Response to NCDEQ Comments Dated July 3, 2019
Old Outfall 002
Remedial Options Plan (May 20, 2019)

NCDEQ Comment	Chemours Response
General Questions and Observations	
DEQ requests any monthly sampling data be provided to the agency as it is generated, rather than waiting until the final report in September.	Data will be provided as received. The first set of data was provided in the quarterly report dated July 15, 2019, pursuant to Consent Order Paragraph 28.
There are no potential preferential pathways identified at the site, which may be useful for test design and developing an overall corrective-action strategy. Please provide any identified potential preferential pathways.	The identification and assessment of potential preferential pathways is presently ongoing and will be incorporated in Chemours' planning for future consent order submittals and corrective action at the Site.
There may be low hydraulic conductivity intervals in the subsurface that could be important considerations with respect to test design and implementation. o Vertical gradients may be present in low conductivity intervals. o Delivery of injectants may be limited by low conductivity intervals and overall subsurface heterogeneity.	Chemours acknowledges this fact and is conducting geological assessments and a pilot study to evaluate the presence of low permeability zones and their potential impacts on potential corrective actions.
Site-specific geochemical conditions may be important considerations for implementation and interpretation of test results. Please provide any available geochemical data for the site.	Chemours is assessing the geochemistry of waters to ensure corrective action approaches will be effective in achieving goals. The pre-injection sampling data from the Regeneis Phase 1 Pilot Study Verification wells was provided to NCDEQ on July 15, 2019. This data included hardness along with total and disolved calcium and organic carbon. This information is also being analyzed in post-injection samples (data pending). Geochemical data was collected at the proposed Old Outfall 002 collection point as part of the NPDES permit application submitted on July 11, 2019. The results for this 24-hour composite sample are attached.
Option 1: Capture and Treat	
Option 1 appears to address the perched and surficial aquifer but not the Black Creek aquifer. How would Option 1 decrease the loading from this aquifer to meet the requirements of the Paragraph 12.e?	Capture and treatment of the Old Outfall 002 dry weather flow will capture any groundwater that has discharged to the Old Outfall 002 before the capture point regardless of which aquifer it comes from.

Response to NCDEQ Comments Dated July 3, 2019
Old Outfall 002
Remedial Options Plan (May 20, 2019)

NCDEQ Comment	Chemours Response
Option 2: Regenesis PlumeStop	
DEQ does not believe that enough information has been provided to determine if Option 2 would be an effective means of compliance with Paragraph 12.e of the Consent Order, i.e. would it achieve results that would be equivalent to or greater than treating dry weather flow at the Option B location with a PFAS removal efficiency of 99%.	Chemours acknowledges this comment and is performing a pilot study to better evaluate the potential for PlumeStop™ to help support corrective action at the Site.
Option 2 appears to address only the perched aquifer, but does not address the surficial aquifer or the Black Creek aquifer. How would Option 2 decrease the loading from these sources to meet the requirements of the Paragraph 12.e?	The PlumeStop™ pilot study is meant to evaluate application in a smaller area, i.e. the Perched Zone. If PlumeStop™ is selected as part of the corrective actions for Paragraph 12.e, it would be also applied to other aquifers as needed to provide performance equivalent to Option 1.
Option 2 should include monitoring for the full suite of PFAS in wells around the PlumeStop to better understand how it interacts with these chemicals and its efficacy.	Chemours is analyzing groundwater samples collected as part of the Pilot study using methods Table 3+ SOP and EPA 537. In addition to PFAS, Chemours is analyzing volatile organic compounds (VOCs), hardness, dissolved calcium, total calcium, and total organic carbon (TOC) to assess the groundwater geochemistry and how this may affect PFAS reductions by PlumeStop™.
DEQ requests that Chemours explain how Chemours will monitor for movement of PlumeStop in soils at the site over time to ensure that PlumeStop constituents are not migrating into surface waters.	PlumeStop™ is a colloidal suspension of activated carbon that adheres to soil particles after injection. After injection, when the likelihood of mobilized colloids is highest, monitoring is performed in downgradient performance monitoring wells to assess if PlumeStop™ colloids are present. Should colloid be present, Regenisis will add a product which immobilizes and terminates the colloidal suspension of PlumeStop™. Should Chemours propose PlumeStop™ as part of corrective actions at the Site, more detailed information regarding this topic will be provided.

