 10B). The ranges in the lower and upper bounds for the modeled mass discharge estimates are not wide and generally within 1.0 mg/s. The measured mass discharges at CFR-TARHEEL was higher than the modeled estimates in January and February 2021 and lower than the modeled estimate in March 2021. However, when compared to the measured mass discharges within a month, the model estimates fall within the range observed at CFR-TARHEEL (Figure 9; top plot).

Further, when the model-estimated mass discharges were used to estimate the Total Table 3+ river concentrations, the modeled concentrations showed a good fit and tracks closely to the trends in the observed Total Table 3+ concentrations measured at CFR-TARHEEL (Figure 9; bottom plot). Therefore, despite the discrepancies between model and measured mass discharges for the one snap-shot in time, overall the model shows good agreement with the measured concentrations at CFR-TARHEEL during Q1 2021.

Nonetheless, several hypotheses are being explored to better understand the differences between modeled and measured mass discharge and are further discussed in Section 4.3.

### 4.2.3 Relative Contributions by Pathway

The relative contributions per pathway for the Q1 2021 MLM assessments is provided in Table 11. The most significant pathways continue to be the Seeps (approximately 35% to 45%) and Onsite Groundwater (approximately 15% to 30%) for the three monthly events, which is consistent with previous events (Geosyntec, 2020b; Geosyntec, 2020c; Geosyntec, 2020e; Geosyntec, 2020f). Previous assessments showed that Old Outfall 002 was also a significant contributor; however, the Q1 2021 average contribution was reduced from 25% to 7% with the implementation of the treatment system. Remedy implementation at Seep C has also reduced the Q1 2021 average contribution of the Seeps from 42% to 38%. The combined reductions from the Seeps are expected to increase throughout 2021 after the installation of the flow through cells at Seeps A, B, and D.

## 4.3 Mass Loading Model Sensitives

As described in previous Cape Fear River PFAS Mass Loading Assessment reports (Geosyntec, 2020b; Geosyntec, 2020c; Geosyntec, 2020e), the Mass Loading Model is a suitable tool to evaluate which PFAS transport pathways are significant contributors of mass to the Cape Fear River, but the results of the model either under or overestimate the mass discharge observed in the Cape Fear River. These discrepancies are being evaluated via a series of hypotheses as outlined in the second quarter 2020 (Q2 2020) report (Geosyntec, 2020c). In general, and as described in the following subsections, these hypotheses relate to the (i) inherent variability in input parameters and (ii) the effect of higher levels of precipitation and river flows on flow measurement, sample collection methods, and analytical results. With one year of twice weekly data now available from the CFR-TARHEEL sampling location, Chemours is assessing these hypotheses with the data collected over the past year from all pathways. Future quarterly reports will provide an update on the evaluation of these hypotheses.

### 4.3.1 Variability in Input Parameters

The Mass Loading Model assessments provide PFAS mass discharge estimates and relative proportions of loadings for a ‘snapshot’ in time. While controlling for temporal variability, the model-based mass discharge estimates contain some level of uncertainty due to the inherent variability and measurement error in the input parameters, e.g., flow, concentrations, etc. To better understand the sensitivity of the model to the various pathway-specific input parameters, the uncertainties associated with the input parameters were used to conduct a sensitivity analysis in the Q1 2020 report (Geosyntec, 2020b). An updated sensitivity analysis will be conducted using the data collected over the past year.

### 4.3.2 River Flows and Precipitation

The Q4 2020 and Q1 2021 sampling events were associated with higher river flows due to above average levels of precipitation. This Q4 2020 assessment was the first wet event in 2020 and the total flow volume recorded in Q4 2020 (4,100 MG) was much higher than that recorded in previous events and this trend continued in Q1 2021. As such, the mass discharge estimates could potentially be more sensitive to this increase in flow, particularly in the river samples (e.g., CFR-TARHEEL). These sensitivities to the changes in river conditions will be studied further using data collected over the past year to better characterize the effect these varying conditions on river concentrations.

## 5 SUMMARY

Two sampling programs were conducted in Q1 2021:

- The PFAS Mass Load Sampling program consisting of 24 composite samples and 14 grab samples collected at the Tar Heel Ferry Road Bridge. The analytical results of these samples were used to calculate the in-river PFAS mass loads in the Cape Fear River during the reporting period and to calculate the Baseline Mass Load.
- The Q1 2021 PFAS Mass Loading Model Sampling program consisting of three monthly sampling events collected water samples from the PFAS transport pathways (seeps, creeks, Old Outfall, Outfall 002, groundwater and Cape Fear River) and paired water flow measurements and estimates. These data were used to assess the relative loadings per transport pathway to the Cape Fear River using the PFAS Mass Loading Model.

The Cape Fear River PFAS Mass Load assessment estimated the Total PFAS that was either discharged or prevented from being discharged to the Cape Fear River over the load assessment period of December 30, 2020 to March 31, 2021. Over this period, the Total PFAS mass load in the Cape Fear River, including the mass load prevented from reaching the Cape Fear River by implemented remedies, was 122.5 kg, where 93.8 kg was the in-river mass load measured at CFR-TARHEEL and 28.7 kg was the mass load prevented from reaching the Cape Fear River due to the installation of remedies at Old Outfall 002 and at Seep C. As additional remedies are implemented at the Site greater quantities of mass will be prevented from reaching the Cape Fear River.

The Cape Fear River Mass Loading Model assessments showed that model estimates were relatively consistent are in good agreement with the monthly trends at observed at CFR-TARHEEL. In fact, when the model-estimated mass discharges were used to estimate the Total Table 3+ river concentrations, the modeled concentrations showed a

good fit and tracks closely to the trends in the observed Total Table 3+ concentrations measured at CFR-TARHEEL during Q1 2021. Overall, reductions in model-estimated mass discharges ranged from 2.7 mg/s to 3.6 mg/s with the implementation of the treatment system at the Old Outfall and the flow through cell at Seep C.

The measured mass discharges at CFR-TARHEEL was higher than the modeled estimates in January and February 2021 and lower than the modeled estimate in March 2021. However, when compared to the measured mass discharges within a month, the model estimates show good agreement with the trends at CFR-TARHEEL (Figure 9; top plot).

In terms of relative contributions, the most significant pathways continue to be the Seeps (Transport Pathway 6) and Onsite Groundwater (Transport Pathway 5). Previous assessments (Geosyntec, 2020b; Geosyntec, 2020c; Geosyntec, 2020e; Geosyntec, 2020f) indicated that Old Outfall 002 (Pathway 7) was also a significant contributor; however, the Q1 2021 average contribution of this pathway was reduced from 25% to 7% with the implementation of the treatment system. Reductions in mass discharge associated with the Seep C flow through cell were also observed in Q1 2021; and further reductions associated with the installation of the flow through cells at Seeps A, B, and D are anticipated through 2021.

Sample collection will continue as outlined in the *Cape Fear River Mass Loading Calculation Protocol Version 2* (Geosyntec 2020d). Capture and treatment of water from the Old Outfall 002 and Seep C has begun and future sampling events will continue to evaluate PFAS mass loads and associated remedy facilitated at CFR-TARHEEL.

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# TABLES

**TABLE 1**
**PFAS ANALYTE LIST**
**Chemours Fayetteville Works, North Carolina**

| Common Name[1] | PFAS Grouping | | | Chemical Name | CASN | Chemical Formula |
|---|---|---|---|---|---|---|
| | Attachment C | Table 3+ (17 compounds) | Table 3+ (20 compounds) | | | |
| HFPO-DA[2] | ✓ | ✓ | ✓ | Hexafluoropropylene oxide dimer acid | 13252-13-6 | C6HF11O3 |
| PEPA | ✓ | ✓ | ✓ | Perfluoro-2-ethoxypropionic acid | 267239-61-2 | C5HF9O3 |
| PFECA-G | ✓ | ✓ | ✓ | Perfluoro-4-isopropoxybutanoic acid | 801212-59-9 | C12H9F9O3S |
| PFMOAA | ✓ | ✓ | ✓ | Perfluoro-2-methoxyacetic acid | 674-13-5 | C3HF5O3 |
| PFO2HxA | ✓ | ✓ | ✓ | Perfluoro-3,5-dioxahexanoic acid | 39492-88-1 | C4HF7O4 |
| PFO3OA | ✓ | ✓ | ✓ | Perfluoro-3,5,7-trioxaoctanoic acid | 39492-89-2 | C5HF9O5 |
| PFO4DA | ✓ | ✓ | ✓ | Perfluoro-3,5,7,9-tetraoxadecanoic acid | 39492-90-5 | C6HF11O6 |
| PMPA | ✓ | ✓ | ✓ | Perfluoro-2-methoxypropionic acid | 13140-29-9 | C4HF7O3 |
| Hydro-EVE Acid | -- | ✓ | ✓ | 2,2,3,3-tetrafluoro-3-({1,1,1,2,3,3-hexafluoro-3-[(1,2,2,2-tetrafluoroethyl)oxy]propan-2-yl}oxy)propionic acid | 773804-62-9 | C8H2F14O4 |
| EVE Acid | -- | ✓ | ✓ | 2,2,3,3-tetrafluoro-3-({1,1,1,2,3,3-hexafluoro-3-[(1,2,2-trifluoroethenyl)oxy]propan-2-yl}oxy)propionic acid | 69087-46-3 | C8HF13O4 |
| PFECA B | -- | ✓ | ✓ | Perfluoro-3,6-dioxaheptanoic acid | 151772-58-6 | C5HF9O4 |
| R-EVE | -- | -- | ✓ | Pentanoic acid, 4-(2-carboxy-1,1,2,2-tetrafluoroethoxy)-2,2,3,3,4,5,5,5-octafluoro- | 2416366-22-6 | C8H2F12O5 |
| PFO5DA | ✓ | ✓ | ✓ | Perfluoro-3,5,7,9,11-pentaoxadodecanoic acid | 39492-91-6 | C7HF13O7 |
| R-PSDA | -- | -- | ✓ | Pentanoic acid, 2,2,3,3,4,5,5,5-octafluoro-4-(1,1,2,2-tetrafluoro-2-sulfoethoxy)- | 2416366-18-0 | C7H2F12O6S |
| R-PSDCA | -- | ✓ | ✓ | Ethanesulfonic acid, 1,1,2,2-tetrafluoro-2-[1,2,2,3,3-pentafluoro-1-(trifluoromethyl)propoxy]- | 2416366-21-5 | C6H2F12O4S |
| Hydrolyzed PSDA | -- | -- | ✓ | Acetic acid, 2-fluoro-2-[1,1,2,3,3,3-hexafluoro-2-(1,1,2,2-tetrafluoro-2-sulfoethoxy)propoxy]- | 2416366-19-1 | C7H3F11O7S |
| NVHOS | -- | ✓ | ✓ | 1,1,2,2,4,5,5,5-heptafluoro-3-oxapentanesulfonic acid; or 2-(1,2,2,2-ethoxy)tetrafluoroethanesulfonic acid; or 1-(1,1,2,2-tetrafluoro-2-sulfoethoxy)-1,2,2,2-tetafluoroethane | 1132933-86-8 | C4H2F8O4S |
| PES | -- | ✓ | ✓ | Perfluoro-2-ethoxyethanesulfonic acid | 113507-82-7 | C4HF9O4S |
| PS Acid | ✓ | ✓ | ✓ | Ethanesulfonic acid, 2-[1-[difluoro[(1,2,2-trifluoroethenyl)oxy]methyl]-1,2,2,2-tetrafluoroethoxy]-1,1,2,2-tetrafluoro- | 29311-67-9 | C7HF13O5S |
| Hydro-PS Acid | ✓ | ✓ | ✓ | Ethanesulfonic acid, 2-[1-[difluoro(1,2,2,2-tetrafluoroethoxy)methyl]-1,2,2,2-tetrafluoroethoxy]-1,1,2,2-tetrafluoro- | 749836-20-2 | C7H2F14O5S |
| PFHpA[2] | ✓ | -- | -- | Perfluoroheptanoic acid | 375-85-9 | C7HF13O2 |

***Notes:***
1 - Analyzed under analytical method Table 3+ Lab SOP.
2 - HFPO-DA and PFHpA can be analyzed under methods Table 3+ SOP and EPA Method 537 Mod.
EPA - Environmental Protection Agency
PFAS - Per- and Polyfluoroalkyl substances
SOP - Standard Operating Procedure

**TABLE 2**
**SURFACE WATER SAMPLE COLLECTION AND FLOW MEASUREMENT SUMMARY**
**Chemours Fayetteville Works, North Carolina**



| Pathway / Location | Location ID | Location Description | January 2021 | | February 2021 | | March 2021 | |
|---|---|---|---|---|---|---|---|---|
| | | | Sample Collection Method[1] | Flow Measurement Method[2] | Sample Collection Method[1] | Flow Measurement Method[2] | Sample Collection Method[1] | Flow Measurement Method[2] |
| Upstream River Water and Groundwater[6] | CFR-MILE-76 | Cape Fear River Mile 76 | Grab | USGS Data | -- | -- | -- | -- |
| | CFR-DCO | Upstream of Cape Fear River Mile 76 | -- | -- | Grab | USGS Data | -- | -- |
| | CFR-2517BoatRamp | Upstream of Cape Fear River Mile 76 | -- | -- | -- | -- | Grab | USGS Data |
| Willis Creek | WC-1 | Mouth of Willis Creek | 24-hour composite | Velocity Probe | -- | -- | -- | -- |
| | WC-2 | Tributary to Seep C | -- | -- | Grab | -- | -- | -- |
| | WC-1-TR2 | Tributary to Seep C | -- | -- | -- | -- | Grab | Velocity Probe |
| | WC-5 | Tributary to Seep C | -- | -- | -- | -- | Grab* | Velocity Probe |
| Intake River Water at Facility | Intake at Facility | Water Drawn Through the Intake Sampled at the Power Area at the Site | 24-hour composite | Facility DMRs | Grab | Facility DMRs | 24-hour composite | Facility DMRs |
| Outfall 002 | Outfall 002 | Outfall 002 in open channel | 24-hour composite | Facility DMRs | Grab | Facility DMRs | 24-hour composite | Facility DMRs |
| Seep A | SEEP-A-IMP | Impoundment Pond Before Seep A FTC | 24-hour composite | --[3] | Grab | --[3] | 24-hour composite | --[3] |
| Seep B | SEEP-B-1 | Mouth of Seep B | Grab | --[3] | -- | -- | -- | -- |
| | SEEP-B-2 | Tributary to Seep B | -- | -- | Grab* | Velocity Probe | -- | -- |
| | SEEP-B-TR1 | Tributary to Seep B | -- | -- | Grab | Velocity Probe | -- | -- |
| | SEEP-B-TR2 | Tributary to Seep B | -- | -- | Grab | Velocity Probe | -- | -- |
| | SEEP-B-IMP | Impoundment Pond Before Seep B FTC | -- | -- | -- | -- | 24-hour composite | -- |
| | SEEP-B-1-C1 | Tributary to Seep B | -- | -- | -- | -- | -- | Velocity Probe |
| | SEEP-B-1-C2 | Tributary to Seep B | -- | -- | -- | -- | -- | Velocity Probe |
| | SEEP-B-1-C3 | Tributary to Seep B | -- | -- | -- | -- | -- | Velocity Probe |
| Seep C | SEEP-C | Mouth of Seep C | -- | Flume | -- | --[3] | -- | --[3] |
| | SEEP-C-EFF | Effluent Basin of Seep C FTC | 24-hour composite | -- | 24-hour composite | -- | 24-hour composite | -- |
| | SEEP-C-2 | Upstream of Seep C FTC | -- | -- | Grab | -- | -- | -- |
| Seep D | SEEP-D-1 | Mouth of Seep D | Grab | Flume | -- | --[3] | -- | --[3] |
| | SEEP-D-3 | Tributary to Seep D | -- | -- | Grab* | -- | -- | -- |
| | SEEP-D-C1 | Tributary to Seep D | -- | -- | Grab | -- | Grab | -- |
| | SEEP-D-D | Tributary to Seep D | -- | -- | Grab | -- | -- | -- |
| | SEEP-D-D1 | Tributary to Seep D | -- | -- | -- | -- | Grab | -- |
| | SEEP-D2-B1 | Tributary to Seep D | -- | -- | -- | -- | Grab* | -- |
| Lock and Dam Seep | LOCK-DAM SEEP | Mouth of the Lock and Dam Seep | Grab | Manually Measured[4] | --[5] | --[3] | Grab | Manually Measured[4] |
| Old Outfall 002 | OLDOF-1 | Mouth of Old Outfall 002 | Grab | Velocity Probe | -- | -- | -- | -- |
| | OLDOF-2 | Upstream of Mouth of Old Outfall 002 | -- | -- | Grab | Velocity Probe | Grab | Velocity Probe |
| Georgia Branch Creek | GBC-1 | Mouth of Georgia Branch Creek | Grab | Velocity Probe | -- | -- | -- | -- |
| | GBC-5 | Upstream of Mouth of Georgia Branch Creek | -- | -- | Grab | Velocity Probe | Grab | Velocity Probe |
| Tar Heel Ferry Road Bridge[6] | CFR-TARHEEL | Cape Fear River at Tar Heel Ferry Road Bridge | 24-hour composite | USGS Data | Grab | USGS Data | Grab / Composite | USGS Data |
| Bladen Bluffs[6] | CFR-BLADEN | Cape Fear River at Bladen Bluffs | Grab | USGS Data | Grab | USGS Data | Grab | USGS Data |
| Kings Bluffs[7] | CFR-KINGS | Cape Fear River at Kings Bluff Raw Water | Grab | USGS Data | Grab | USGS Data | Grab | USGS Data |

***Notes:***
1 - Samples analyzed for PFAS by EPA Method 537 Mod and Table 3+ Lab SOP.
2 - Results of estimated flow at these locations are provided in Appendix A Table A6 and supplemental flow measurement data are included in Appendix B.
3 - Flow at this location could not be measured due to high river stages.
4 - Flow was measured at the Lock and Dam Seep manually using a volumetric container (e.g., five gallon bucket, two liter bottle, etc.) and recording the duration of flow.
5 - Sample at Lock and Dam Seep could not be collected in the February 2021 event due to high river stages.
6 - USGS data measurements are recorded from the USGS flow gauging station at the W.O. Huske Dam, ID 02105500 (USGS, 2021).
7 - USGS data measurements are recorded from the USGS flow gauging station at the Lock and Dam #1, ID 02105769 (USGS, 2021).
-- - not sampled or not measured
* - this grab-sampled location represents the maximum Table 3+ concentration among the multiple locations that were sampled during these monthly events. This concentration was used in the mass loading model calculations.
DMRs - Discharge Monitoring Reports
EPA - Environmental Protection Agency
FTC - flow-through cell
PFAS - per- and polyfluoroalkyl substances
USGS - United States Geological Survey

