April 4, 2022

Scoping PFAS in NC Reference Dose Derivation

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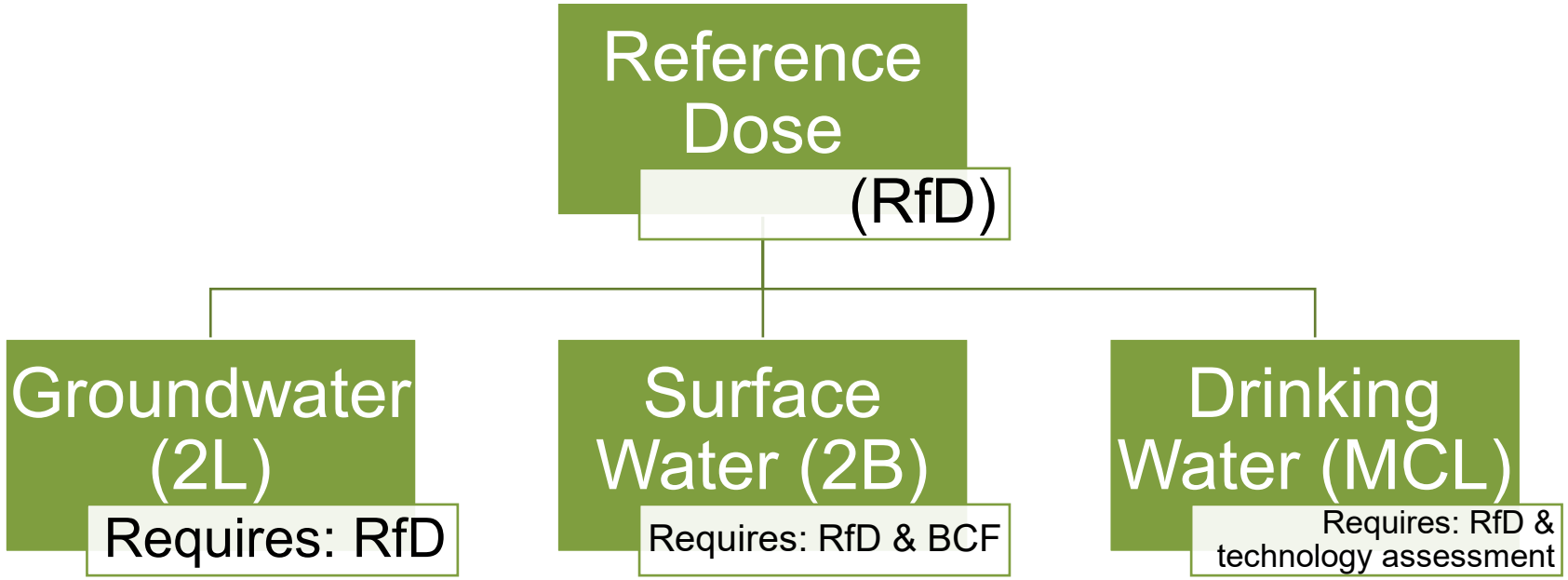
The Important of Reference Doses in NC Standard Development



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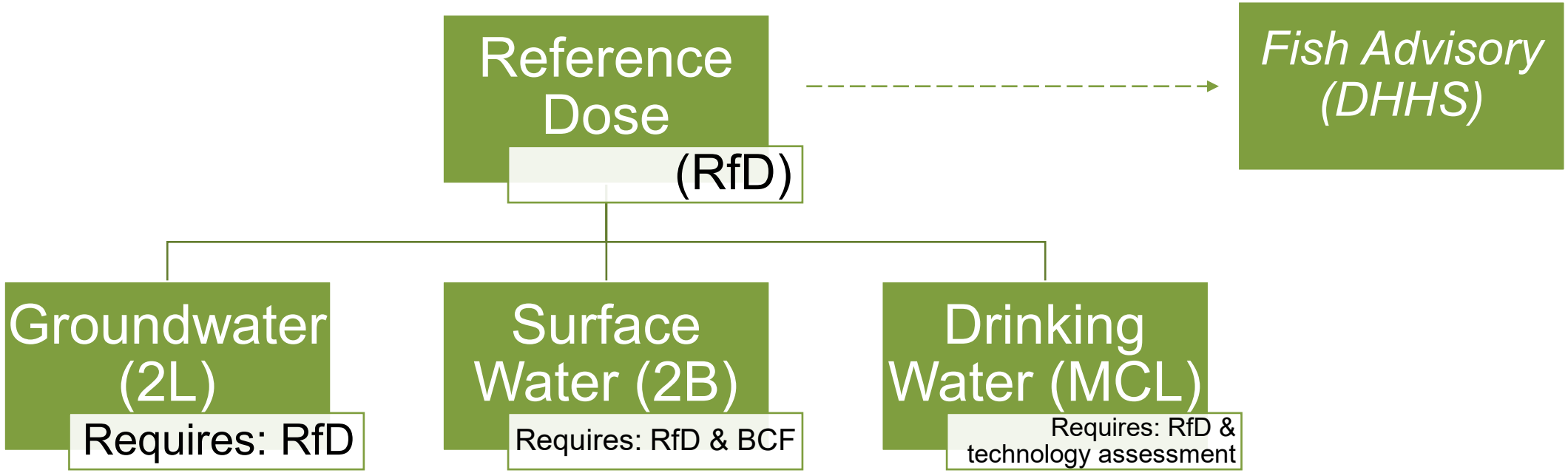