NCDEQ Comment	Chemours Response
Option 2 would require an Injection Permit Application. A complete application would need to be submitted 60-90 days before implementation with the following information: • Injection zone • Hydrogeologic Evaluation • Injectant Information • Injection Procedure • Fracturing plan (if applicable) • Well Construction Details • Monitoring Plan • Well Data Tabulation • Maps and Cross section	Chemours appreciates DEQ noting this information.
Option 3: Hydraulic Control	
DEQ does not believe that enough information has been provided to determine if Option 3 would be an effective means of compliance with Paragraph 12.e of the Consent Order, i.e. would it achieve results that would be equivalent to or greater than treating dry weather flow at the Option B location with a PFAS removal efficiency of 99%.	Chemours acknowledges this comment and is completing an additional geological investigation at the Site. Chemours is also preparing a numerical groundwater model, which is being constructed consistent with the North Carolina Department of Environmental Quality's (NCDEQ) 2007 Groundwater Modeling Policy.
Option 3 appears to address the perched and surficial aquifer but not the Black Creek aquifer. How would Option 3 decrease the loading from this aquifer to meet the requirements of the Paragraph 12.e?	Any potential hydraulic control option performed as part of Paragraph 12.e will be designed to be as effective as capture and treatment of dry weather flow at the capture location. If this requires reductions in the loading of Black Creek Aquifer flow, then this will be part of any potentially proposed action.
Option 3 would require a non-discharge groundwater remediation permit application that includes information on hydraulic control and hydrogeology that helps determine if the aquifer will accommodate the volumes of injected water.	Chemours acknowledges this comment. As noted earlier, Chemours is preparing a numerical groundwater model to help quantitatively assess this consideration should re-injection of groundwater be proposed as part of corrective actions at the Site.

Response to NCDEQ Comments Dated July 3, 2019
Old Outfall 002
Remedial Options Plan (May 20, 2019)

NCDEQ Comment	Chemours Response
As Option 3 is considered, it should be noted that a slurry wall with treated water injected into the aquifer at too high a volume and pressure could results in well integrity failure, injected water breaching into upper and lower aquifers, or injected water daylighting to the surface.	Chemours acknowledges this comment. If this options is proposed as part of corrective actions at Site, this consideration will be addressed in detailed design phases of the project.
What levels of PFAS are proposed to be reinjected as part of the pump and treat system?	Chemours acknowledges this is an important consideration in a detailed design of this type of system. Should this type of approach be proposed as part of corrective actions at the Site, Chemours will include the consideration in the design to make sure the corrective action meets overall goals.

Attachment 1

24-Hour Influent Characterization Results Old Outfall 002 Option B Location (Proposed Dam)

24-Hour Influent Characterization Results
Old Outfall 002 Option B Location (Proposed Dam)
Attachment 1

Parameter	Units	Result
Table 3+ PFAS		
Byproduct 1 (PFESA BP 1)	µg/L	0.38
Byproduct 2 (PFESA BP 2)	µg/L	0.31
Byproduct 4 (PFESA BP 4)	µg/L	0.38
Byproduct 5 (PFESA BP 5)	µg/L	0.82
Byproduct 6 (PFESA BP 6)	µg/L	< 0.015
DFSA	µg/L	Note (1)
EVE Acid	µg/L	0.034
Hydro-EVE Acid	µg/L	0.19
MeFOSA	µg/L	< 0.035
M-MeFOSE-M	µg/L	< 0.11
MMP	µg/L	Note (1)
MTP	µg/L	Note (1)
NEtFOSAM	µg/L	< 0.037
N-EtFOSE-M	µg/L	< 0.060
NVHOS	µg/L	0.78
2,3,3,3-Tetrafluoro-2-(pentafluoroethoxy)propanoic acid (PEPA)	µg/L	1.9
PES	µg/L	< 0.046
PFECA B	µg/L	< 0.060
PFECA G	µg/L	< 0.041
Perfluoro-2-methoxyacetic acid (PFMOAA)	µg/L	**85**
Perfluoro(3,5-dioxahexanoic) acid (PFO2HxA)	µg/L	17
Perfluoro(3,5,7-trioxaoctanoic) acid (PFO3OA)	µg/L	5.1
Perfluoro(3,5,7,9-tetraoxadecanoic) acid (PFO4DA)	µg/L	1.6
Perfluoro(3,5,7,9,11-pentadodecanoic) acid (PFO5DA)	µg/L	0.58
Perfluoro-2-methoxypropanoic acid (PMPA)	µg/L	5.4
PPF Acid	µg/L	Note (1)
R-EVE	µg/L	0.12
EPA Mod 537 MAX PFAS		
10:2 fluorotelomer sulfonate (10:2 FTS)	µg/L	< 0.0026
4:2 fluorotelomer sulfonate (4:2 FTS)	µg/L	< 0.0026
6:2 fluorotelomer sulfonate (6:2 FTS)	µg/L	< 0.0017

24-Hour Influent Characterization Results
Old Outfall 002 Option B Location (Proposed Dam)
Attachment 1-Contd.