**TABLE 3**
**GROUNDWATER MONITORING WELL SAMPLE COLLECTION AND WATER LEVEL MEASUREMENT SUMMARY**
**Chemours Fayetteville Works, North Carolina**

| Area | Water Bearing Unit[1] | Well ID | Adjacent Surface Water Feature | January 2021 | | February 2021 | | March 2021 | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sample Collection Date | Synoptic Water Level Date | Sample Collection Date | Synoptic Water Level Date | Sample Collection Date | Synoptic Water Level Date |
| Onsite | Black Creek | PIW-3D | Cape Fear River | 1/29/2021 | 1/13/2021 | 2/8/2021 | 2/3/2021 | 3/16/2021 | 3/5/2021 |
| Onsite | Floodplain | PIW-7S | Cape Fear River | 1/27/2021 | 1/13/2021 | 2/23/2021 | 2/3/2021 | 3/23/2021 | 3/5/2021 |
| Onsite | Black Creek | PIW-7D | Cape Fear River | 1/27/2021 | 1/13/2021 | 2/23/2021 | 2/3/2021 | 3/23/2021 | 3/5/2021 |
| Onsite | Floodplain | LTW-01 | Cape Fear River | 1/28/2021 | 1/13/2021 | 2/8/2021 | 2/3/2021 | 3/16/2021 | 3/5/2021 |
| Onsite | Black Creek | LTW-02 | Cape Fear River | 1/27/2021 | 1/13/2021 | 2/11/2021 | 2/3/2021 | 3/16/2021 | 3/5/2021 |
| Onsite | Floodplain | LTW-03 | Cape Fear River | 1/28/2021 | 1/13/2021 | 2/4/2021 | 2/3/2021 | 3/9/2021 | 3/5/2021 |
| Onsite | Floodplain | LTW-04 | Cape Fear River | 1/19/2021 | 1/13/2021 | 2/23/2021 | 2/3/2021 | 3/9/2021 | 3/5/2021 |
| Onsite | Black Creek | LTW-05 | Cape Fear River | 1/19/2021 | 1/13/2021 | 2/11/2021 | 2/3/2021 | 3/23/2021 | 3/5/2021 |
| Onsite | Black Creek | PZ-22 | Cape Fear River | 1/19/2021 | 1/13/2021 | 2/23/2021 | 2/3/2021 | 3/23/2021 | 3/5/2021 |
| Onsite | Surficial | PW-06 | Georgia Branch Creek | 1/18/2021 | 1/13/2021 | 2/10/2021 | 2/3/2021 | 3/16/2021 | 3/5/2021 |
| Onsite | Surficial | PW-07 | Georgia Branch Creek | 1/18/2021 | 1/13/2021 | 2/10/2021 | 2/3/2021 | 3/9/2021 | 3/5/2021 |
| Onsite | Surficial | PW-04 | Old Outfall | 1/18/2021 | 1/13/2021 | 2/11/2021 | 2/3/2021 | 3/11/2021 | 3/5/2021 |
| Onsite | Black Creek | PW-11[2] | Old Outfall | -- | 1/14/2021 | -- | 2/3/2021 | -- | 3/5/2021 |
| Onsite | Black Creek | PW-09 | Willis Creek | 1/27/2021 | 1/13/2021 | 2/4/2021 | 2/3/2021 | 3/12/2021 | 3/5/2021 |
| Onsite | Surficial | SMW-11 | Willis Creek | 1/15/2021 | 1/13/2021 | 2/10/2021 | 2/3/2021 | 3/9/2021 | 3/5/2021 |
| Onsite | Surficial | SMW-10 | Willis Creek | 1/28/2021 | 1/13/2021 | 2/8/2021 | 2/3/2021 | 3/11/2021 | 3/5/2021 |
| Onsite | Black Creek | SMW-12 | Willis Creek | 1/29/2021 | 1/13/2021 | 2/5/2021 | 2/3/2021 | 3/9/2021 | 3/5/2021 |
| Onsite | Floodplain | PIW-1S | Cape Fear River / Willis Creek | 1/27/2021 | 1/13/2021 | 2/8/2021 | 2/3/2021 | 3/11/2021 | 3/5/2021 |
| Onsite | Surficial | PIW-1D | Cape Fear River / Willis Creek | 1/27/2021 | 1/13/2021 | 2/8/2021 | 2/3/2021 | 3/11/2021 | 3/5/2021 |
| Offsite | Black Creek | Bladen-1D[2] | Georgia Branch Creek | -- | 1/13/2021 | -- | 2/3/2021 | -- | 3/5/2021 |

***Notes:***
1 - Water Bearing Unit - refers to primary aquifer unit well screen is estimated to be screened within.
2 - Bladen-1D (damaged) and PW-11 (being pumped as part of the Pre-design Investigation activities) could not be sampled in December 2020.
-- - not applicable

**TABLE 4**

**SUMMARY OF CALCULATED TOTAL MASS LOAD IN THE CAPE FEAR RIVER**

**Chemours Fayetteville Works, North Carolina**

| Reporting Peroid | Reporting Period Details | | | | Total Attachment C[1] | | |
|---|---|---|---|---|---|---|---|
| | Start Date | End Date | Days | River volume ($m^3$) | Load in Cape Fear River (kg)[3,6] | Remedy Reduction Loads (kg)[4,6] | Total Load to Cape Fear River (kg)[5,6] |
| **2020-Q1 Report** | 03/28/2020 1:00 | 05/09/2020 23:49 | 43 | 514,570,000 | 45.1 | 0 | 45.1 |
| **2020-Q2 Report** | 05/09/2020 23:49 | 06/29/2020 16:06 | 51 | 1,308,600,000 | 79.1 | 0 | 79.1 |
| **2020-Q3 Report** | 06/29/2020 16:06 | 10/01/2020 0:01 | 93 | 1,036,200,000 | 77.3 | 0 | 77.3 |
| **2020-Q4 Report** | 10/01/2020 0:01 | 12/30/2020 10:56 | 90 | 2,118,700,000 | 75.8 | 25.5 | 101.3 |
| **2021-Q1 Report** | 12/30/2020 10:56 | 03/31/2021 23:01 | 92 | 3,157,900,000 | 93.8 | 28.3 | 122.1 |
| **Total[4]** | **03/28/2020 1:00** | **03/31/2021 23:01** | **369** | **8,135,970,000** | **371.1** | **53.8** | **424.9** |

***Notes:***

1 - Total Attachment C does not include Perfluorohepthanoic acid (PFHpA).

2 - Total table 3+ (17 compounds) does not include R-PSDA, Hydrolyzed, PSDA, and R-EVE.

3 - Calculated Cape Fear River loads represents loads measured in the Cape Fear River at the CFR-TARHEEL sampling location downstream of the Site.

4 - Calculated remedy reduction loads represents loads from Old Outfall 002 and Seep C that were prevented from reaching the Cape Fear River.

5 - Total load to Cape Fear River represents the sum of the measured in-river load and the remedy reduction load. This value represents the baseline load that would reach the Cape Fear River in the absence of any remedies.

6 - Total values are rounded to two significant digits. Values in calculations supporting totals are not rounded.

kg - kilograms

$m^3$ - cubic meters

**TABLE 4**
**SUMMARY OF CALCULATED TOTAL MASS LOAD IN THE CAPE FEAR RIVER**
**Chemours Fayetteville Works, North Carolina**

| Reporting Peroid | Reporting Period Details | | | | Total Table 3+ (17 Compounds)[2] | | |
|---|---|---|---|---|---|---|---|
| | Start Date | End Date | Days | River volume ($m^3$) | Load in Cape Fear River (kg)[3,6] | Remedy Reduction Loads (kg)[4,6] | Total Load to Cape Fear River (kg)[5,6] |
| **2020-Q1 Report** | 03/28/2020 1:00 | 05/09/2020 23:49 | 43 | 514,570,000 | 45.8 | 0 | 45.8 |
| **2020-Q2 Report** | 05/09/2020 23:49 | 06/29/2020 16:06 | 51 | 1,308,600,000 | 79.7 | 0 | 79.7 |
| **2020-Q3 Report** | 06/29/2020 16:06 | 10/01/2020 0:01 | 93 | 1,036,200,000 | 78.5 | 0 | 78.5 |
| **2020-Q4 Report** | 10/01/2020 0:01 | 12/30/2020 10:56 | 90 | 2,118,700,000 | 76.7 | 25.8 | 102.5 |
| **2021-Q1 Report** | 12/30/2020 10:56 | 03/31/2021 23:01 | 92 | 3,157,900,000 | 93.8 | 28.7 | 122.5 |
| **Total[4]** | **03/28/2020 1:00** | **03/31/2021 23:01** | **369** | **8,135,970,000** | **374.5** | **54.5** | **429.0** |

***Notes:***

1 - Total Attachment C does not include Perfluorohepthanoic acid (PFHpA).

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3 - Calculated Cape Fear River loads represents loads measured in the Cape Fear River at the CFR-TARHEEL sampling location downstream of the Site.

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5 - Total load to Cape Fear River represents the sum of the measured in-river load and the remedy reduction load. This value represents the baseline load that would reach the Cape Fear River in the absence of any remedies.

6 - Total values are rounded to two significant digits. Values in calculations supporting totals are not rounded.

kg - kilograms
$m^3$ - cubic meters

**TABLE 4**

**SUMMARY OF CALCULATED TOTAL MASS LOAD IN THE CAPE FEAR RIVER**

**Chemours Fayetteville Works, North Carolina**

| Reporting Peroid | Reporting Period Details | | | | Total Table 3+ (20 Compounds) | | |
|---|---|---|---|---|---|---|---|
| | Start Date | End Date | Days | River volume ($m^3$) | Load in Cape Fear River (kg)[3,6] | Remedy Reduction Loads (kg)[4,6] | Total Load to Cape Fear River (kg)[5,6] |
| **2020-Q1 Report** | 03/28/2020 1:00 | 05/09/2020 23:49 | 43 | 514,570,000 | 58.7 | 0 | 58.7 |
| **2020-Q2 Report** | 05/09/2020 23:49 | 06/29/2020 16:06 | 51 | 1,308,600,000 | 101.6 | 0 | 101.6 |
| **2020-Q3 Report** | 06/29/2020 16:06 | 10/01/2020 0:01 | 93 | 1,036,200,000 | 99.5 | 0 | 99.5 |
| **2020-Q4 Report** | 10/01/2020 0:01 | 12/30/2020 10:56 | 90 | 2,118,700,000 | 98.5 | 26.5 | 125.0 |
| **2021-Q1 Report** | 12/30/2020 10:56 | 03/31/2021 23:01 | 92 | 3,157,900,000 | 117.9 | 29.5 | 147.3 |
| **Total[4]** | **03/28/2020 1:00** | **03/31/2021 23:01** | **369** | **8,135,970,000** | **476.2** | **56.0** | **532.2** |

***Notes:***

1 - Total Attachment C does not include Perfluorohepthanoic acid (PFHpA).

2 - Total table 3+ (17 compounds) does not include R-PSDA, Hydrolyzed, PSDA, and R-EVE.

3 - Calculated Cape Fear River loads represents loads measured in the Cape Fear River at the CFR-TARHEEL sampling location downstream of the Site.

4 - Calculated remedy reduction loads represents loads from Old Outfall 002 and Seep C that were prevented from reaching the Cape Fear River.

5 - Total load to Cape Fear River represents the sum of the measured in-river load and the remedy reduction load. This value represents the baseline load that would reach the Cape Fear River in the absence of any remedies.

6 - Total values are rounded to two significant digits. Values in calculations supporting totals are not rounded.

kg - kilograms

$m^3$ - cubic meters

**TABLE 5A**
**CAPE FEAR RIVER PFAS MASS LOAD BY COMPOUND AND TIME INTERVAL**
**Chemours Fayetteville Works, North Carolina**

