ROY COOPER
Governor
MICHAEL S. REGAN
Secretary
MICHAEL SCOTT
Director

NORTH CAROLINA
Environmental Quality

July 1, 2020

Mr. Brian Long
The Chemours Company FC, LLC
22828 NC Highway 87 W
Fayetteville, NC 28306

RE: PFAS isomers

Dear Mr. Long:

The NC Department of Environmental Quality would like to review the process for compound identification and quantification for the isomer pairs PEPA / PFMOBA (molecular formula=$C_5HF_9O_3$) and PMPA / PFMOPrA (molecular formula=$C_4HF_7O_3$).

The Department has reviewed what is required under the Consent Order, and how the compounds with isomer pairs are currently being identified and quantified in environmental samples related to the Chemours Fayetteville Works site.

Each isomer pair (PEPA / PFMOBA, and PMPA / PFMOPrA) is a pair of compounds with the same molecular formulas (same elements in the same ratios) but a different structural arrangement (branched/linear). These compounds go by several names but can be uniquely identified by their CASN as follows: PEPA (267239-61-2), PFMOBA (863090-89-5), PMPA (13140-29-9), and PFMOPrA (377-73-1).

The February, 2019 Consent Order was written with the isomers paired together (see tables in attachments B and C of the Consent Order). At that time, the science stated that an isomer was present, but there was a lack of definitive data about which of the isomers was currently or might be seen in the environment. Attachment B further states that "For clarification, compounds identified with two common names in Attachment B or C shall be tested using a single CASN, to be proposed by Chemours and approved by DEQ."

When analysis began in 2017, there were no EPA drinking water methods for analyzing these compounds. GEL laboratories analyzed samples for DEQ and they used a modified version of EPA method 537. Chemours' contract lab used a method developed by Chemours and referred to as the Table 3 method. In 2019, the US EPA published a method called EPA 533; however this method only includes the linear versions of the isomers

(PFMOBA and PFMOPrA) and not the branched versions of the isomers (PEPA and PMPA).

When analysis began in 2017, there were no commercially available standards for these compounds, which are used to calibrate instruments for analysis. The first lab standards for these compounds were generated by Chemours and shared with their contract labs and the state's contract lab. However, the initial paperwork that came with the standards from Chemours to GEL Labs did not state which of the isomers were included in the standard by either name or CAS number, or if both were included.

Since that time, Chemours' contract labs have concluded that only PEPA and PMPA, the branched isomers, are found in the environment. The Department of Environmental Quality concludes that additional research is needed to show definitively that PEPA and PMPA are the only isomers in the environment because it has not been demonstrated that the linear isomers, PFMOBA and PFMOPrA, are not also in the environmental samples. These concerns are based on the following:

- Current analyses rely on the standards produced and provided by Chemours. Chemours reports that these standards contain PMPA and PEPA. Now that there are commercially available standards for all 4 isomers, these should be used to calibrate instruments and analyze environmental samples to confirm which isomers are present.
- Analysis of the branched and linear compounds requires different analytical methods in order to optimize analysis of one over the other. There is still no approved EPA drinking water method for analysis of the branched isomers; however multiple methods have been modified and optimized for their analysis. The new EPA Method 533 includes the linear isomers and optimizes for these, and this method should be used to confirm if PFMOPrA and PFMOBA are present in environmental samples.

Based on these circumstances, DEQ asks that Chemours conduct the following in order to gather data sufficient to recommend how labs should analyze for these four isomers and how they should report results:

- Provide standards that are fully labeled with the compound name(s), CAS number(s), concentrations of each of the isomer(s), and percent purity.
- Analyze environmental samples for all four isomers using new commercially available analytical standards and methods. This should include:
  - Comparison of analytical approaches for identification, including analysis of several most likely parent and daughter ion shifts for each of the four isomers.
  - Comparison of the Table 3 method and EPA method 533.
  - Analysis of different environmental media (groundwater, surface water, soil, and sediment) to determine which isomers are present in each.

- Participate in a multi-laboratory blind analysis of PFAS samples for comparison.

DEQ recognizes that the analysis of environmental samples for emerging compounds for which there is no standard method is not a simple matter. DEQ is asking for these additional steps to be completed and an outline of the proposed work to be submitted within two weeks of the date of this letter in order to ensure that the ongoing analytical results coming from all labs involved are accurate, precise, and comparable. It is also necessary to confirm which isomers are present in order to prioritize toxicity testing for the correct isomers.

Sincerely,

Michael E. Scott, Director
NC Division of Waste Management
N.C. Department of Environmental Quality