Parameter	Units	Result
8:2 fluorotelomer sulfonate (8:2 FTS)	µg/L	< 0.0052
Perfluoro-2-propoxypropanoic acid (HFPO-DA; "Dimer Acid")	µg/L	**6.0**
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	µg/L	< 0.0026
N-ethylperfluoro-1-octanesulfonamide (NEtPFOSA)	µg/L	< 0.0079
2-(N-ethylperfluoro-1-octanesulfonamido) ethanol (NEtPFOSAE)	µg/L	< 0.0026
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	µg/L	< 0.0026
N-methylperfluoro-1-octanesulfonamide (NMePFOSA)	µg/L	< 0.0079
2-(N-methylperfluoro-1-octanesulfonamido) ethanol (NMePFOSAE)	µg/L	< 0.0026
Perfluorobutane Sulfonic Acid (PFBS)	µg/L	0.0013
Perfluorobutanoic Acid (PFBA)	µg/L	0.072
Perfluorodecane Sulfonic Acid (PFDS)	µg/L	< 0.0017
Perfluorodecanoic Acid (PFDA)	µg/L	< 0.0017
Perfluorododecane Sulfonic Acid (PFDoS)	µg/L	< 0.00087
Perfluorododecanoic Acid (PFDoA)	µg/L	< 0.0017
Perfluoroheptane Sulfonic Acid (PFHpS)	µg/L	< 0.0017
Perfluoroheptanoic Acid (PFHpA)	µg/L	0.024
Perfluorohexadecanoic Acid (PFHxDA)	µg/L	< 0.00087
Perfluorohexane Sulfonic Acid (PFHxS)	µg/L	< 0.0017
Perfluorohexanoic Acid (PFHxA)	µg/L	0.015
Perfluorononane Sulfonic Acid (PFNS)	µg/L	< 0.0017
Perfluorononanoic Acid (PFNA)	µg/L	0.0069
Perfluorooctadecanoic Acid (PFODA)	µg/L	< 0.0017
Perfluorooctane Sulfonamide (FOSA)	µg/L	< 0.0026
Perfluorooctane Sulfonic Acid (PFOS)	µg/L	0.0018
Perfluorooctanoic Acid (PFOA)	µg/L	0.028
Perfluoropentane Sulfonic Acid (PFPeS)	µg/L	< 0.0017
Perfluoropentanoic Acid (PFPeA)	µg/L	0.15
Perfluorotetradecanoic Acid (PFTeA)	µg/L	< 0.00087
Perfluorotridecanoic Acid (PFTriA)	µg/L	< 0.00087
Perfluoroundecanoic Acid (PFUnA)	µg/L	< 0.0017

24-Hour Influent Characterization Results
Old Outfall 002 Option B Location (Proposed Dam)
Attachment 1-Contd.

Parameter	Units	Result
Conventional and Nonconventional Parameters		
Biochemical Oxygen Demand (BOD_5)	mg/L	< 2
Chemical Oxygen Demand (COD)	mg/L	< 12.8
Total Organic Carbon (TOC)	mg/L	1.1
Total Suspended Solids (TSS)	mg/L	10.4
Ammonia (NH_3-N)	mg/L as N	< 0.05
Certain Conventional and Nonconventional Pollutants		
Bromide	mg/L	< 1.3
Chlorine, total residual	mg/L	Not Measured(1)
Color	CP Units	< 5
Fecal Coliform	UNITS	Not Measured(1)
Fluoride	mg/L	< 0.25
Nitrate-nitrite	mg/L	0.29
Nitrogen, Total Organic	mg/L as N	Not Measured(1)
Oil and Grease	mg/L	< 1.4
Phosphorus, Total	mg/L as P	< 0.050
Sulfate	mg/L as SO_4	71
Sulfide	mg/L as S	< 0.70
Sulfite	mg/L as SO_3	< 2
Surfactants (MBAS)	mg/L	< 0.040
Aluminum, Total	mg/L	8.1
Barium, Total	mg/L	0.052
Boron, Total	mg/L	0.14
Cobalt, Total	mg/L	0.17
Iron, Total	mg/L	11.7
Magnesium, Total	mg/L	1.95
Molybdenum, Total	mg/L	< 0.0020
Manganese, Total	mg/L	0.195
Tin, Total	mg/L	< 0.0070
Titanium, Total	mg/L	< 0.0020

24-Hour Influent Characterization Results
OOF2 Option B Location (Proposed Dam)
Attachment 1-Contd.