| Interval Details | | | | Calculated Mass Load[2] (kg) | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Interval ID | Start Time[1] | End Time[1] | Total River Flow ($m^3$) | HFPO-DA | PFMOAA | PFO2HxA | PFO3OA | PFO4DA | PFO5DA | PMPA | PEPA | PS Acid (Formerly PFESA-BP1) | Hydro-PS Acid (Formerly PFESA-BP2) | R-PSDA (Formerly Byproduct 4) | Hydrolyzed PSDA (Foremerly Byproduct 5) | R-PSDCA (Formerly Byproduct 6) | NVHOS | EVE Acid | Hydro-EVE Acid | R-EVE | PES | PFECA B | PFECA-G | PFHpA | Total Attachment C[3] | Total Table 3+ (17 Compounds)[4] | Total Table 3+ (20 Compounds) |
| 2021_1_Q1 | 12/30/20 10:56 | 1/6/21 12:10 | 334,627,822 | 1.20 | 2.51 | 1.39 | 0.00 | 0 | 0.00 | 0.00 | 0 | 0 | 0 | 1 | 0.72 | 0 | 0 | 0 | 0 | 0.47 | 0 | 0 | 0 | 0.59 | 5.1 | 5.1 | 7.2 |
| 2021_2_Q1 | 1/6/21 12:10 | 1/7/21 11:00 | 45,269,293 | 0.14 | 0.07 | 0.16 | 0.00 | 0 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 | 0.00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.00 | 0.4 | 0.4 | 0.4 |
| 2021_3_Q1 | 1/7/21 11:00 | 1/11/21 10:30 | 161,851,166 | 0.73 | 1.05 | 0.76 | 0.00 | 0 | 0.00 | 0.00 | 0 | 0 | 0 | 0.32 | 0.23 | 0 | 0 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0.00 | 2.5 | 2.5 | 3.1 |
| 2021_4_Q1 | 1/11/21 10:30 | 1/14/21 12:40 | 80,160,009 | 0.60 | 1.36 | 0.63 | 0.08 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 0.34 | 0.28 | 0 | 0.00 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0.00 | 2.7 | 2.7 | 3.3 |
| 2021_5_Q1 | 1/14/21 12:40 | 1/21/21 0:01 | 101,278,798 | 0.95 | 2.13 | 0.93 | 0.10 | 0.00 | 0.00 | 0.71 | 0 | 0 | 0 | 0.52 | 0.58 | 0 | 0.00 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0.12 | 4.8 | 4.8 | 5.9 |
| 2021_6_Q1 | 1/21/21 0:01 | 1/22/21 0:01 | 12,924,035 | 0.12 | 0.27 | 0.11 | 0.00 | 0.00 | 0.00 | 0.18 | 0 | 0 | 0 | 0.07 | 0.09 | 0 | 0.00 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0.03 | 0.7 | 0.7 | 0.8 |
| 2021_7_Q1 | 1/22/21 0:01 | 1/22/21 23:01 | 11,886,280 | 0.12 | 0.27 | 0.10 | 0.00 | 0 | 0.00 | 0.17 | 0 | 0 | 0 | 0.08 | 0.09 | 0 | 0 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0.03 | 0.7 | 0.7 | 0.8 |
| 2021_8_Q1 | 1/22/21 23:01 | 1/26/21 15:00 | 38,714,509 | 0.52 | 1.14 | 0.41 | 0.06 | 0 | 0.00 | 0.66 | 0 | 0 | 0 | 0.51 | 0.34 | 0 | 0 | 0 | 0 | 0.08 | 0 | 0 | 0 | 0.09 | 2.8 | 2.9 | 3.8 |
| 2021_9_Q1 | 1/26/21 15:00 | 1/26/21 16:10 | 630,758 | 0.01 | 0.02 | 0.01 | 0.00 | 0 | 0.00 | 0.01 | 0 | 0 | 0 | 0.01 | 0.01 | 0 | 0.00 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0.00 | 0.1 | 0.1 | 0.1 |
| 2021_10_Q1 | 1/26/21 16:10 | 1/27/21 0:01 | 4,979,036 | 0.05 | 0.11 | 0.06 | 0.01 | 0 | 0.00 | 0.09 | 0 | 0 | 0 | 0.05 | 0.04 | 0 | 0.00 | 0 | 0 | 0.02 | 0 | 0 | 0 | 0.02 | 0.3 | 0.3 | 0.4 |
| 2021_11_Q1 | 1/27/21 0:01 | 1/27/21 15:10 | 12,789,729 | 0.13 | 0.29 | 0.14 | 0.01 | 0 | 0.00 | 0.23 | 0 | 0 | 0 | 0.10 | 0.09 | 0 | 0.00 | 0 | 0 | 0.04 | 0 | 0 | 0 | 0.03 | 0.8 | 0.8 | 1.0 |
| 2021_12_Q1 | 1/27/21 15:10 | 1/28/21 0:01 | 9,642,566 | 0.09 | 0.22 | 0.09 | 0.00 | 0 | 0.00 | 0.16 | 0 | 0 | 0 | 0.07 | 0.06 | 0 | 0.00 | 0 | 0 | 0.03 | 0 | 0 | 0 | 0.02 | 0.6 | 0.6 | 0.7 |
| 2021_13_Q1 | 1/28/21 0:01 | 1/28/21 23:01 | 29,998,584 | 0.22 | 0.48 | 0.21 | 0.00 | 0 | 0.00 | 0.42 | 0 | 0 | 0 | 0.18 | 0.14 | 0 | 0 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0.07 | 1.3 | 1.3 | 1.7 |
| 2021_14_Q1 | 1/28/21 23:01 | 2/1/21 10:05 | 129,039,020 | 0.83 | 1.59 | 0.76 | 0.00 | 0 | 0.00 | 1.74 | 0 | 0 | 0 | 0.38 | 0.49 | 0 | 0.00 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0.35 | 4.9 | 4.9 | 5.8 |
| 2021_15_Q1 | 2/1/21 10:05 | 2/4/21 16:35 | 157,579,853 | 0.79 | 0.68 | 0.74 | 0.00 | 0 | 0.00 | 1.81 | 0 | 0 | 0 | 0.00 | 0.57 | 0 | 0.00 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0.43 | 4.0 | 4.0 | 4.6 |
| 2021_16_Q1 | 2/4/21 16:35 | 2/8/21 16:00 | 159,603,375 | 0.36 | 0.00 | 0.37 | 0.00 | 0 | 0.00 | 0.80 | 0 | 0 | 0 | 0.00 | 0.35 | 0 | 0.00 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0.51 | 1.5 | 1.5 | 1.9 |
| 2021_17_Q1 | 2/8/21 16:00 | 2/11/21 0:01 | 83,254,162 | 0.42 | 1.00 | 0.34 | 0.00 | 0 | 0.00 | 0.83 | 0 | 0 | 0 | 0.21 | 0.25 | 0 | 0.00 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0.31 | 2.6 | 2.6 | 3.1 |
| 2021_18_Q1 | 2/11/21 0:01 | 2/12/21 14:01 | 32,965,312 | 0.33 | 0.79 | 0.27 | 0.00 | 0 | 0.00 | 0.66 | 0 | 0 | 0 | 0.17 | 0.20 | 0 | 0.00 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0.12 | 2.1 | 2.1 | 2.4 |
| 2021_19_Q1 | 2/12/21 14:01 | 2/16/21 12:00 | 180,462,725 | 1.27 | 2.17 | 1.03 | 0.00 | 0 | 0.00 | 3.16 | 0 | 0 | 0 | 0.46 | 0.54 | 0 | 0.00 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0.55 | 7.6 | 7.6 | 8.6 |
| 2021_20_Q1 | 2/16/21 12:00 | 2/19/21 13:35 | 186,467,284 | 1.17 | 0.83 | 0.71 | 0.00 | 0 | 0.00 | 2.89 | 0 | 0 | 0 | 0.45 | 0.28 | 0 | 0.00 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0.24 | 5.6 | 6 | 6 |
| 2021_21_Q1 | 2/19/21 13:35 | 2/22/21 9:35 | 164,917,031 | 1.16 | 1.26 | 0.94 | 0.18 | 0 | 0.00 | 2.31 | 0 | 0 | 0 | 0.98 | 0.51 | 0 | 0.00 | 0 | 0 | 0.17 | 0 | 0 | 0 | 0.00 | 6.1 | 6.1 | 7.7 |
| 2021_22_Q1 | 2/22/21 9:35 | 2/24/21 15:15 | 93,018,293 | 0.47 | 0.70 | 0.56 | 0.10 | 0 | 0.00 | 0.95 | 0 | 0 | 0 | 0.55 | 0.26 | 0 | 0.00 | 0 | 0 | 0.10 | 0 | 0 | 0 | 0.00 | 2.9 | 2.9 | 3.8 |
| 2021_23_Q1 | 2/24/21 15:15 | 2/25/21 12:20 | 35,590,029 | 0.17 | 0.29 | 0.19 | 0.00 | 0 | 0.00 | 0.36 | 0 | 0 | 0 | 0.14 | 0.08 | 0 | 0.00 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0.06 | 1.0 | 1.0 | 1.2 |
| 2021_24_Q1 | 2/25/21 12:20 | 3/5/21 0:01 | 331,411,594 | 1.66 | 3.21 | 1.77 | 0.00 | 0 | 0.00 | 1.99 | 0 | 0 | 0 | 1.67 | 1.18 | 0 | 0.00 | 0 | 0 | 0.00 | 0 | 0 | 0 | 1.11 | 8.6 | 8.6 | 11.5 |
| 2021_25_Q1 | 3/5/21 0:01 | 3/6/21 0:01 | 43,768,217 | 0.20 | 0.53 | 0.23 | 0.00 | 0 | 0.00 | 0.00 | 0 | 0 | 0 | 0.32 | 0.21 | 0 | 0.00 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0.15 | 0.9 | 0.9 | 1.5 |
| 2021_26_Q1 | 3/6/21 0:01 | 3/6/21 23:01 | 41,150,891 | 1.15 | 0.45 | 0.19 | 0.00 | 0 | 0.00 | 0.00 | 0 | 0 | 0 | 0.26 | 0.16 | 0 | 0.00 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0.16 | 1.8 | 1.8 | 2.2 |
| 2021_27_Q1 | 3/6/21 23:01 | 3/8/21 0:01 | 42,955,240 | 0.73 | 0.49 | 0.20 | 0.00 | 0 | 0.00 | 0.00 | 0 | 0 | 0 | 0.22 | 0.13 | 0 | 0.00 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0.17 | 1.4 | 1.4 | 1.8 |
| 2021_28_Q1 | 3/8/21 0:01 | 3/8/21 23:01 | 38,107,963 | 0.22 | 0.46 | 0.17 | 0.00 | 0 | 0.00 | 0.00 | 0 | 0 | 0 | 0.14 | 0.09 | 0 | 0.00 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0.15 | 0.8 | 0.8 | 1.1 |
| 2021_29_Q1 | 3/8/21 23:01 | 3/11/21 0:01 | 74,531,356 | 0.51 | 1.19 | 0.44 | 0.00 | 0 | 0.00 | 0.52 | 0 | 0 | 0 | 0.31 | 0.24 | 0 | 0.00 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0.28 | 2.7 | 2.7 | 3.2 |
| 2021_30_Q1 | 3/11/21 0:01 | 3/11/21 23:01 | 25,460,186 | 0.20 | 0.51 | 0.18 | 0.00 | 0 | 0.00 | 0.36 | 0 | 0 | 0 | 0.11 | 0.11 | 0 | 0.00 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0.09 | 1.3 | 1.3 | 1.5 |
| 2021_31_Q1 | 3/11/21 23:01 | 3/15/21 0:01 | 61,556,350 | 0.49 | 1.23 | 0.44 | 0.00 | 0 | 0.00 | 0.86 | 0 | 0 | 0 | 0.28 | 0.26 | 0 | 0.00 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0.22 | 3.0 | 3.0 | 3.6 |
| 2021_32_Q1 | 3/15/21 0:01 | 3/15/21 23:01 | 21,039,530 | 0.16 | 0.40 | 0.14 | 0.00 | 0 | 0.00 | 0.25 | 0 | 0 | 0 | 0.09 | 0.08 | 0 | 0.00 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0.09 | 0.9 | 0.9 | 1.1 |
| 2021_33_Q1 | 3/15/21 23:01 | 3/18/21 0:01 | 46,167,900 | 0.29 | 0.74 | 0.27 | 0.00 | 0 | 0.00 | 0.53 | 0 | 0 | 0 | 0.18 | 0.15 | 0 | 0.00 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0.19 | 1.8 | 1.8 | 2.2 |
| 2021_34_Q1 | 3/18/21 0:01 | 3/18/21 23:01 | 30,138,753 | 0.15 | 0.39 | 0.16 | 0.00 | 0 | 0.00 | 0.33 | 0 | 0 | 0 | 0.11 | 0.09 | 0 | 0.00 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0.11 | 1.0 | 1.0 | 1.2 |
| 2021_35_Q1 | 3/18/21 23:01 | 3/24/21 0:01 | 118,868,402 | 0.83 | 1.96 | 1.08 | 0.13 | 0 | 0.00 | 1.66 | 0 | 0 | 0 | 1.53 | 1.00 | 0 | 0.00 | 0 | 0 | 0.32 | 0 | 0 | 0 | 0.42 | 5.9 | 5.9 | 8.8 |
| 2021_36_Q1 | 3/24/21 0:01 | 3/24/21 23:01 | 19,076,663 | 0.06 | 0.15 | 0.09 | 0.00 | 0 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 | 0.08 | 0 | 0.00 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0.04 | 0.3 | 0.3 | 0.4 |
| 2021_37_Q1 | 3/24/21 23:01 | 3/25/21 23:01 | 19,613,126 | 0.06 | 0.11 | 0.05 | 0.00 | 0 | 0.00 | 0.00 | 0 | 0 | 0 | 0.14 | 0.04 | 0 | 0.00 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0.07 | 0.2 | 0.2 | 0.4 |
| 2021_38_Q1 | 3/25/21 23:01 | 3/29/21 0:01 | 63,362,994 | 0.09 | 0.17 | 0.07 | 0.00 | 0 | 0.00 | 0.00 | 0 | 0 | 0 | 0.23 | 0.07 | 0 | 0.00 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0.12 | 0.3 | 0.3 | 0.6 |
| 2021_39_Q1 | 3/29/21 0:01 | 3/29/21 12:50 | 17,967,039 | 0.06 | 0.14 | 0.08 | 0.00 | 0 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 | 0.07 | 0 | 0.00 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0.04 | 0.3 | 0.3 | 0.4 |
| 2021_40_Q1 | 3/29/21 12:50 | 3/29/21 23:01 | 15,484,784 | 0.05 | 0.10 | 0.05 | 0.00 | 0 | 0.00 | 0.00 | 0 | 0 | 0 | 0.06 | 0.05 | 0 | 0.00 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0.05 | 0.2 | 0.2 | 0.3 |
| 2021_41_Q1 | 3/29/21 23:01 | 3/30/21 8:50 | 15,161,123 | 0.04 | 0.08 | 0.03 | 0.00 | 0 | 0.00 | 0.00 | 0 | 0 | 0 | 0.11 | 0.03 | 0 | 0.00 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0.06 | 0.2 | 0.2 | 0.3 |
| 2021_42_Q1 | 3/30/21 8:50 | 3/31/21 0:01 | 25,026,429 | 0.09 | 0.15 | 0.07 | 0.00 | 0 | 0.00 | 0.00 | 0 | 0 | 0 | 0.10 | 0.07 | 0 | 0.00 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0.08 | 0.3 | 0.3 | 0.5 |
| 2021_43_Q1 | 3/31/21 0:01 | 3/31/21 23:01 | 39,405,157 | 0.17 | 0.27 | 0.15 | 0.00 | 0 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 | 0.12 | 0 | 0.00 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0.11 | 0.6 | 0.6 | 0.7 |
| **Totals** | | | **3,157,903,369** | **19** | **32** | **17** | **0.7** | **0.0** | **0.0** | **25** | **0.6** | **0** | **0** | **12** | **10** | **0.0** | **0.1** | **0.0** | **0.0** | **1.2** | **0.0** | **0.0** | **0.0** | **7.3** | **94** | **94** | **118** |

***Notes:***
1 - Start and end times are adjusted based on sampling times ± one hour to account for the total flow of the Cape Fear River.
2 - The calculated mass load is a product of weighted concentration and total river flow. Refer to the Cape Fear River PFAS Mass Loading Calculation Protocol Version 2 (Geosyntec, 2020d) for more details.
3 - Total Attachment C does not include Perfluorohepthanoic acid (PFHpA).
4 - Total Table 3+ (17 compounds) does not include R-PSDA, Hydrolyzed, PSDA, and R-EVE.

# TABLE 5B
## OLD OUTFALL 002 CAPTURED MASS LOAD BY COMPOUND AND TIME INTERVAL
## Chemours Fayetteville Works, North Carolina

| Interval Details | | | | | Calculated Captured Mass Load (kg)[1] | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Interval ID | Start Time | End Time | Duration (hours) | Total Flow ($m^3$) | HFPO-DA | PFMOAA | PFO2HxA | PFO3OA | PFO4DA | PFO5DA | PMPA | PEPA | PS Acid | Hydro-PS Acid | R-PSDA | Hydrolyzed PSDA | R-PSDCA | NVHOS | EVE Acid | Hydro-EVE Acid | R-EVE | PES | PFECA B | PFECA-G | Total Attachment C[2,4] | Total Table 3+ (17 compounds)[3] | Total Table 3+ (20 compounds) |
| OF003_2020_1_Q4 | 10/1/20 0:00 | 10/31/20 0:00 | 720 | 90,000 | 0.41 | 4.98 | 1.24 | 0.34 | 0.10 | 0.06 | 0.47 | 0.12 | 0.02 | 0.02 | 0.05 | 0.13 | 0.00 | 0.05 | 0.00 | 0.02 | 0.02 | 0.00 | 0.00 | 0.00 | 7.73 | 7.82 | 8.00 |
| OF003_2020_2_Q4 | 11/1/20 0:00 | 11/30/20 0:00 | 696 | 80,000 | 0.52 | 4.86 | 1.00 | 0.33 | 0.12 | 0.06 | 0.50 | 0.16 | 0.08 | 0.03 | 0.03 | 0.15 | 0.00 | 0.05 | 0.00 | 0.02 | 0.02 | 0.00 | 0.00 | 0.00 | 7.62 | 7.70 | 7.87 |
| OF003_2020_3_Q4 | 12/1/20 0:00 | 12/31/20 0:00 | 720 | 120,000 | 0.53 | 5.89 | 1.42 | 0.34 | 0.11 | 0.07 | 0.55 | 0.17 | 0.10 | 0.04 | 0.08 | 0.24 | 0.00 | 0.05 | 0.01 | 0.02 | 0.03 | 0.00 | 0.00 | 0.00 | 9.20 | 9.31 | 9.67 |
| OF003_2021_1_Q1 | 1/1/21 0:00 | 1/31/21 0:00 | 720 | 120,000 | 0.67 | 4.72 | 1.11 | 0.31 | 0.09 | 0.05 | 0.37 | 0.12 | 0.10 | 0.03 | 0.11 | 0.15 | 0.00 | 0.04 | 0.01 | 0.02 | 0.03 | 0.00 | 0.00 | 0.00 | 7.55 | 7.67 | 7.90 |
| OF003_2021_2_Q1 | 2/1/21 0:00 | 2/28/21 0:00 | 648 | 100,000 | 0.53 | 4.84 | 1.30 | 0.37 | 0.13 | 0.07 | 0.48 | 0.18 | 0.09 | 0.04 | 0.06 | 0.13 | 0.00 | 0.05 | 0.01 | 0.02 | 0.02 | 0.00 | 0.00 | 0.00 | 8.02 | 8.14 | 8.26 |
| OF003_2021_3_Q1 | 3/1/21 0:00 | 3/31/21 0:00 | 720 | 100,000 | 0.75 | 4.36 | 1.18 | 0.32 | 0.10 | 0.06 | 0.45 | 0.17 | 0.11 | 0.03 | 0.07 | 0.17 | 0.00 | 0.04 | 0.01 | 0.02 | 0.03 | 0.00 | 0.00 | 0.00 | 7.55 | 7.55 | 7.90 |
| | | **Total** | **610,000** | **3.4** | **30** | **7.2** | **2.0** | **0.64** | **0.36** | **2.8** | **0.91** | **0.51** | **0.19** | **0.40** | **0.97** | **0** | **0.28** | **0.03** | **0.10** | **0.14** | **0** | **0** | **0** | **48** | **48** | **50** |

***Notes:***

1 - The calculated captured mass load is a product of the concentration difference in the influent and the effluent samples and total flow at the influent for the sampling interval. Refer to the Cape Fear River PFAS Mass Loading Calculation Protocol Version 2 (Geosyntec, 2020d) for more details.

2 - Total Attachment C does not include Perfluorohepthanoic acid (PFHpA).

3 - Total Table 3+ (17 compounds) does not include R-PSDA, Hydrolyzed, PSDA, and R-EVE.

OF003 - Outfall 003, i.e., Old Outfall 002 treatment system

**TABLE 5C**
**SEEP C FLOW THROUGH CELL CAPTURED MASS LOAD BY COMPOUND AND TIME INTERVAL**
**Chemours Fayetteville Works, North Carolina**

| Interval Details | | | | | Calculated Captured Mass Load (kg)[1] | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Interval ID | Start Time | End Time | Duration (hours) | Total Flow ($m^3$) | Hfpo Dimer Acid | PFMOAA | PFO2HxA | PFO3OA | PFO4DA | PFO5DA | PMPA | PEPA | PS Acid | Hydro-PS Acid | R-PSDA | Hydrolyzed PSDA | R-PSDCA | NVHOS | EVE Acid | Hydro-EVE Acid | R-EVE | PES | PFECA B | PFECA-G | Total Attachment C[2] | Total Table 3+ (17 compounds)[3] | Total Table 3+ (20 compounds) |
| SeepC_2020_1_Q4[4] | 12/17/2020 | 12/30/2020 | 291 | 5513 | 0.105 | 0.529 | 0.149 | 0.042 | 0.011 | 0 | 0.050 | 0.017 | 0 | 0.002 | 0.006 | 0.007 | 0 | 0.005 | 0 | 0.008 | 0.005 | 0 | 0 | 0 | 0.88 | 0.93 | 0.93 |
| SeepC_2020_2_Q4 | 12/30/2020 | 12/31/2020 | 24 | 522 | 0.010 | 0.039 | 0.012 | 0.004 | 0.001 | 0 | 0.005 | 0.002 | 0 | 0.0002 | 0.0004 | 0.001 | 0 | 0.0004 | 0 | 0.001 | 0.0005 | 0 | 0 | 0 | 0.07 | 0.07 | 0.07 |
| SeepC_2021_1_Q1 | 1/1/2021 | 1/18/2021 | 416 | 4496 | 0.063 | 0.287 | 0.094 | 0.029 | 0.013 | 0 | 0.037 | 0.014 | 0 | 0.0018 | 0.0022 | 0.003 | 0 | 0.0034 | 0 | 0.006 | 0.0033 | 0 | 0 | 0 | 0.54 | 0.54 | 0.54 |
| SeepC_2021_2_Q1 | 1/18/2021 | 1/29/2021 | 270 | 5571 | 0.089 | 0.421 | 0.120 | 0.029 | 0.012 | 0 | 0.043 | 0.012 | 0 | 0.0015 | 0.0039 | 0.006 | 0 | 0.0033 | 0 | 0.006 | 0.0040 | 0 | 0 | 0 | 0.75 | 0.75 | 0.75 |
| SeepC_2021_3_Q1 | 1/29/2021 | 2/26/2021 | 674 | 8647 | 0.129 | 0.611 | 0.216 | 0.061 | 0.025 | 0.0007 | 0.066 | 0.026 | 0 | 0.0029 | 0.0073 | 0.009 | 0 | 0.0059 | 0 | 0.009 | 0.0066 | 3.8E-05 | 0 | 0 | 1.12 | 1.12 | 1.21 |
| SeepC_2021_4_Q1 | 2/26/2021 | 2/28/2021 | 56 | 1068 | 0.006 | 0.024 | 0.009 | 0.003 | 0.001 | 0 | 0.003 | 0.001 | 0 | 0.0002 | 0.0004 | 0.001 | 0 | 0.0003 | 6.9E-05 | 0.000 | 0.0004 | 0 | 0 | 0 | 0.05 | 0.05 | 0.05 |
| SeepC_2021_5_Q1 | 3/1/2021 | 3/19/2021 | 444 | 11632 | 0.209 | 0.917 | 0.279 | 0.083 | 0.040 | 0.00086 | 0.101 | 0.041 | 0 | 0.0050 | 0.0076 | 0.009 | 0 | 0.0091 | 0 | 0.015 | 0.0086 | 0 | 0 | 0 | 1.63 | 1.74 | 1.74 |
| SeepC_2021_6_Q1 | 3/19/2021 | 3/31/2021 | 312 | 7632 | 0.122 | 0.633 | 0.198 | 0.062 | 0.019 | 0 | 0.076 | 0.028 | 0 | 0.0034 | 0.0066 | 0.008 | 0 | 0.0068 | 0 | 0.009 | 0.0068 | 0 | 0 | 0 | 1.14 | 1.14 | 1.14 |
| | | **Total** | **45,081** | **0.73** | **3.5** | **1.1** | **0.31** | **0.12** | **0.002** | **0.38** | **0.14** | **0** | **0.02** | **0.03** | **0.04** | **0.001** | **0.03** | **0.0001** | **0.05** | **0.04** | **0.00004** | **0** | **0** | **6.2** | **6.4** | **6.4** |

***Notes:***

1 - The calculated captured mass load is a product of the concentration difference in the influent and the effluent samples and total flow recorded at the influent for the sampling interval. Refer to the Cape Fear River PFAS Mass Loading Calculation Protocol Version 2 (Geosyntec, 2020d) for more details.