PFAS in North Carolina

PFBS	PFHxS	PFHpA	PFMOAA	PMPA	PFOS
PFOA	PFO2HxA	PFBA	PEPA	PFO3OA	PFHxA
PFNA	GenX	PFO4DA	PFO5DA	HydroEVE	PFDA
		PFPeA	Nafion BPs		

PFAS in North Carolina

EPA PFAS RoadMap Compounds

PFBS	PFHxS	PFOS
PFOA	PFBA	PFHxA
PFNA	GenX	PFDA

Non-EPA PFAS RoadMap Compounds

PFHpA	PFMOAA	PMPA
PFO2HxA	PEPA	PFO3OA
PFO4DA	PFO5DA	HydroEVE
PFPeA	Nafion BPs	

Department of Environmental Quality

Targeting PFAS in NC for Regulatory Effort

- What compounds are the priority?
  - Do we use the PFAS that are at the nexus of those most frequently detected and those that we have the most data for?

Targeting PFAS in NC for Regulatory Effort

- What compounds should be the priority?
  - Do we use the PFAS that are at the nexus of those most frequently detected and those that we have the most data for?

Most frequently detected PFAS in North Carolina*

PFAS Type	PFAS Group	PFAS Compound	Physical Characteristics: Fluorinated Carbons	Total Chain Length	Molecular Formula	Molecular Weight (g/mol)	Water Solubility[38] (20-25C (g/L))	Toxicity Data: Nuclear Receptor Activity (mean fold induction relative to control)[3]: PPARα[3]	PPARγ[3]	RXR[3]	ERα[3]	Other Active Sites[18]	Non-Mammalian	Mammalian	Relative Potency in Rat (or compared to PFOA)	Sampled Media	Environmental Data: Concentration in NC water (median (range)) ng/L ppt: DAQ Total Atmospheric Deposition 2018-2021: Chemours Area (n-42)	Regional Sites (n-19)	Surface water: DWR Chemours Outfall 002 (n-2424)	Cape Fear, Lock & Dam 1 (n-[illegible])	Chemours area (mean)[2] (n-[illegible])	DWR Lake data (n-140)	Drinking Water Well/ Groundwater: DEQ Chemours area (n-3406)	% Detection (n)	Conc in NC Striped Bass Serum[4] [mean (range)] ng/L parts per trillion: Pamlico Field Lab (n-29)	% Detection (n)	Cape Fear River (n-58)	% Detection (n)	Biological Data: Blood Serum Data [median (range)] ng/L parts per trillion: Wilmington NC[5]: Adults (n-289)	% Detection (n)	Children (n-55)	% Detection (n)	Pittsboro NC[5]	Fayetteville Works	Adults (n-30)	NHANES Data US Population[6] [geo mean (95%CI)] (n-1929)
Legacy Compounds	Sulfonic Acidr	PFBS	4	5	$C_4HF_9O_3S$	300.1	56.6	1-5^^^	1.5-11	1-1.5	0.5-5	CYP3A4, CYP2D6, CNG, ALDH1A1, NPSR, HTT0103, WP16,RORγ, G9a, JMJD2A, Nrf2, ELG1, Smad3, Grqap, DNArep-replication, GLP-1, ATXN, HT-1080-NT, DT40-hTDP1, PIk PBD	Zebrafish, Medaka, Trout[11-]	Rat[25]	0.001[35]	DW, SW			36 (2-82)	<10	1.3	40 (37-42)	2.9 (0.9-21)	1.8% (63)	10 (10-200)	45% (13)	150 (10-1350)	24% (14)								
		PFHxS	6	7	$C_6HF_{13}O_3S$	400.12	2.3						Zebrafish[14,15]	Mause[21]	0.6[35]	DW, Serum	5.9		37 (2-82)	27	0.7	40 (20-70)	3.5 (1.9-11)	1% (37)	590	3.4% (1)	800 (200-1000)	98.3% (57)	3500 (1200-8600)	98% (282)	1900 (1.2-4.7)	98% (54)	3000 (20-12500)	2100 (700-6700)	1080 (990-1180)	
		PFOS	8	9	$C_8HF_{17}O_3S$	500.13	1.57						Zebrafish, Daphnia, Myrid	Rat[25,27]	2[35]	DW, SW, Serum, Air	4.2-9.7	4.1-37	37 (2-82)	29	2.1	40 (17-590)	6.9 (2.2-39)	1.4% (49)	9410 (4620-16500)	100% (29)	490000 (122000-970000)	100% (58)	9400 (3800-28200)	99% (287)	5100 (2800-11500)	100% (55)	11600 (3200-31800)	5500 (1400-34600)	4250 (3900-4620)	
	Carboxylic Acidr	PFBA	3	4	$C_7H_5FO_2$	140.11	0.4	1-12^^^ PFOA-15	1-21 PFOA-22	1-18 PFOA-13	1-9 PFOA-7		Daphnia, Zebrafish, Trout[17-]	Rat[25]	0.05[35]	DW, SW, Air	2.0-40	4.0-8.0	40 (3-160)	31	8.6	40 (17-160)	7.5 (2.2-300)	3.2% (109)	<108 (LOD)	0% (0)	100 (100-200)	14% (8)								
		PFPeA	4	5	C_5HF_9O	264.05	112.6						Daphnia, Trout[17-]	Rat[25,28]	0.01<RPF<0.05[35]	DW, SW, Air	4.3-14		35 (5-310)	35	6.3	40 (17-260)	6.8 (2-53)	3.2% (109)												