Parameter	Units	Result
Certain Conventional and Nonconventional Pollutants (Continued)		
Radioactivity		
Alpha, Total	PCi/L	7.38
Beta, Total	PCi/L	6.79
Radium, Total	PCi/L	3.44
Radium 226, Total	PCi/L	< 0.373
Toxic Metals, Total Cyanide, and Total Phenols		
Antimony, Total	mg/L	< 0.0100
Arsenic, Total	mg/L	< 0.0160
Beryllium, Total	mg/L	0.0018
Cadmium, Total	mg/L	< 0.0010
Chromium, Total	mg/L	0.0094
Copper, Total	mg/L	0.0064
Lead, Total	mg/L	< 0.0060
Mercury, Total	µg/L	< 0.050
Nickel, Total	mg/L	0.0020
Selenium, Total	mg/L	< 0.0210
Silver, Total	mg/L	< 0.0050
Thallium, Total	mg/L	< 0.0140
Zinc, Total	mg/L	0.0368
Toxic Metals, Total Cyanide, and Total Phenols (Continued)		
Cyanide, Total	mg/L	< 0.0050
Phenols, Total	mg/L	< 0.010
Organic Toxic Pollutants (GC/MS Fraction – Volatile Compounds)		
Acrolein	µg/L	< 3
Acrylonitrile	µg/L	< 0.5
Benzene	µg/L	< 0.2
Bromoform	µg/L	< 0.5
Carbon Tetrachloride	µg/L	< 0.2

24-Hour Influent Characterization Results
OOF2 Option B Location (Proposed Dam)
Attachment 1-Contd.

Parameter	Units	Result
Organic Toxic Pollutants (GC/MS Fraction – Volatile Compounds) (Continued)		
Chlorobenzene	µg/L	< 0.2
Chromodibromomethane	µg/L	< 0.3
Chloroethane	µg/L	< 0.3
2-Chloroethylvinyl ether	µg/L	< 0.1
Chloroform	µg/L	< 0.2
Dichlorobromomethane	µg/L	< 0.3
1,1-Dichloroethane	µg/L	< 0.2
1,2-Dichloroethane	µg/L	< 0.2
1,1-Dichloroethylene	µg/L	< 0.2
1,2-Dichloropropane	µg/L	< 0.2
1,3-Dichloropropylene	µg/L	< 0.2
Ethylbenzene	µg/L	< 0.1
Methyl bromide	µg/L	< 0.4
Methyl chloride	µg/L	< 0.3
Methylene chloride	µg/L	< 0.3
1,1,2,2-Tetrachloroethane	µg/L	< 0.2
Tetrachloroethylene	µg/L	< 0.2
Toluene	µg/L	< 0.1
1,2-trans-dichloroethylene	µg/L	< 0.2
1,1,1-Trichloroethane	µg/L	< 0.2
1,1,2-Trichloroethane	µg/L	< 0.2
Trichloroethylene	µg/L	< 0.1
Vinyl Chloride	µg/L	< 0.4
Organic Toxic Pollutants (GC/MS Fraction – Acid Fraction)		
2-Chlorophenol	µg/L	< 0.3
2,4-Dichlorophenol	µg/L	< 0.3
2,4-Dimethylphenol	µg/L	< 0.3
4,6-Dinitro-o-Cresol	µg/L	< 4

24-Hour Influent Characterization Results
OOF2 Option B Location (Proposed Dam)
Attachment 1-Contd.