2 - Total Attachment C does not include Perfluorohepthanoic acid (PFHpA).

3 - Total Table 3+ (17 compounds) does not include R-PSDA, Hydrolyzed, PSDA, and R-EVE.

4 - Seep C was not operation for 47 hours between December 25 and 27, 2020 due to flooding.

# TABLE 6
## SUMMARY OF TOTAL PFAS MASS DISCHARGE AT TARHEEL FERRY ROAD BRIDGE
## Chemours Fayetteville Works, North Carolina

| Quarter | Field Sample ID | Collection Date | Hours Composited[1] | Concentrations (ng/L) | | | Total Volume ($ft^3$)[4] | Instantaneous Flow Rate ($ft^3/s$)[5] | Mass Discharge (mg/s) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Total Attachment C[2] | Total Table 3+ (17 compounds)[3] | Total Table 3+ (20 compounds) | | | Total Attachment C[2] | Total Table 3+ (17 compounds)[3] | Total Table 3+ (20 compounds) |
| 2021 Q1 | CFR-TARHEEL-010621 | 1/6/21 12:10 | 0 | 9.3 | 9.3 | 9.3 | -- | 19,900 | 5.2 | 5.2 | 5.2 |
| 2021 Q1 | CFR-TARHEEL-010721 | 1/7/21 11:00 | 0 | 7 | 7 | 7 | -- | 18,900 | 3.7 | 3.7 | 3.7 |
| 2021 Q1 | CFR-TARHEEL-011121 | 1/11/21 10:30 | 0 | 24 | 24 | 31 | -- | 14,600 | 9.9 | 9.9 | 13 |
| 2021 Q1 | CFR-TARHEEL-011421 | 1/14/21 12:40 | 0 | 42 | 42 | 51 | -- | 7,500 | 8.9 | 8.9 | 11 |
| 2021 Q1 | CFR-TARHEEL-24-012121 | 1/21/21 23:01 | 23 | 53 | 53 | 66 | 437,800,000 | -- | 7.9 | 7.9 | 9.8 |
| 2021 Q1 | CFR-TARHEEL-24-012221 | 1/22/21 23:01 | 23 | 55 | 55 | 70 | 419,760,000 | -- | 7.9 | 8 | 10 |
| 2021 Q1 | CAP0121-CFR-TARHEEL-012621 | 1/26/21 15:00 | 0 | 91 | 94 | 130 | -- | 4,910 | 13 | 13 | 18 |
| 2021 Q1 | CAP0121-CFR-TARHEEL-24-012721 | 1/27/21 15:10 | 23 | 67 | 67 | 88 | 627,500,000 | -- | 14 | 14 | 19 |
| 2021 Q1 | CFR-TARHEEL-24-012721 | 1/27/21 23:01 | 23 | 58 | 58 | 74 | 753,130,000 | -- | 15 | 15 | 19 |
| 2021 Q1 | CFR-TARHEEL-24-012821 | 1/28/21 23:01 | 23 | 44 | 44 | 55 | 1,059,400,000 | -- | 16 | 16 | 20 |
| 2021 Q1 | CFR-TARHEEL-020121 | 2/1/21 10:05 | 0 | 32 | 32 | 35 | -- | 14,800 | 13 | 13 | 15 |
| 2021 Q1 | CFR-TARHEEL-020421 | 2/4/21 16:35 | 0 | 19 | 19 | 24 | -- | 18,200 | 9.8 | 9.8 | 12 |
| 2021 Q1 | CFR-TARHEEL-020821 | 2/8/21 16:00 | 0 | 0 | 0 | 0 | -- | 17,900 | 0 | 0 | 0 |
| 2021 Q1 | CFR-TARHEEL-38-021221 | 2/12/21 14:01 | 38 | 62 | 62 | 73 | 1,164,200,000 | -- | 15 | 15 | 18 |
| 2021 Q1 | CFR-TARHEEL-021621 | 2/16/21 12:00 | 0 | 22 | 22 | 22 | -- | 25,000 | 16 | 16 | 16 |
| 2021 Q1 | CFR-TARHEEL-021921 | 2/19/21 13:35 | 0 | 38 | 38 | 46 | -- | 24,200 | 26 | 26 | 32 |
| 2021 Q1 | CFR-TARHEEL-022221 | 2/22/21 9:35 | 0 | 36 | 36 | 48 | -- | 18,900 | 19 | 19 | 26 |
| 2021 Q1 | CAP0221-CFR-TARHEEL-022421 | 2/24/21 15:15 | 0 | 71 | 75 | 88 | -- | 16,900 | 34 | 36 | 42 |
| 2021 Q1 | CFR-TARHEEL-022521 | 2/25/21 12:20 | 0 | 30 | 30 | 36 | -- | 16,200 | 14 | 14 | 17 |
| 2021 Q1 | CFR-TARHEEL-24-030521 | 3/5/21 23:01 | 23 | 22 | 22 | 34 | 1,481,400,000 | -- | 11 | 11 | 17 |
| 2021 Q1 | CFR-TARHEEL-24-030621 | 3/6/21 23:01 | 23 | 44 | 44 | 54 | 1,453,200,000 | -- | 22 | 22 | 27 |
| 2021 Q1 | CFR-TARHEEL-24-030821 | 3/8/21 23:01 | 23 | 22 | 22 | 28 | 1,345,800,000 | -- | 10 | 10 | 13 |
| 2021 Q1 | CFR-TARHEEL-24-031121 | 3/11/21 23:01 | 23 | 49 | 49 | 58 | 899,120,000 | -- | 15 | 15 | 18 |
| 2021 Q1 | CFR-TARHEEL-24-031521 | 3/15/21 23:01 | 23 | 45 | 45 | 53 | 743,000,000 | -- | 11 | 11 | 13 |
| 2021 Q1 | CFR-TARHEEL-24-031821 | 3/18/21 23:01 | 23 | 34 | 34 | 41 | 1,064,300,000 | -- | 12 | 12 | 15 |
| 2021 Q1 | CFR-TARHEEL-24-032421 | 3/24/21 23:01 | 23 | 65 | 75 | 120 | 673,680,000 | -- | 15 | 17 | 28 |
| 2021 Q1 | CFR-TARHEEL-24-032521 | 3/25/21 23:01 | 23 | 58 | 61 | 90 | 663,150,000 | -- | 13 | 14 | 20 |
| 2021 Q1 | CAP0321-CFR-TARHEEL-032921 | 3/29/21 12:10 | 0 | 14 | 14 | 20 | -- | 14,000 | 5.6 | 5.6 | 7.9 |
| 2021 Q1 | CAP0321-CFR-TARHEEL-21-033021 | 3/30/21 8:50 | 20 | 11 | 11 | 20 | 1,082,200,000 | -- | 4.7 | 4.6 | 8.6 |
| 2021 Q1 | CFR-TARHEEL-24-032921 | 3/29/21 23:01 | 23 | 16 | 16 | 20 | 1,181,300,000 | -- | 6.5 | 6.5 | 8.1 |
| 2021 Q1 | CFR-TARHEEL-24-033121 | 3/31/21 23:01 | 23 | 15 | 15 | 18 | 1,391,600,000 | -- | 7.1 | 6.9 | 8.4 |
| 2021 Q1 | CFR-TARHEEL-24-033121-D | 3/31/21 23:01 | 23 | 15 | 15 | 18 | 1,391,600,000 | -- | 7.1 | 7.2 | 8.7 |

***Notes:***

1 - Samples with a compositing duration of zero (0) hours are grab samples.

2 - Total flow volume is determined based on measurements taken over the sample collection period.

3 - For samples with a duration of zero (0) hours, i.e., grab samples, the instantaneous flow rate was used to calculated the mass discharge.

4 - Total Attachment C does not include Perfluorohepthanoic acid (PFHpA).

5 - Total Table 3+ (17 compounds) does not include R-PSDA, Hydrolyzed, PSDA, and R-EVE.

-- - not applicable

ng/L - nanograms per liter

$ft^3$ - cubic feet

mg/s - milligrams per second

**TABLE 7**
**PFAS MASS LOADING MODEL POTENTIAL PATHWAYS**
**Chemours Fayetteville Works, North Carolina**

| Transport Pathway Number | Potential PFAS Transport Pathway | Analytical Data Source for Mass Loading Model[1] | Flow Data Source for Mass Loading Model[1] |
|---|---|---|---|
| 1 | Upstream River and Groundwater | Measured from Cape Fear River Mile 76 samples collected in January 2021, from Cape Fear DCO sample collected in February 2021, and from Cape Fear 2517 Boat Ramp sample collected in March 2021 as reported in Appendix A Table A5. | Measured flow rates from USGS gauging station at W.O. Huske Dam during January, February, March 2021 volumetrically adjusted for flow pathways between River Mile 76 and W.O. Huske Dam[2]. |
| 2 | Willis Creek | Measured from Willis Creek samples collected in January, February, March 2021 as reported in Appendix A Table A5. | Measured flow rates through point velocity method during January, February, March 2021 as reported in Appendix B. |
| 3 | Aerial Deposition on River | Estimated from air deposition modeling[3]. | Estimated from air deposition modeling[3]. |
| 4 | Outfall 002 | Measured from Outfall 002 samples collected in January, February, March 2021 as reported in Appendix A Table A5. | Measured daily Outfall 002 flow rates recorded in Facility discharge monitoring reports, summarized in Appendix B. |
| 5 | Onsite Groundwater | Measured from monitoring well samples collected in January, February, March 2021 as reported in Appendix A Table A7. | Estimated as the sum of the mass flux from the Black Creek Aquifer calculated from a transect along the Cape Fear River. Further details and supporting calculations provided in Appendix E. |
| 6 | Seeps | Measured from Seeps A, B, C, and D samples collected in January, February, March 2021 as reported in Appendix A Table A5. | Measured flow rates through point velocity method and flumes during January, February, March 2021 as reported in Appendix B. |
| 7 | Old Outfall 002 | Measured from Old Outfall 002 sample collected in January, February, March 2021 as reported in Appendix A Table A5. | Measured flow rates through point velocity method during January, February, March 2021 as reported in Appendix B. |
| 8 | Adjacent and Downstream Groundwater | Estimated using a scaling factor applied to upstream mass discharge. Refer to Cape Fear River PFAS Mass Loading Calculation Protocol Version 2 (Geosyntec, 2020d) for details. | Estimated using a scaling factor applied to upstream mass discharge. Refer to Cape Fear River PFAS Mass Loading Calculation Protocol Version 2 (Geosyntec, 2020d) for details. |
| 9 | Georgia Branch Creek | Measured from Georgia Branch Creek sample collected in January, February, March 2021 as reported in Appendix A Table A5. | Measured flow rates through point velocity method during January, February, March 2021 as reported in Appendix B. |

***Notes:***

1 - Flow and concentration data are multiplied together to estimate the PFAS mass discharge in the Cape Fear River originating from each pathway.

2 - Cape Fear River flow rates measured at USGS gauging station #02105500 located at William O Huske Lock & Dam accessed from https://waterdata.usgs.gov on 2021-04-30 at 12:00 EDT.

3 - ERM, 2018. Modeling Report: HFPO-DA Atmospheric Deposition and Screening Groundwater Effects. 27 April 2018.

**TABLE 8A**
**SUMMARY OF TOTAL PFAS MASS DISCHARGE BY PATHWAY BEFORE REMEDIES -JANUARY 2021**
**Chemours Fayetteville Works, North Carolina**

| Pathway | Pathway Name | Total Flow Volume on Sample Date (MG)[1] | Total Attachment C[5] | | Total Table 3+ (17 compounds)[6] | | Total Table 3+ (20 compounds) | |
|---|---|---|---|---|---|---|---|---|
| | | | Concentration (ng/L) | Mass Loading (mg/s) | Concentration (ng/L) | Mass Loading (mg/s) | Concentration (ng/L) | Mass Loading (mg/s) |
| 1 | Upstream River Water and Groundwater[2] | 4,407 | 0.0 | 0.0 | 0.0 | 0.0 | 3.7 | 0.7 |
| 2 | Willis Creek | 15.69 | 1,100 | 0.76 | 1,100 | 0.76 | 1,100 | 0.76 |
| 3 | Aerial Deposition on Water Features | -- | -- | 0.01 | -- | 0.01 | -- | 0.01 |
| 4 | Outfall 002[3] | 18 | 800 | 0.63 | 860 | 0.68 | 1,700 | 1.34 |
| 5 | Onsite Groundwater (Lower Bound)[4] | -- | -- | 2.29 | -- | 2.29 | -- | 2.31 |
| | Onsite Groundwater (Upper Bound)[4] | -- | -- | 3.3 | -- | 3.3 | -- | 3.3 |
| 6A | Seep A | 0.30 | 91,000 | 1.21 | 94,000 | 1.25 | 110,000 | 1.46 |
| 6B | Seep B | 0.18 | 170,000 | 1.36 | 170,000 | 1.36 | 190,000 | 1.52 |
| 6C | Seep C[7] | 0.10 | 150,000 | 0.63 | 150,000 | 0.63 | 150,000 | 0.63 |
| 6D | Seep D | 0.38 | 140,000 | 2.36 | 140,000 | 2.36 | 150,000 | 2.52 |
| 6E | Lock and Dam Seep | 0.05 | 40,000 | 0.09 | 40,000 | 0.09 | 41,000 | 0.09 |
| 7 | Old Outfall 002[7] | 1.23 | 64,000 | 3.46 | 65,000 | 3.51 | 67,000 | 3.62 |
| 8 | Offsite Adjacent and Downstream Groundwater | -- | -- | 0.00 | -- | 0.00 | -- | 0.27 |
| 9 | Georgia Branch Creek | 11.84 | 1,400 | 0.73 | 1,500 | 0.78 | 1,600 | 0.83 |
| **Calculated Total Table 3+ Loading (mg/s) at Tar Heel (Lower Bound)** | | | | **13.5** | | **13.7** | | **16.1** |
| **Calculated Total Table 3+ Loading (mg/s) at Tar Heel (Upper Bound)** | | | | **14.5** | | **14.7** | | **17.1** |
| **Measured Total Table 3+ Loading (mg/s) at Tar Heel** | | **4,890** | **67** | **14.4** | **67** | **14.4** | **88** | **18.9** |

***Notes:***

1 - Total flow volume is determined based on measurements taken over 24-hour sample collection period for all locations except Seeps A and B, Lock and Dam Seep, Old Outfall 002, Georgia Branch Creek and Willis Creek. At these locations, the total flow volume was estimated based on the instantaneous flow measurement.

2 - The volumetric flow rate for upstream river water and groundwater was estimated by subtracting inflows from Willis Creek, upwelling groundwater, seeps to the river, and Outfall 002 and by adding the river water intake from Chemours to the flow rate measurement from the W.O. Huske Dam.

3 - Total PFAS concentrations at the Intake River Water at Facility location are subtracted from Outfall 002 concentrations to compute the mass discharge at Outfall 002.

4 - Mass Discharge for Onsite Groundwater was determined using calculations described in Appendix E. The lower and upper bounds on the mass discharge were calculated calculated using two different contour elevation differences in the vicinity of the river frontage: a ten-foot elevation difference (between the 40 and 50 ft contours) and a twenty-foot elevation difference (between the 40 and 60 ft contours) as described in Appendix E.

5 - Mass dicharge calculations for Total Attachment C does not include Perfluorohepthanoic acid (PFHpA).

6 - Total Table 3+ (17 compounds) does not include R-PSDA, Hydrolyzed, PSDA, and R-EVE.

7 - For January 2021, the concentrations from the influent samples collected at the Old Outfall 002 treatment system and Seep C flow-through cell were used to calculate the Before Remedy mass discharge for these pathways.