		PFHxA	5	6	C_6HF_{11}	314.05	21.7						Zebrafish, Daphnia, Trout	Rat, Mouse[25,28]	0.01[35]	DW, SW, Serum			40 (2-98)	33	2	40 (31-350)	3.4 (1.9-29)	2.5% (85)									1500 (300-4000)		<100 (LOD)	
		PFOA	8	8	$C_8HF_{15}O_2$	414.07	9.5						Zebrafish, Minnau,	Rat, Mouse[25,28,29]	1[36]	DW, SW, Serum, Air	5.4-120	5.2-7.9	40 (4-130)	21	1	40 (26-90)	4.5 (1.1-61)	2.6% (89)	160 (160-1140)	14% (4)	570 (160-4290)	15% (9)	3800 (1700-11300)	99.7% (288)	3000 (1900-6500)	100% (*55)	6400 (2100-42400)	1800 (400-7300)	1420 (1330-1520)	
		PFNA	8	9	$C_9HF_{17}O_2$	464.08	9.5						Daphnia[28,24]	Mouse[34]	1036	SW, Air, Serum			40 (1-82)	<10	0.4	40 (16-160)	3.5 (2.3-7.5)	0.2% (8)	480 (340-820)	96% (28)	4500 (800-11600)	100% (58)	1300 (600-3600)	97% (280)	800 (400-1500)	82% (45)	1500 (300-9500)	600 (<100-2100)	411 (360-460)	
		PFDA	9	10	$C_{10}HF_{19}O_2$	514.08	5.1						Daphnia, Trout[24]	Rat[25]	0.01<RPF<10[35]	Serum			40 (1-200)		3.7	40 (20-160)	3.2 (3-7.5)	0.1% (3)	2500 (1680-4600)	96% (28)	68000 (10200-146000)	100% (58)					600 (400-2400)	200 (<100-1200)	200 (180-210)	
		PFHpA	6	7	$C_7HF_{13}O_2$	364.06	4.2						Zebrafish, Daphnia[14,24]	Mouse[28]	0.01<RPF<1[35]	DW, SW, Serum	4.6		37 (2-82)	25	1.3	40 (13-280)	3 (0.9-43)	22% (740)					200 (100-1400)	59% (170)	400 (200-1000)	98% (54)		100 (<100-600)		
		PFMOPrA$	3	5	$C_4HF_7O_3$	230.04								Mouse[38]		Air							[illegible]	[illegible]												
		PFMOBA$	4	6	$C_5HF_9O_3$	280.04							Zebrafish[22]	Mouse[38]		Air							[illegible]	[illegible]												
Consent Order Compounds	Ether Carboxylic Acidr	PFMOAA	2	4	$C_3HF_5O_3$	180.03		2-7^^^	5.5-9	1.5-11	1-2	CYP2D6, HTT0103, G9a, JMJD2A, ATXN, HT-1080-NT, DT40-hTDP1	Zebrafish[22]	Mouse[38,31]	=[22,35]	DW, SW, GW, Air				95000	76		13 (2-3500)	66% (2241)												
		PMPA$	3	5	$C_4HF_7O_3$	230.04	13.4[33]						Zebrafish[22]		=[22,35]	DW, SW				740	696.6		63 (2-8800)	92% (3117)	120 (120-140)	10% (3)	120 (120-190)	14% (8)								
		PFO2HxA	3	6	$C_6HF_9O_4$	246.04							Zebrafish[22]		=[22,35]	DW, GW, Air				8200	296.6		13 (1.5-2800)	73% (2495)												
		PEPA$	4	6	$C_6HF_9O_3$	280.04							Zebrafish[22]		=[22,35]	DW, SW				280			33 (2-2100)	23% (792)												
		PFO3OA	4	8	$C_8HF_9O_5$	312.04							Zebrafish[22,23]		=[22,35]	DW, SW, Air				7000	37.2		4.6 (1.3-490)	21% (704)												
		HFPO-DA (Gen	5	7	$C_6HF_{11}O_3$	330.05	300[37]						Zebrafish[22,24,25a]	Rat, Mouse[25,28,32]	=[22,35]	DW, SW, GW, Air			110 (21-3900)[39]	790	475.2	40 (16-42)	15 (2-3200)	69% (2355)	1640 (240-2300)	10.3% (3)	1910 (310-5850)	48% (28)	<2000 (LOD)	0%	<2000 (LOD)	0%	not detected	<100 (LOD)	<100 (LOD)	
		PFO4DA	5	10	$C_8HF_{11}O_5$	378.05							Zebrafish[22,23]	=[24,25]	=[22,35]	DW, GW, Serum, Air				330	5.9		3.5 (1.1-230)	6% (216)					2300 (400-13700)	98% (284)	2600 (700-8900)	100% (55)				
		PFO5DA	6	12	$C_9HF_{15}O_7$	444.06							Zebrafish[22,24,25a]	=[24,25]	=[22,35]	Air, Serum				153	0.2		5.1 (2.1-460)	1% (34)	<5 (LOD)	0% (0)	490 (10-1350)	22% (13)	300 (100-1000)	89% (256)	200 (100-400)	84% (46)				
		HydraEVE	6	10	$C_8H_2F_{14}O$	428.08							Zebrafish[22,24,25a]	=[24,25]	=[22,35]	Serum				<10																
	Ether Sulfonic Acidr	Nafion By-prod	7	10	$C_7HF_{13}O_5S$	444.12										Air							4.6 (1.5-20)	0.4% (14)												
		Nafion by-prod	7	10	$C_7H_2F_{14}O_5S$	464.13							=[24,25]	Mouse[33]		Surface Water, Serum				<10	18.8		5.5 (1.1-110)	51% (1748)	<248 (LOD)	0% (0)	300 (250-1030)	77.6% (45)	3200 (1000-8500)	99% (286)	1600 (600-3800)	100% (55)				