Parameter	Units	Result
Organic Toxic Pollutants (GC/MS Fraction – Acid Fraction) (Continued)		
2,4-Dinitrophenol	µg/L	< 10
2-Nitrophenol	µg/L	< 0.4
4-Nitrophenol	µg/L	< 5
p-Chloro-m-cresol	µg/L	< 0.3
Pentachlorophenol	µg/L	< 3
Phenol	µg/L	< 0.4
2,4-6-Trichlorophenol	µg/L	< 0.7
Organic Toxic Pollutants (GC/MS Fraction – Base/Neutral Compounds)		
Acenaphthene	µg/L	< 0.3
Acenaphthylene	µg/L	< 0.3
Anthracene	µg/L	< 0.2
Benzidene	µg/L	< 20
Benzo(a)anthracene	µg/L	< 0.2
Benzo(a)pyrene	µg/L	< 0.3
3,4-Benzofluoranthene	µg/L	< 0.3
Benzo(g,h,i)perylene	µg/L	< 0.2
Benzo(k)fluoranthene	µg/L	< 0.3
Bis (2-chloroethoxy)methane	µg/L	< 0.5
Bis (2-chloroethyl)ether	µg/L	< 0.4
Bis (2-chloroisopropyl)ether	µg/L	< 0.3
Bis (2-ethylhexyl)phthalate	µg/L	< 1
4-Bromophenyl phenyl ether	µg/L	< 0.3
Butyl Benzyl Phthalate	µg/L	< 0.8
2-Chloronaphthalene	µg/L	< 0.6
4-Chlorophenyl Phenyl Ether	µg/L	< 0.3
Chrysene	µg/L	< 0.2
Dibenzo(a,h)anthracene	µg/L	< 0.4
1,2-Dichlorobenzene	µg/L	< 0.5
1,3-Dichlorobenzene	µg/L	< 0.5

24-Hour Influent Characterization Results
OOF2 Option B Location (Proposed Dam)
Attachment 1-Contd.

Parameter	Units	Result
Organic Toxic Pollutants (GC/MS Fraction – Base/Neutral Compounds) (Continued)		
1,4-Dichlorobenzene	µg/L	< 0.5
3,3'-Dichlorobenzidene	µg/L	< 0.8
Diethyl Phthalate	µg/L	< 0.3
Dimethyl Phthalate	µg/L	< 1
Di-n-butyl Phthalate	µg/L	< 0.5
2,4-Dinitrotoluene	µg/L	< 0.4
2,6-Dinitrotoluene	µg/L	< 0.3
Di-n-octyl-phthalate	µg/L	< 0.5
1,2-Diphenylhydrazine	µg/L	< 0.2
Fluoranthene	µg/L	< 0.3
Fluorene	µg/L	< 0.3
Fluorene	µg/L	< 0.3
Hexachlorobenzene	µg/L	< 1
Hexachlorobutadiene	µg/L	< 0.8
Hexachlorocyclopentadiene	µg/L	< 2
Hexachloroethane	µg/L	< 0.4
Indeno(1,2,3-cd)pyrene	µg/L	< 0.3
Isophorone	µg/L	< 0.3
Naphthalene	µg/L	< 0.2
Nitrobenzene	µg/L	< 0.5
N-nitrosodimethylamine	µg/L	< 2
N-nitrosodi-n-propylamine	µg/L	< 0.4
N-nitrosodiphenylamine	µg/L	< 0.3
Phenanthrene	µg/L	< 0.2
Pyrene	µg/L	< 0.2
1,2-4-Trichlorobenzene	µg/L	< 0.3

24-Hour Influent Characterization Results
OOF2 Option B Location (Proposed Dam)
Attachment 1-Contd.

Parameter	Units	Result
Organic Toxic Pollutants (GC/MS Fraction – Pesticides)		
Aldrin	µg/L	< 0.00504
α-BHC	µg/L	< 0.0121
β-BHC	µg/L	< 0.0464
γ-BHC (Lindane)	µg/L	< 0.00524
δ-BHC	µg/L	< 0.0111
Chlordane	µg/L	< 0.234
4,4'-DDT	µg/L	< 0.0101
4,4'-DDE	µg/L	< 0.0202
4,4'-DDD	µg/L	< 0.00907
Dieldrin	µg/L	< 0.00807
α-Endosulfan	µg/L	< 0.00302
β-Endosulfan	µg/L	< 0.00988
Endosulfan Sulfate	µg/L	< 0.0101
Endrin	µg/L	< 0.00907
Endrin Aldehyde	µg/L	< 0.00917
Heptachlor	µg/L	< 0.00807
Heptachlor Epoxide	µg/L	< 0.00504
PCB-1242	µg/L	< 0.0746
PCB-1254	µg/L	< 0.0746
PCB-1221	µg/L	< 0.0746
PCB-1232	µg/L	< 0.0746
PCB-1248	µg/L	< 0.0746
PCB-1260	µg/L	< 0.0746
PCB-1016	µg/L	< 0.0746
Toxaphene	µg/L	< 0.358
Dioxins		
2,3,7,8-TCDD	pg/L	< 0.24

Note 1 – PFAS compounds PPF Acid, DFSA, MMF and MTP are presently undergoing analytical methods development and therefore data for these compounds are not reported here.