**TABLE 8B**
**SUMMARY OF TOTAL PFAS MASS DISCHARGE BY PATHWAY AFTER REMEDIES - JANUARY 2021**
**Chemours Fayetteville Works, North Carolina**

| Pathway | Pathway Name | Total Flow Volume on Sample Date (MG)[1] | Total Attachment C[5] | | Total Table 3+ (17 compounds)[6] | | Total Table 3+ (20 compounds) | |
|---|---|---|---|---|---|---|---|---|
| | | | Concentration (ng/L) | Mass Loading (mg/s) | Concentration (ng/L) | Mass Loading (mg/s) | Concentration (ng/L) | Mass Loading (mg/s) |
| 1 | Upstream River Water and Groundwater[2] | 4,407 | 0.0 | 0.0 | 0.0 | 0.0 | 3.7 | 0.7 |
| 2 | Willis Creek | 15.69 | 1,100 | 0.76 | 1,100 | 0.76 | 1,100 | 0.76 |
| 3 | Aerial Deposition on Water Features | -- | -- | 0.01 | -- | 0.01 | -- | 0.01 |
| 4 | Outfall 002[3] | 18 | 800 | 0.63 | 860 | 0.68 | 1,700 | 1.34 |
| 5 | Onsite Groundwater (Lower Bound)[4] | -- | -- | 2.29 | -- | 2.29 | -- | 2.31 |
| | Onsite Groundwater (Upper Bound)[4] | -- | -- | 3.3 | -- | 3.3 | -- | 3.3 |
| 6A | Seep A | 0.30 | 91,000 | 1.21 | 94,000 | 1.25 | 110,000 | 1.46 |
| 6B | Seep B | 0.18 | 170,000 | 1.36 | 170,000 | 1.36 | 190,000 | 1.52 |
| 6C | Seep C[7] | 0.10 | 1,400 | 0.01 | 1,400 | 0.01 | 1,500 | 0.01 |
| 6D | Seep D | 0.38 | 140,000 | 2.36 | 140,000 | 2.36 | 150,000 | 2.52 |
| 6E | Lock and Dam Seep | 0.05 | 40,000 | 0.09 | 40,000 | 0.09 | 41,000 | 0.09 |
| 7 | Old Outfall 002[7] | 1.23 | 9,900 | 0.53 | 10,000 | 0.54 | 10,000 | 0.54 |
| 8 | Offsite Adjacent and Downstream Groundwater | -- | -- | 0.00 | -- | 0.00 | -- | 0.27 |
| 9 | Georgia Branch Creek | 11.84 | 1,400 | 0.73 | 1,500 | 0.78 | 1,600 | 0.83 |
| **Calculated Total Table 3+ Loading (mg/s) at Tar Heel (Lower Bound)** | | | | **10.0** | | **10.1** | | **12.4** |
| **Calculated Total Table 3+ Loading (mg/s) at Tar Heel (Upper Bound)** | | | | **11.0** | | **11.1** | | **13.4** |
| **Measured Total Table 3+ Loading (mg/s) at Tar Heel** | | **4,890** | **67** | **14.4** | **67** | **14.4** | **88** | **18.9** |

***Notes:***

1 - Total flow volume is determined based on measurements taken over 24-hour sample collection period for all locations except Seeps A and B, Lock and Dam Seep, Old Outfall 002, Georgia Branch Creek and Willis Creek. At these locations, the total flow volume was estimated based on the instantaneous flow measurement.

2 - The volumetric flow rate for upstream river water and groundwater was estimated by subtracting inflows from Willis Creek, upwelling groundwater, seeps to the river, and Outfall 002 and by adding the river water intake from Chemours to the flow rate measurement from the W.O. Huske Dam.

3 - Total PFAS concentrations at the Intake River Water at Facility location are subtracted from Outfall 002 concentrations to compute the mass discharge at Outfall 002.

4 - Mass Discharge for Onsite Groundwater was determined using calculations described in Appendix E. The lower and upper bounds on the mass discharge were calculated calculated using two different contour elevation differences in the vicinity of the river frontage: a ten-foot elevation difference (between the 40 and 50 ft contours) and a twenty-foot elevation difference (between the 40 and 60 ft contours) as described in Appendix E.

5 - Mass dicharge calculations for Total Attachment C does not include Perfluorohepthanoic acid (PFHpA).

6 - Total Table 3+ (17 compounds) does not include R-PSDA, Hydrolyzed, PSDA, and R-EVE.

7 - For January 2021, the concentrations from the Old Outfall 002 sample collected downgradient from the treatment system and the Seep C sample collected downgradient from the Seep C flow-through cell were used to calculate the After Remedy mass discharge for these pathways.

**TABLE 9A**
**SUMMARY OF TOTAL PFAS MASS DISCHARGE BY PATHWAY BEFORE REMEDIES-FEBRUARY 2021**
**Chemours Fayetteville Works, North Carolina**

| Pathway | Pathway Name | Total Flow Volume on Sample Date (MG)[1] | Total Attachment C[5] | | Total Table 3+ (17 compounds)[6] | | Total Table 3+ (20 compounds) | |
|---|---|---|---|---|---|---|---|---|
| | | | Concentration (ng/L) | Mass Loading (mg/s) | Concentration (ng/L) | Mass Loading (mg/s) | Concentration (ng/L) | Mass Loading (mg/s) |
| 1 | Upstream River Water and Groundwater[2] | 10,827 | 0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2 | Willis Creek | 15.69 | 1,400 | 0.96 | 1,400 | 0.96 | 1,600 | 1.10 |
| 3 | Aerial Deposition on Water Features | -- | | 0.01 | -- | 0.01 | | 0.01 |
| 4 | Outfall 002[3] | 11 | 255 | 0.12 | 275 | 0.13 | 403 | 0.20 |
| 5 | Onsite Groundwater (Lower Bound)[4] | -- | | 2.34 | -- | 2.34 | | 2.35 |
| | Onsite Groundwater (Upper Bound)[4] | -- | | 3.2 | -- | 3.2 | | 3.2 |
| 6A | Seep A | 0.30 | 190,000 | 2.52 | 200,000 | 2.65 | 220,000 | 2.91 |
| 6B | Seep B | 0.30 | 120,000 | 1.60 | 130,000 | 1.73 | 140,000 | 1.86 |
| 6C | Seep C[7] | 0.12 | 46,000 | 0.24 | 47,000 | 0.25 | 48,000 | 0.25 |
| 6D | Seep D | 0.23 | 120,000 | 1.20 | 120,000 | 1.20 | 120,000 | 1.20 |
| 6E | Lock and Dam Seep | 0.05 | 40,000 | 0.09 | 40,000 | 0.09 | 41,000 | 0.09 |
| 7 | Old Outfall 002[7] | 1.11 | 68,000 | 3.30 | 69,000 | 3.35 | 70,000 | 3.40 |
| 8 | Offsite Adjacent and Downstream Groundwater | -- | | 0.00 | | 0.00 | | 0.00 |
| 9 | Georgia Branch Creek | 5.28 | 1,700 | 0.39 | 1,800 | 0.42 | 1,900 | 0.44 |
| **Calculated Total Table 3+ Loading (mg/s) at Tar Heel (Lower Bound)** | | | | **12.8** | | **13.1** | | **13.8** |
| **Calculated Total Table 3+ Loading (mg/s) at Tar Heel (Upper Bound)** | | | | **13.6** | | **14.0** | | **14.7** |
| **Measured Total Table 3+ Loading (mg/s) at Tar Heel** | | **10,923** | **26** | **12.4** | **26** | **12.4** | **34** | **16.3** |

***Notes:***

1 - Total flow volume is determined based on measurements taken over 24-hour sample collection period for all locations except Seeps A through D, Lock and Dam Seep, Old Outfall 002, Georgia Branch Creek and Willis Creek. At these locations, the total flow volume was estimated based on the instantaneous flow measurement.

2 - The volumetric flow rate for upstream river water and groundwater was estimated by subtracting inflows from Willis Creek, upwelling groundwater, seeps to the river, and Outfall 002 and by adding the river water intake from Chemours to the flow rate measurement from the W.O. Huske Dam.

3 - Total PFAS concentrations at the Intake River Water at Facility location are subtracted from Outfall 002 concentrations to compute the mass discharge at Outfall 002.

4 - Mass Discharge for Onsite Groundwater was determined using calculations described in Appendix E. The lower and upper bounds on the mass discharge were calculated calculated using two different contour elevation differences in the vicinity of the river frontage: a ten-foot elevation difference (between the 40 and 50 ft contours) and a twenty-foot elevation difference (between the 40 and 60 ft contours) as described in Appendix E.

5 - Mass dicharge calculations for Total Attachment C does not include Perfluorohepthanoic acid (PFHpA).

6 - Total Table 3+ (17 compounds) does not include R-PSDA, Hydrolyzed, PSDA, and R-EVE.

7 - For February 2021, the concentrations from the influent samples collected at the Old Outfall 002 treatment system and Seep C flow-through cell were used to calculate the Before Remedy mass discharge for these pathways.

**TABLE 9B**
**SUMMARY OF TOTAL PFAS MASS DISCHARGE BY PATHWAY AFTER REMEDIES -FEBRUARY 2021**
**Chemours Fayetteville Works, North Carolina**

| Pathway | Pathway Name | Total Flow Volume on Sample Date (MG)[1] | Total Attachment C[5] | | Total Table 3+ (17 compounds)[6] | | Total Table 3+ (20 compounds) | |
|---|---|---|---|---|---|---|---|---|
| | | | Concentration (ng/L) | Mass Loading (mg/s) | Concentration (ng/L) | Mass Loading (mg/s) | Concentration (ng/L) | Mass Loading (mg/s) |
| 1 | Upstream River Water and Groundwater[2] | 10,838 | 0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2 | Willis Creek | 15.69 | 1,400 | 0.96 | 1,400 | 0.96 | 1,600 | 1.10 |
| 3 | Aerial Deposition on Water Features | -- | | 0.01 | -- | 0.01 | | 0.01 |
| 4 | Outfall 002[3] | 11 | 255 | 0.12 | 275 | 0.13 | 403 | 0.20 |
| 5 | Onsite Groundwater (Lower Bound)[4] | -- | | 2.34 | -- | 2.34 | | 2.35 |
| | Onsite Groundwater (Upper Bound)[4] | -- | | 3.2 | -- | 3.2 | | 3.2 |
| 6A | Seep A | 0.30 | 190,000 | 2.52 | 200,000 | 2.65 | 220,000 | 2.91 |
| 6B | Seep B | 0.30 | 120,000 | 1.60 | 130,000 | 1.73 | 140,000 | 1.86 |
| 6C | Seep C | 0.12 | 1,000 | 0.01 | 1,000 | 0.01 | 1,000 | 0.01 |
| 6D | Seep D | 0.23 | 120,000 | 1.20 | 120,000 | 1.20 | 120,000 | 1.20 |
| 6E | Lock and Dam Seep | 0.05 | 40,000 | 0.09 | 40,000 | 0.09 | 41,000 | 0.09 |
| 7 | Old Outfall 002[7] | 1.11 | 15,000 | 0.73 | 15,000 | 0.73 | 15,000 | 0.73 |
| 8 | Offsite Adjacent and Downstream Groundwater | -- | | 0.00 | | 0.00 | | 0.00 |
| 9 | Georgia Branch Creek | 5.28 | 1,700 | 0.39 | 1,800 | 0.42 | 1,900 | 0.44 |
| **Calculated Total Table 3+ Loading (mg/s) at Tar Heel (Lower Bound)** | | | | **10.0** | | **10.3** | | **10.9** |
| **Calculated Total Table 3+ Loading (mg/s) at Tar Heel (Upper Bound)** | | | | **10.8** | | **11.1** | | **11.8** |
| **Measured Total Table 3+ Loading (mg/s) at Tar Heel** | | **10,923** | **26** | **12.4** | **26** | **12.4** | **34** | **16.3** |

***Notes:***

1 - Total flow volume is determined based on measurements taken over 24-hour sample collection period for all locations except Seeps A through D, Lock and Dam Seep, Old Outfall 002, Georgia Branch Creek and Willis Creek. At these locations, the total flow volume was estimated based on the instantaneous flow measurement.

2 - The volumetric flow rate for upstream river water and groundwater was estimated by subtracting inflows from Willis Creek, upwelling groundwater, seeps to the river, and Outfall 002 and by adding the river water intake from Chemours to the flow rate measurement from the W.O. Huske Dam.

3 - Total PFAS concentrations at the Intake River Water at Facility location are subtracted from Outfall 002 concentrations to compute the mass discharge at Outfall 002.

4 - Mass Discharge for Onsite Groundwater was determined using calculations described in Appendix E. The lower and upper bounds on the mass discharge were calculated calculated using two different contour elevation differences in the vicinity of the river frontage: a ten-foot elevation difference (between the 40 and 50 ft contours) and a twenty-foot elevation difference (between the 40 and 60 ft contours) as described in Appendix E.

5 - Mass dicharge calculations for Total Attachment C does not include Perfluorohepthanoic acid (PFHpA).

6 - Total Table 3+ (17 compounds) does not include R-PSDA, Hydrolyzed, PSDA, and R-EVE.

7 - For February 2021, the concentrations from the Old Outfall 002 sample collected downgradient from the treatment system and effluent sample collected at the Seep C flow-through cell were used to calculate the After Remedy mass discharge for these pathways.

**TABLE 10A**
**SUMMARY OF TOTAL PFAS MASS DISCHARGE BY PATHWAY BEFORE REMEDIES - MARCH 2021**
**Chemours Fayetteville Works, North Carolina**

| Pathway | Pathway Name | Total Flow Volume on Sample Date (MG)[1] | Total Attachment C[5] | | Total Table 3+ (17 compounds)[6] | | Total Table 3+ (20 compounds) | |
|---|---|---|---|---|---|---|---|---|
| | | | Concentration (ng/L) | Mass Loading (mg/s) | Concentration (ng/L) | Mass Loading (mg/s) | Concentration (ng/L) | Mass Loading (mg/s) |
| 1 | Upstream River Water and Groundwater[2] | 10,309 | 0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2 | Willis Creek | 9.84 | 900 | 0.39 | 900 | 0.39 | 900 | 0.39 |
| 3 | Aerial Deposition on Water Features | -- | -- | 0.01 | -- | 0.01 | -- | 0.01 |
| 4 | Outfall 002[3] | 18 | 196 | 0.16 | 216 | 0.17 | 298 | 0.24 |
| 5 | Onsite Groundwater (Lower Bound)[4] | -- | -- | 2.77 | -- | 2.77 | -- | 2.81 |
| | Onsite Groundwater (Upper Bound)[4] | -- | -- | 3.6 | -- | 3.6 | -- | 3.7 |
| 6A | Seep A | 0.30 | 150,000 | 1.99 | 150,000 | 1.99 | 160,000 | 2.12 |
| 6B | Seep B | 0.15 | 210,000 | 1.38 | 220,000 | 1.44 | 260,000 | 1.71 |
| 6C | Seep C[7] | 0.10 | 150,000 | 0.63 | 150,000 | 0.63 | 150,000 | 0.63 |
| 6D | Seep D | 0.24 | 170,000 | 1.81 | 170,000 | 1.81 | 180,000 | 1.92 |
| 6E | Lock and Dam Seep | 0.02 | 140,000 | 0.14 | 140,000 | 0.14 | 150,000 | 0.15 |
| 7 | Old Outfall 002[7] | 1.42 | 64,000 | 3.98 | 64,000 | 3.98 | 67,000 | 4.17 |
| 8 | Offsite Adjacent and Downstream Groundwater | -- | -- | 0.00 | -- | 0.00 | -- | 0.00 |
| 9 | Georgia Branch Creek | 2.42 | 3,100 | 0.33 | 3,100 | 0.33 | 3,100 | 0.33 |
| **Calculated Total Table 3+ Loading (mg/s) at Tar Heel (Lower Bound)** | | | | **13.6** | | **13.7** | | **14.5** |
| **Calculated Total Table 3+ Loading (mg/s) at Tar Heel (Upper Bound)** | | | | **14.5** | | **14.5** | | **15.3** |
| **Measured Total Table 3+ Loading (mg/s) at Tar Heel[8]** | | **8,290** | **13** | **4.5** | **13** | **4.5** | **20** | **7.3** |

***Notes:***

1 - Total flow volume is determined based on measurements taken over 24-hour sample collection period for all locations except Seeps A through D, Lock and Dam Seep, Old Outfall 002, Georgia Branch Creek and Willis Creek. At these locations, the total flow volume was estimated based on the instantaneous flow measurement.

2 - The volumetric flow rate for upstream river water and groundwater was estimated by subtracting inflows from Willis Creek, upwelling groundwater, seeps to the river, and Outfall 002 and by adding the river water intake from Chemours to the flow rate measurement from the W.O. Huske Dam.

3 - Total PFAS concentrations at the Intake River Water at Facility location are subtracted from Outfall 002 concentrations to compute the mass discharge at Outfall 002.

4 - Mass Discharge for Onsite Groundwater was determined using calculations described in Appendix E. The lower and upper bounds on the mass discharge were calculated calculated using two different contour elevation differences in the vicinity of the river frontage: a ten-foot elevation difference (between the 40 and 50 ft contours) and a twenty-foot elevation difference (between the 40 and 60 ft contours) as described in Appendix E.

5 - Mass dicharge calculations for Total Attachment C does not include Perfluorohepthanoic acid (PFHpA).

6 - Total Table 3+ (17 compounds) does not include R-PSDA, Hydrolyzed, PSDA, and R-EVE.

7 - For March 2021, the concentrations from the influent samples collected at the Old Outfall 002 treatment system and Seep C flow-through cell were used to calculate the Before Remedy mass discharge for these pathways.

8 - For the March 2021 sampling event, a 24-hr composite sample could not be collected because of battery failure after 21 cycles. The average concentration between the grab sample and partial 24-hr composite sample were used in the calculation of mass dischrage.

**TABLE 10B**
**SUMMARY OF TOTAL PFAS MASS DISCHARGE BY PATHWAY AFTER REMEDIES - MARCH 2021**
**Chemours Fayetteville Works, North Carolina**

| Pathway | Pathway Name | Total Flow Volume on Sample Date (MG)[1] | Total Attachment C[5] | | Total Table 3+ (17 compounds)[6] | | Total Table 3+ (20 compounds) | |
|---|---|---|---|---|---|---|---|---|
| | | | Concentration (ng/L) | Mass Loading (mg/s) | Concentration (ng/L) | Mass Loading (mg/s) | Concentration (ng/L) | Mass Loading (mg/s) |
| 1 | Upstream River Water and Groundwater[2] | 10,309 | 0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2 | Willis Creek | 9.84 | 900 | 0.39 | 900 | 0.39 | 900 | 0.39 |
| 3 | Aerial Deposition on Water Features | -- | -- | 0.01 | -- | 0.01 | -- | 0.01 |
| 4 | Outfall 002[3] | 18 | 196 | 0.16 | 216 | 0.17 | 298 | 0.24 |
| 5 | Onsite Groundwater (Lower Bound)[4] | -- | -- | 2.77 | -- | 2.77 | -- | 2.81 |
| | Onsite Groundwater (Upper Bound)[4] | -- | -- | 3.6 | -- | 3.6 | -- | 3.7 |
| 6A | Seep A | 0.30 | 150,000 | 1.99 | 150,000 | 1.99 | 160,000 | 2.12 |
| 6B | Seep B | 0.15 | 210,000 | 1.38 | 220,000 | 1.44 | 260,000 | 1.71 |
| 6C | Seep C | 0.10 | 110 | 0.00 | 110 | 0.00 | 110 | 0.00 |
| 6D | Seep D | 0.24 | 170,000 | 1.81 | 170,000 | 1.81 | 180,000 | 1.92 |
| 6E | Lock and Dam Seep | 0.02 | 140,000 | 0.14 | 140,000 | 0.14 | 150,000 | 0.15 |
| 7 | Old Outfall 002[7] | 1.42 | 30,000 | 1.87 | 30,000 | 1.87 | 31,000 | 1.93 |
| 8 | Offsite Adjacent and Downstream Groundwater | -- | -- | 0.00 | -- | 0.00 | -- | 0.00 |
| 9 | Georgia Branch Creek | 2.42 | 3,100 | 0.33 | 3,100 | 0.33 | 3,100 | 0.33 |
| **Calculated Total Table 3+ Loading (mg/s) at Tar Heel (Lower Bound)** | | | | **10.8** | | **10.9** | | **11.6** |
| **Calculated Total Table 3+ Loading (mg/s) at Tar Heel (Upper Bound)** | | | | **11.7** | | **11.8** | | **12.5** |
| **Measured Total Table 3+ Loading (mg/s) at Tar Heel[8]** | | **8,290** | **13** | **4.5** | **13** | **4.5** | **20** | **7.3** |

***Notes:***

1 - Total flow volume is determined based on measurements taken over 24-hour sample collection period for all locations except Seeps A through D, Lock and Dam Seep, Old Outfall 002, Georgia Branch Creek and Willis Creek. At these locations, the total flow volume was estimated based on the instantaneous flow measurement.

2 - The volumetric flow rate for upstream river water and groundwater was estimated by subtracting inflows from Willis Creek, upwelling groundwater, seeps to the river, and Outfall 002 and by adding the river water intake from Chemours to the flow rate measurement from the W.O. Huske Dam.

3 - Total PFAS concentrations at the Intake River Water at Facility location are subtracted from Outfall 002 concentrations to compute the mass discharge at Outfall 002.

4 - Mass Discharge for Onsite Groundwater was determined using calculations described in Appendix E. The lower and upper bounds on the mass discharge were calculated calculated using two different contour elevation differences in the vicinity of the river frontage: a ten-foot elevation difference (between the 40 and 50 ft contours) and a twenty-foot elevation difference (between the 40 and 60 ft contours) as described in Appendix E.

5 - Mass dicharge calculations for Total Attachment C does not include Perfluorohepthanoic acid (PFHpA).

6 - Total Table 3+ (17 compounds) does not include R-PSDA, Hydrolyzed, PSDA, and R-EVE.

7 - For March 2021, the concentrations from the Old Outfall 002 sample collected downgradient from the treatment system and the Seep C sample collected downgradient from the Seep C flow-through cell were used to calculate the After Remedy mass discharge for these pathways.

8 - For the March 2021 sampling event, a 24-hr composite sample could not be collected because of battery failure after 21 cycles. The average concentration between the grab sample and partial 24-hr composite sample were used in the calculation of mass dischrage.

# TABLE 11
## CAPE FEAR RIVER TOTAL TABLE 3+ (17 COMPOUNDS)
## RELATIVE MASS DISCHARGE PER PATHWAY
## Chemours Fayetteville Works, North Carolina

| Pathway[1] | January 2021 | | February 2021 | | March 2021 | |
|---|---|---|---|---|---|---|
| | Lower | Upper | Lower | Upper | Lower | Upper |
| [1] Upstream River Water and Groundwater | 0% | 0% | 0% | 0% | 0% | 0% |
| [2] Willis Creek | 6% | 5% | 7% | 7% | 3% | 3% |
| [3] Aerial Deposition on Water Features | <1% | <1% | <1% | <1% | <1% | <1% |
| [4] Outfall 002 | 5% | 5% | 1% | 1% | 1% | 1% |
| [5] Onsite Groundwater | 17% | 23% | 18% | 23% | 20% | 25% |
| [6] Seeps | 41% | 39% | 45% | 42% | 44% | 41% |
| *Seeps (After Remedies)*[2] | *37%* | *34%* | *43%* | *41%* | *39%* | *37%* |
| [7] Old Outfall 002 | 26% | 24% | 25% | 24% | 29% | 27% |
| *Old Outfall 002 (After Remedies)*[2] | *3.9%* | *3.7%* | *5.5%* | *5.2%* | *14%* | *13%* |
| [8] Offsite Adjacent and Downstream Groundwater | 0% | 0% | 0% | 0% | 0% | 0% |
| [9] Georgia Branch Creek | 6% | 5% | 3% | 3% | 2% | 2% |

***Notes:***

1 - Relative contributions were calculated using the before remedies Total Table 3+ (17 compounds) model-estimated mass discharges (Tables 8A, 9A, and 10A). These relative contributions are presented as a range, which represents the upper and lower bound model estimates. Relative contributions for Total Attachment C and Total Table 3+ (20 compounds) are provided in Appendix A.

2 - For Old Outfall 002 and at Seep C, the relative contributions were also calcalated using the after remedies model-estimated mass discharges (Tables 8B, 9B, and 10B).

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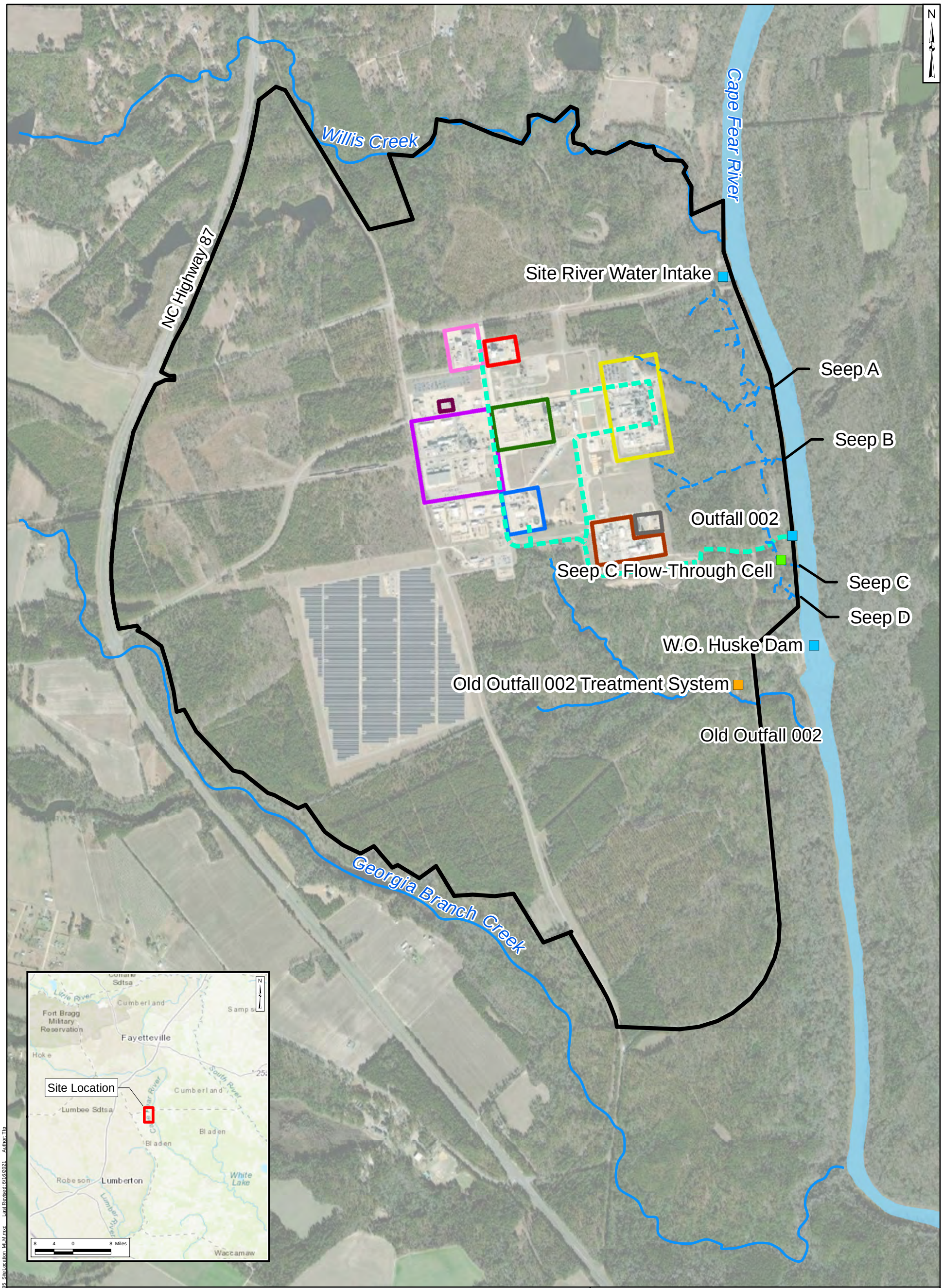
# FIGURES




Legend

- Seep C Flow-Through Cell
- Old Outfall 002 Treatment System
- Site Features
- Site Boundary
- Nearby Tributary
- Observed Seep (Natural Drainage)
- Site Conveyance Network

Areas at Site

- Chemours Monomers IXM
- Chemours Polymer Processing Aid Area
- DuPont Polyvinyl Fluoride Leased Area
- Former DuPont PMDF Area
- Kuraray SentryGlas® Leased Area
- Kuraray Trosifol® Leased Area
- Wastewater Treatment Plant
- Power - Filtered and Demineralized Water Production
- Kuraray Laboratory

Notes:
1. The outline of Cape Fear River is approximate and is based on open data from ArcGIS Online and North Carolina Department of Environmental Quality Online GIS (MajorHydro shapefile).
2. Basemap sources: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

1,000 500 0 1,000 Feet

**Site Location Map**

Chemours Fayetteville Works, North Carolina

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Figure 1

Path: P:\PR\Projects\TR0795\Database and GIS\GIS\Baseline Monitoring\Workplan\TR0795_Site Location_MLM.mxd Last Revised: 6/16/2021 Author: Tlp

Projection: NAD 1983 StatePlane North Carolina FIPS 3200 Feet; Units in Foot US

Virginia

North Carolina

South Carolina

Haw River

Deep River

Start of Cape Fear River

Little River

Greensboro

Raleigh

Fayetteville

Chemours Fayetteville Works

W.O. Huske Dam

Bladen Bluffs Intake

Tar Heel Ferry Road Bridge

Kings Bluff Intake Canal

Cape Fear River

Wilmington

N

Legend

- Chemours Fayetteville Works
- Upper Basin
- Middle Basin
- Lower Basin

Note:
Basemap sources: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community.

20 10 0 20 Miles

**Cape Fear River Watershed and Downstream Drinking Water Intakes**

Chemours Fayetteville Works, North Carolina

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Figure 2

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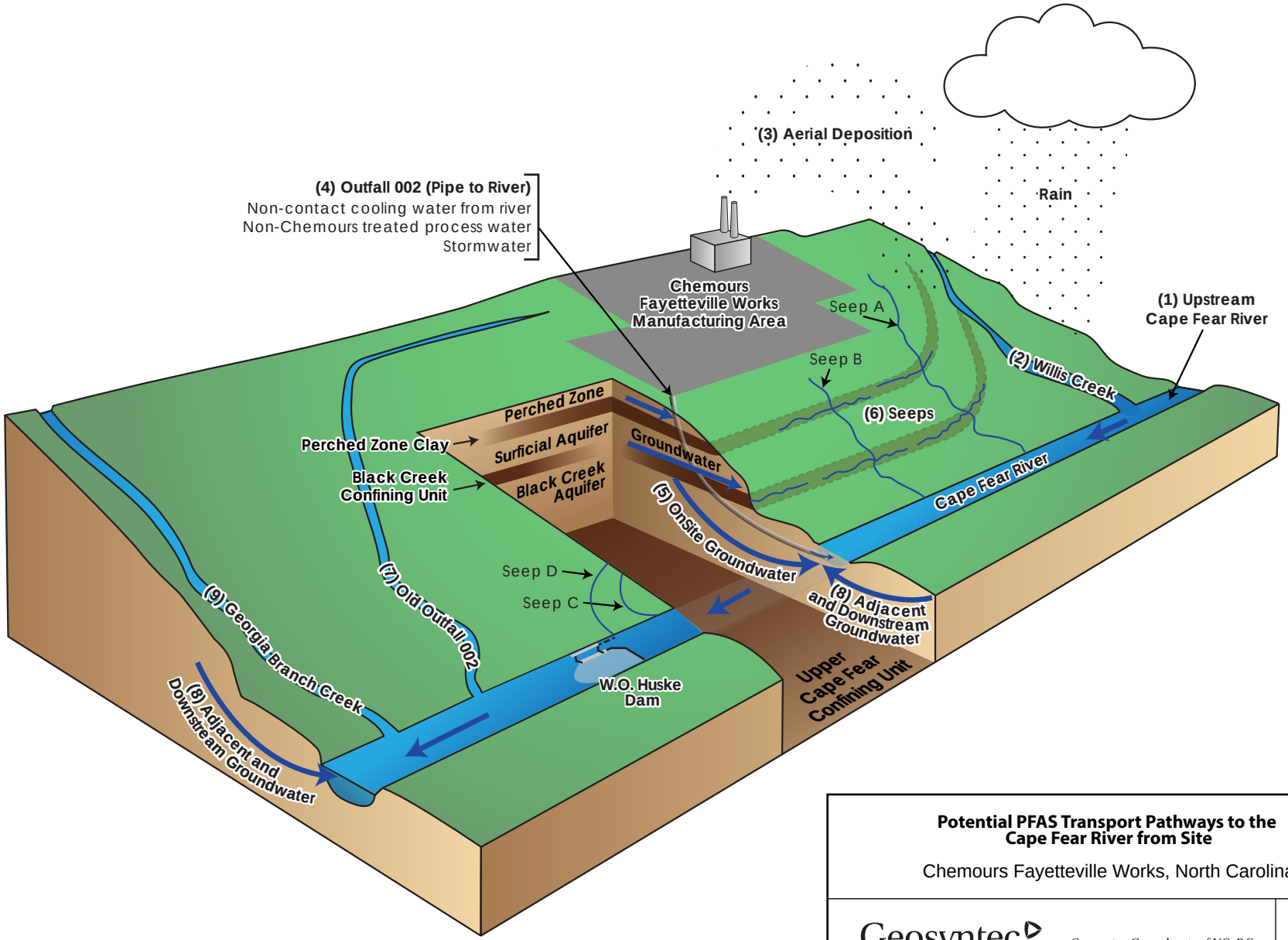
Path: P:\PR_B\Projects\TR0795\Database and GIS\GIS\Baseline Monitoring Workplan\TR0795_Cape Fear River Watershed and Downstream Intakes.mxd; TP; 06/16/2021

Projection: NAD 1983 StatePlane North Carolina FIPS 3200 Feet; Units in Foot US




Note: Image is conceptual and is not to scale

**Potential PFAS Transport Pathways to the Cape Fear River from Site**

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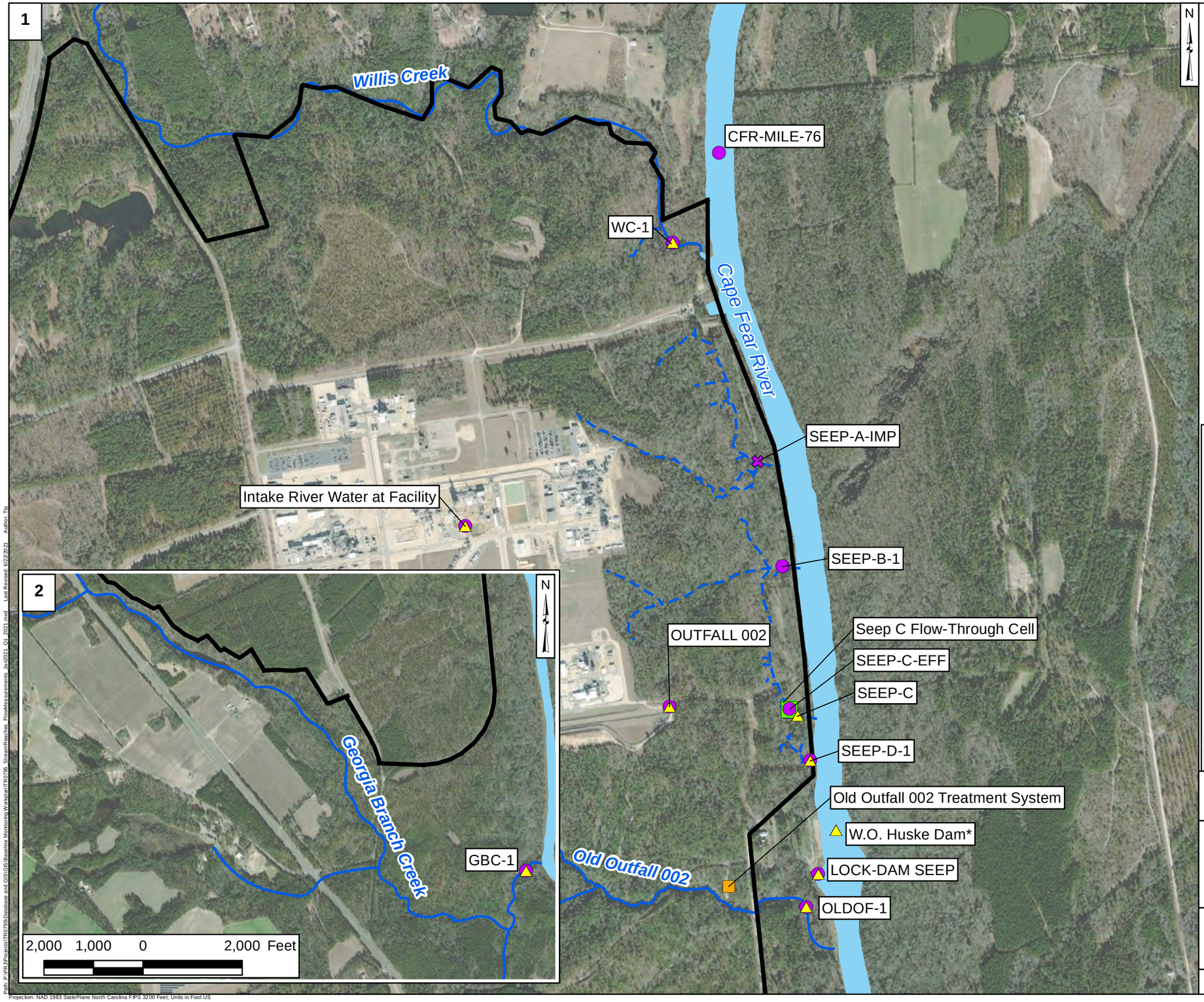
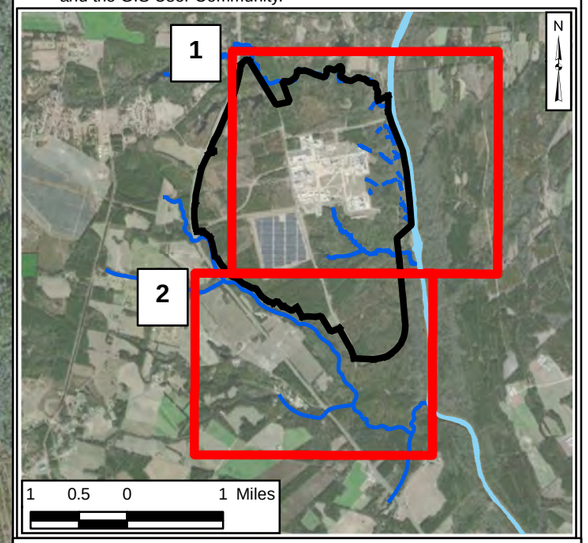
Figure **3**

Data/PRJ/Projects/TR0795/Database and GIS/Illustrator/3D CSM Illustration/ConceptualSiteModel_Dec2020.ai




Legend

- Flow Measurement Location
- Sample Location
- Sample Location (alternate)
- Seep C Flow-Through Cell
- Old Outfall 002 Treatment System
- Observed Seep
- Nearby Tributary
- Site Boundary

Notes:

* - Flow measurement was taken at W.O. Huske Dam - USGS

1. Flow at Seep C and Seep D was measured using a flume.
2. Flow at Old Outfall 002, Willis Creek, and Georgia Branch Creek, were measured using flow velocity method. Seep A flume measurements contained many negative values and were not used in the mass loading model. Flow at Seep B could not be measured during the January 2021 event. Due to low flow, the Lock and Dam seep flow was manually measured using a stopwatch and volumetric container.
3. For Seeps A and B, flows were estimated using median flows of wet weather events measured at the flumes over 2020 historical periods.
4. Results of estimated flow at these locations are provided in Table A3.
5. The outline of Cape Fear River is approximate and is based on open data from ArcGIS Online and North Carolina Department of Environmental Quality Online GIS.
6. Basemap sources: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community.

1,000 500 0 1,000 Feet

**Sample and Flow Measurement Locations - January 2021**

Chemours Fayetteville Works, North Carolina

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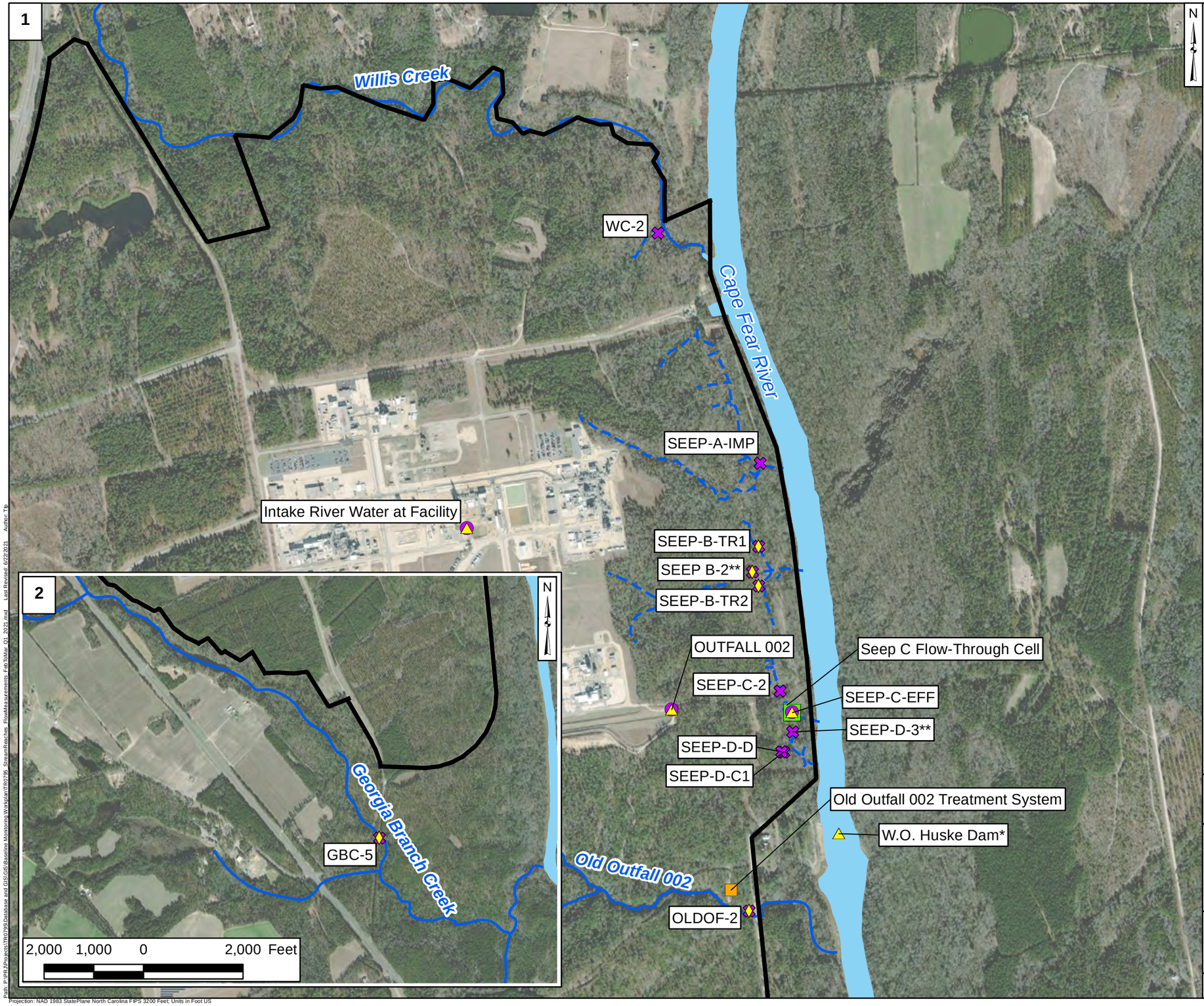
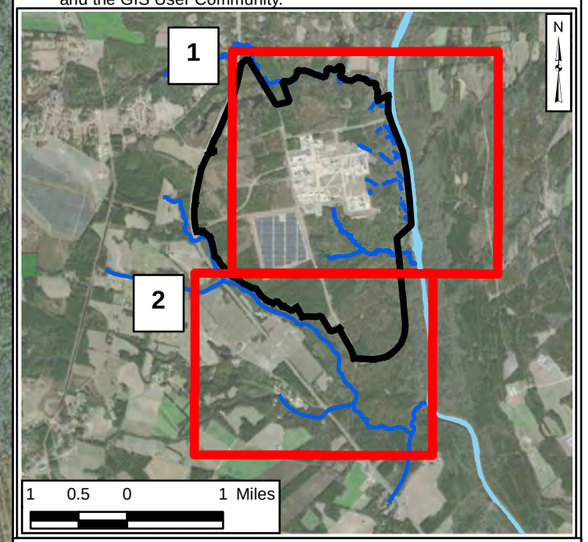
Figure **4A**

Path: P:\PRJ\Projects\TR0795\Database and GIS\GIS\Baseline Monitoring\Workplan\TR0795_StreamReaches_FlowMeasurements_Jan2021_Q1_2021.mxd Last Revised: 6/22/2021 Author: Tip

Projection: NAD 1983 StatePlane North Carolina FIPS 3200 Feet; Units in Foot US




Legend

- Flow Measurement Location (alternate)
- Flow Measurement Location
- Sample Location (alternate)
- Sample Location
- Seep C Flow-Through Cell
- Old Outfall 002 Treatment System
- Observed Seep
- Nearby Tributary
- Site Boundary

Notes:

* - Flow measurement was taken at W.O. Huske Dam - USGS

** - This location represents the maximum concentration used in the mass loading model calculations.

1. Flow at Old Outfall 002, Georgia Branch Creek, Seep A, Seep B, Seep C, and Seep D were measured using flow velocity method. Flow at Willis Creek could not be measured during the February 2021 event. Flow measurement and sample collection at Lock and Dam could not be obtained during the February 2021 event.
2. For Seeps A and D, flows were estimated using median flows of wet weather events measured at the flumes over 2020 historical periods.
3. Results of estimated flow at these locations are provided in Table A3.
4. The outline of Cape Fear River is approximate and is based on open data from ArcGIS Online and North Carolina Department of Environmental Quality Online GIS.
5. Basemap sources: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community.

1,000 500 0 1,000 Feet

**Sample and Flow Measurement Locations - February 2021**

Chemours Fayetteville Works, North Carolina

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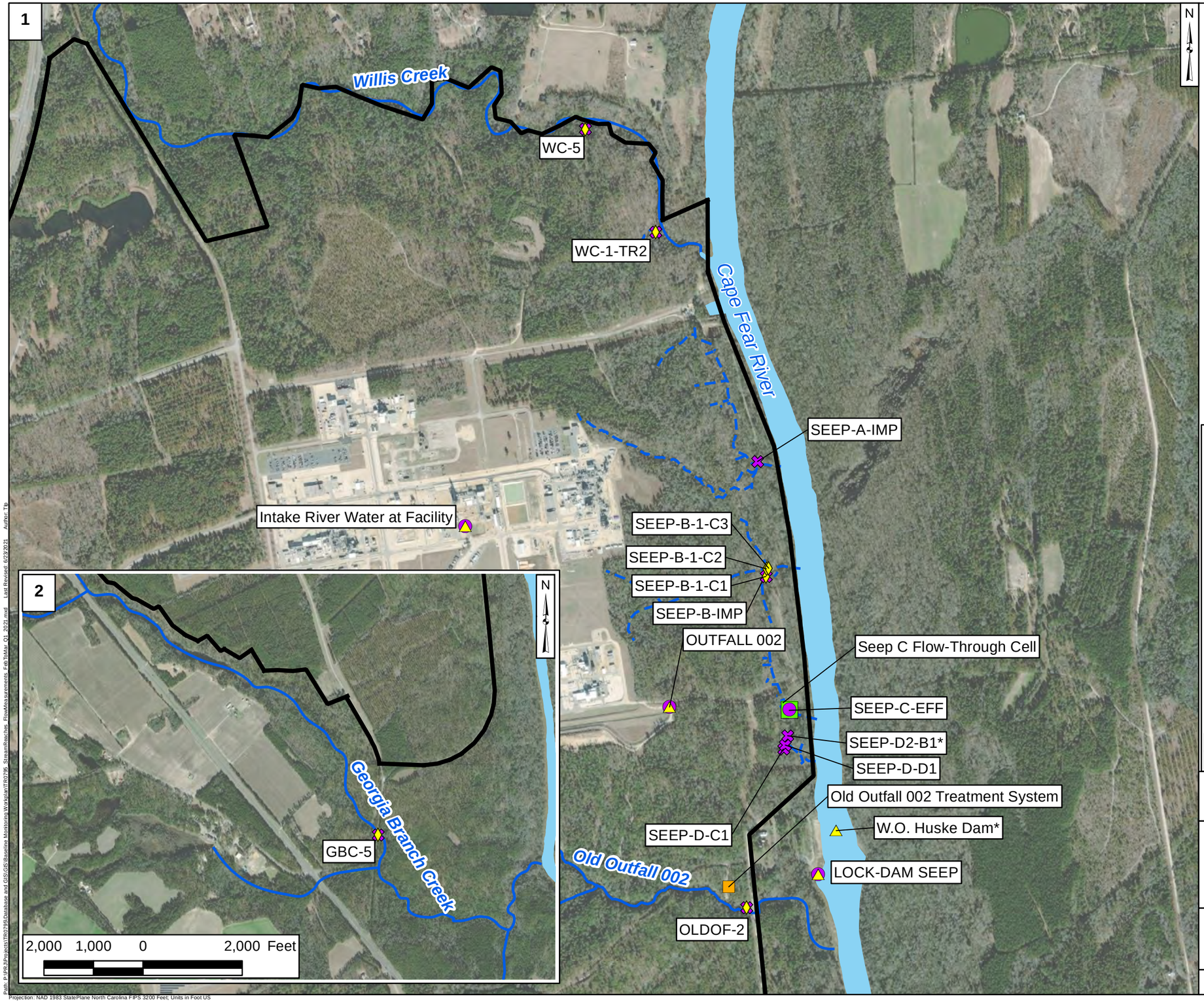
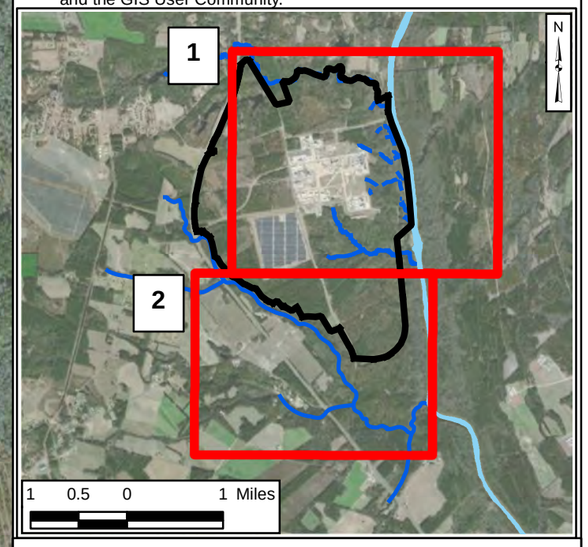
Figure **4B**

Path: P:\PR\Projects\TR0795\Database and GIS\GIS\Baseline Monitoring Workplan\TR0795_StreamReaches_FlowMeasurements_FebToMar_Q1_2021.mxd Last Revised: 6/22/2021 Author: Tlp

Projection: NAD 1983 StatePlane North Carolina FIPS 3200 Feet; Units in Foot US




Legend

- Flow Measurement Location (alternate)
- Flow Measurement Location
- Sample Location (alternate)
- Sample Location
- Seep C Flow-Through Cell
- Old Outfall 002 Treatment System
- Observed Seep
- Nearby Tributary
- Site Boundary

Notes:

* - Flow measurement was taken at W.O. Huske Dam - USGS

** - This location represents the maximum concentration used in the mass loading model calculations.

1. Flow at Old Outfall 002, Willis Creek, Georgia Branch Creek, Seep A, Seep B, Seep C, and Seep D were measured using flow velocity method. Due to low flow, the Lock and Dam seep flow was manually measured using a stopwatch and volumetric container.
2. For Seeps A, C, and D, flows were estimated using median flows of wet weather events measured at the flumes over 2020 historical periods.
3. Results of estimated flow at these locations are provided in Table A3.
4. The outline of Cape Fear River is approximate and is based on open data from ArcGIS Online and North Carolina Department of Environmental Quality Online GIS.
5. Basemap sources: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community.

1,000 500 0 1,000 Feet

**Sample and Flow Measurement Locations - March 2021**

Chemours Fayetteville Works, North Carolina

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Figure 4C

Path: P:\PR\Projects\TR0795\Database and GIS\GIS\Baseline Monitoring Workplan\TR0795_StreamReaches_FlowMeasurements_FebToMar_Q1_2021.mxd Last Revised: 6/23/2021 Author: Tlp

Projection: NAD 1983 StatePlane North Carolina FIPS 3200 Feet; Units in Foot US

1

CFR-DCO

CFR-2517BoatRamp

CFR-MILE-76

CFR-BLADEN

CFR-TARHEEL

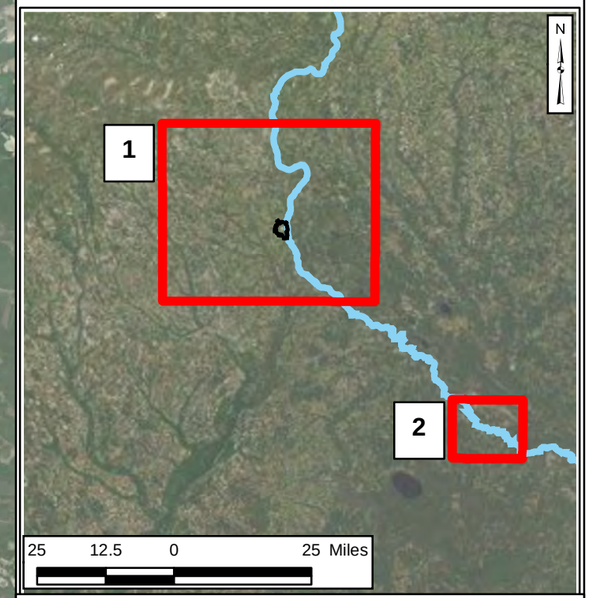
N

Legend

- Sample Location (alternate)
- Sample Location
- Site Boundary
- Cape Fear River

Notes:

1. The outline of Cape Fear River is approximate and is based on open data from ArcGIS Online and North Carolina Department of Environmental Quality Online GIS.
2. CFR-MILE-76 could not be sampled in February and March 2021. CFR-DCO was sampled in February 2021 and CFR-2517BoatRamp was sampled in March 2021.
3. Basemap sources: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community.




2 - Downstream

CFR-KINGS

N

2 1 0 2 Miles

2 1 0 2 Miles

**Cape Fear River Sample Locations - Q1 2021**

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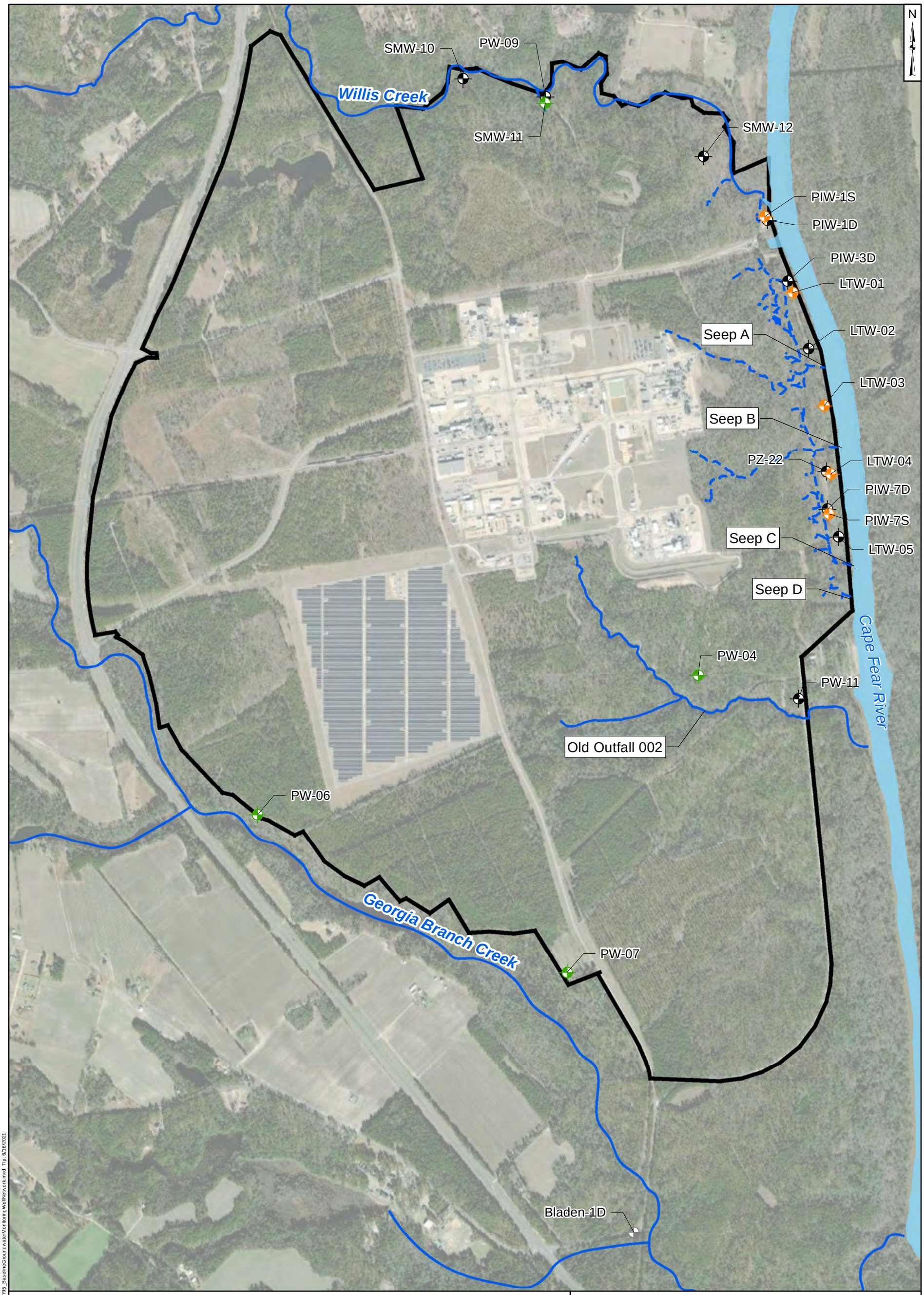
Figure 5

Path: P:\PR\Projects\TR0795\Database and GIS\GIS\Baseline Monitoring Workplan\TR0795_CapeFearRiverSampleLocations_Q12021.mxd Last Revised: 6/16/2021 Author: Tip

Projection: NAD 1983 StatePlane North Carolina FIPS 3200 Feet; Units in Foot US




Legend

- Surficial Aquifer
- Floodplain Deposits
- Black Creek Aquifer
- Damaged
- Observed Seep
- Nearby Tributary
- Site Boundary

Notes:
1. Due to the scale of the map, pairs of wells that are in close proximity have been offset for visibility. Therefore, the placement of these wells on this map do not reflect their true geographic coordinates.
2. The outline of Cape Fear River is approximate and is based on open data from ArcGIS Online and North Carolina Department of Environmental Quality Online GIS.
3. Basemap source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community.

1,000 500 0 1,000 Feet

**Groundwater Wells for Mass Loading Assessment**

Chemours Fayetteville Works, North Carolina

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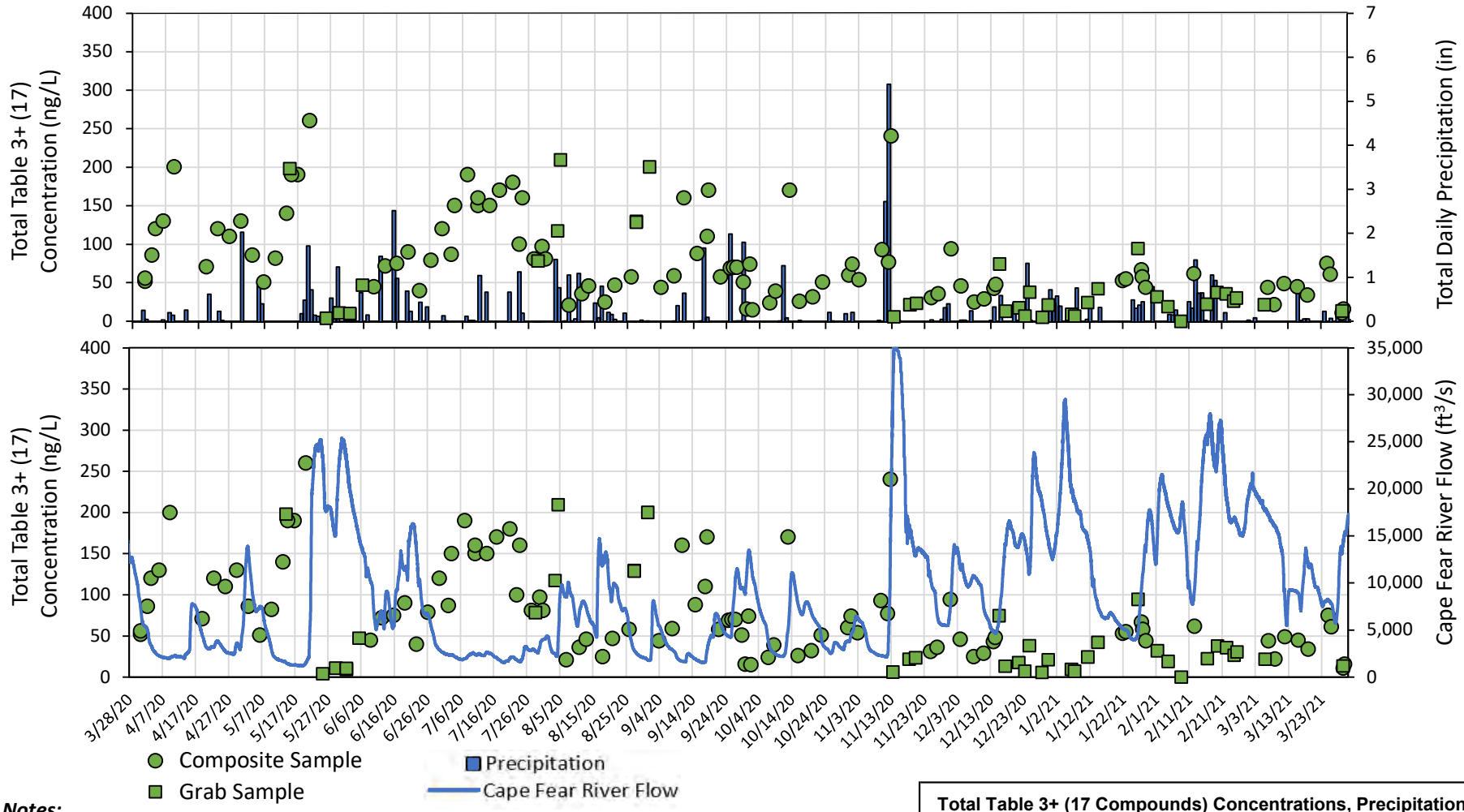
Figure 6

Path: P:\PRJ\Projects\TR0795\Database and GIS\GIS\Baseline Monitoring Workplan\TR0795_BaselineGroundwaterMonitoringWellNetwork.mxd; Tlp; 6/16/2021

Projection: NAD 1983 StatePlane North Carolina FIPS 3200 Feet; Units in Foot US




***Notes:***

-Total Table 3+ concentrations calculated by summing over Attachment C compounds and Table 3+ (20 compounds) are provided in Appendix A.

-Precipitation data are from the USGS monitoring site at the W.O. Huske Dam.

***Abbrevations:***

in - inches

ng/L - nanograms per liter

$ft^3/s$ - cubic feet per seconds

**Total Table 3+ (17 Compounds) Concentrations, Precipitation and Daily Flow at Tar Heel Ferry Road Bridge**

Chemours Fayetteville Works, North Carolina

Geosyntec consultants

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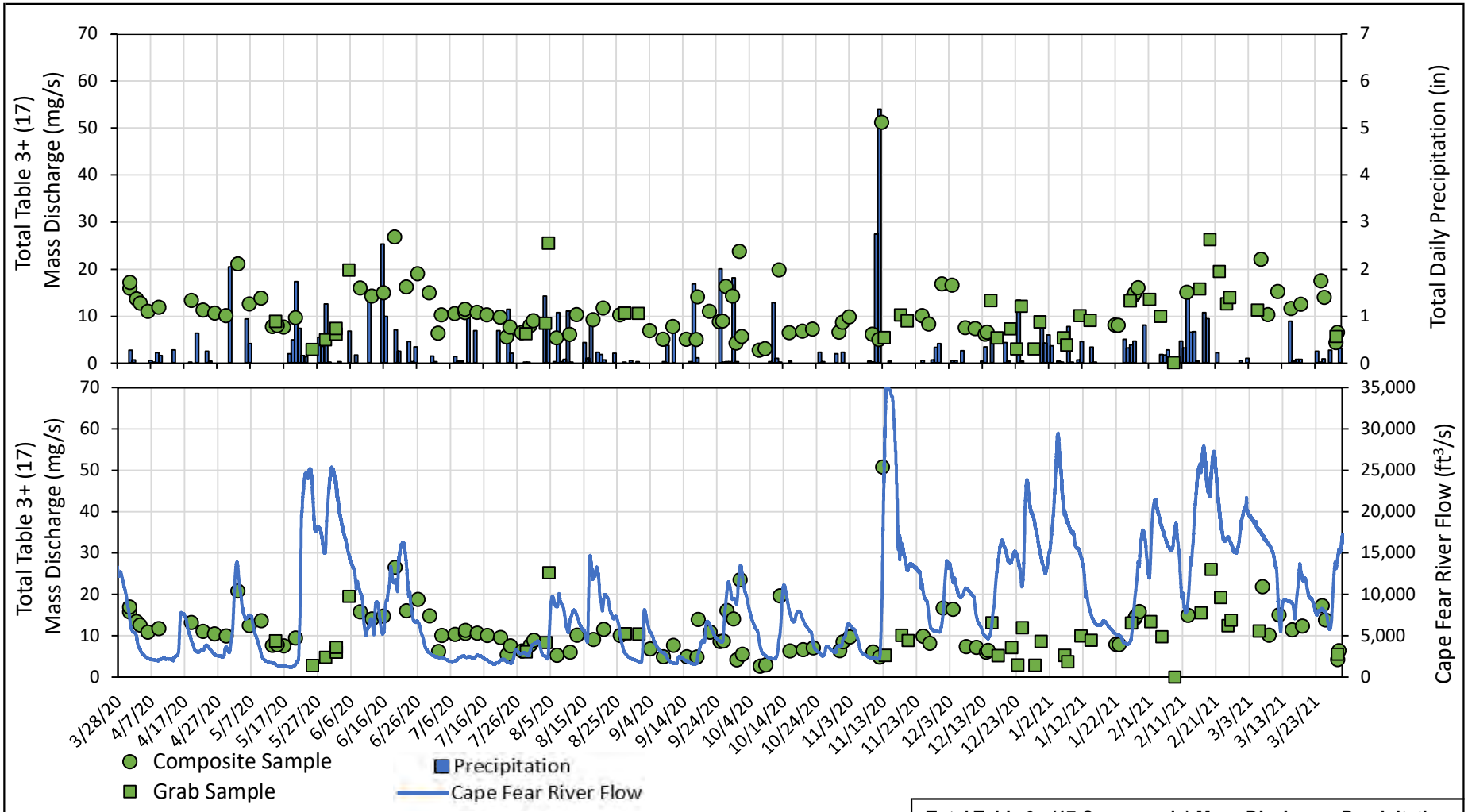
Figure 7




***Notes:***

-Total PFAS mass discharges calculated by summing over Table 3+ compounds (20 compounds) are provided in Table 6.

-Precipitation data are from the USGS monitoring site at the W.O. Huske Dam.

***Abbrevations:***

in - inches

mg/s - milligrams per seconds

$ft^3/s$ - cubic feet per seconds

**Total Table 3+ (17 Compounds) Mass Discharge, Precipitation and Daily Flow at Tar Heel Ferry Road Bridge**

Chemours Fayetteville Works, North Carolina

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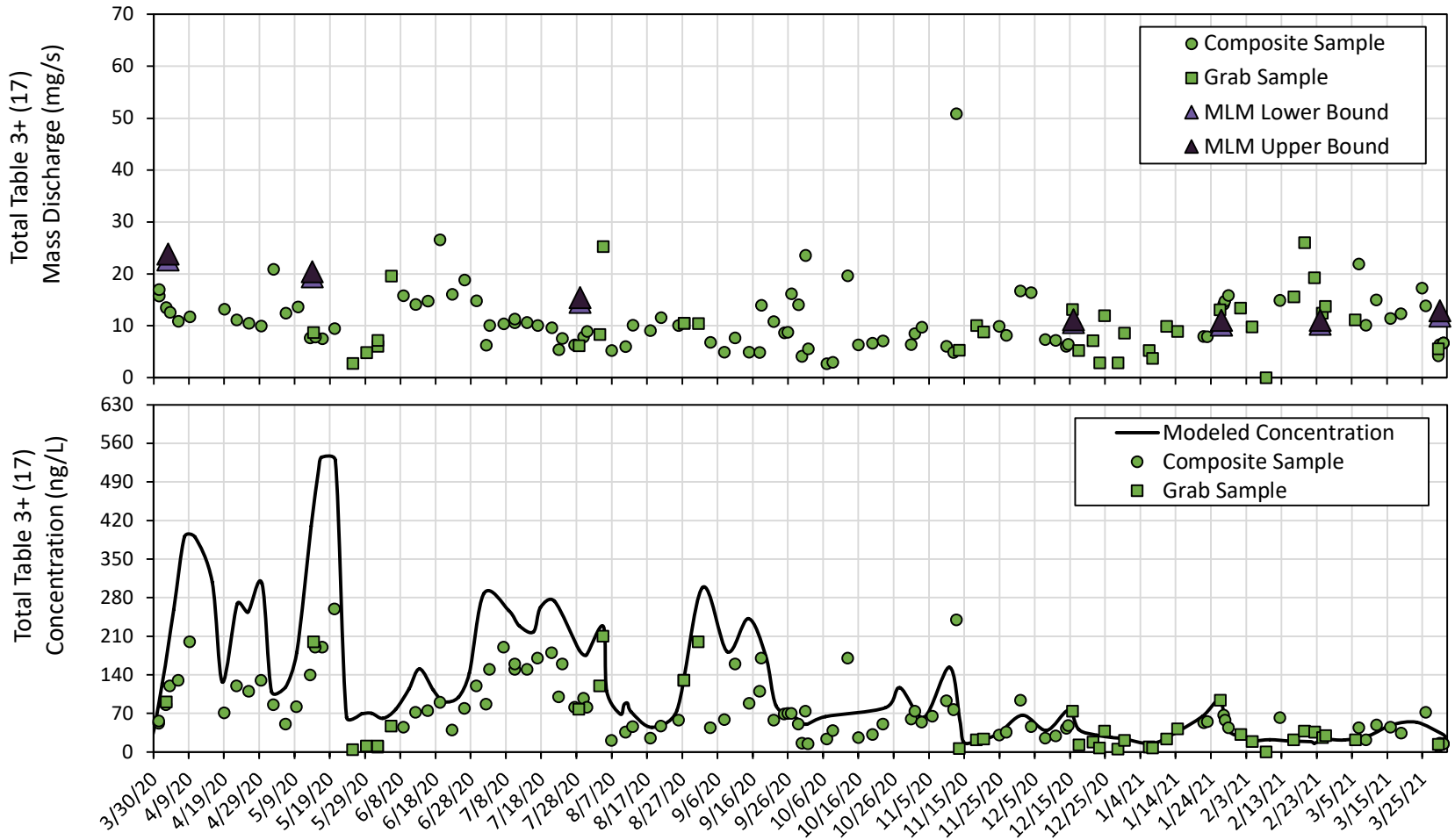
Figure 8




***Notes:***

1. Modeled mass discharges and concentrations were estimated using the MLM. The Q1 2021 mass discharge estimates are reported in Tables 8A, 8B, 9A, 9B, 10A, and 10B. The modeled concentrations are provided in Appendix A.
2. Measured mass discharges and concentrations at CFR-TARHEEL are reported in Table 6 and Appendix A, respectively.

mg/s - milligrams per seconds
MLM - mass loading model
ng/L - nanograms per liter

**Modeled versus Measured Total PFAS Mass Discharge and Concentration**
Chemours Fayetteville Works, North Carolina

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Figure **9**