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Legacy Compounds	[redacted]																																					
	PFPeA	4	5	$C_5HF_9O_2$	264.05	112.6						VP16,RORγ,	Daphnia, Trout[17,]	[illegible]	0.01<RPF<0.05[35]	DW, SW, Air	4.3-14		35 (5-310)	35	6.3	40 (17-260)	6.8 (2-53)	3.2% (109)														
	[redacted]																																					
	PFHpA	6	7	$C_7HF_{13}O_2$	364.06	4.2						PIk PBD	Zebrafish, Daphnia[14,21]	Mouse[28]	0.01<RPF<1[35]	DW, SW, Serum	4.6		37 (2-82)	25	1.3	40 (13-280)	3 (0.9-43)	22% (740)						200 (100-1400)	59% (170)	400 (200-1000)	98% (54)		100 (<100-600)		
	PFMOPrA$	3	5	$C_4HF_7O_3$	230.04									Mouse[28]		Air				@			@	@														
	PFMOBA$	4	6	$C_5HF_9O_3$	280.04								Zebrafish[22]	Mouse[28]		Air				@			@	@														
Consent Order Compounds	PFMOAA	2	4	$C_3HF_5O_3$	180.03							CYP2D6, JMJD2A, ATXN, HT-1080 HT, DT40-hTDP1	Zebrafish[22]	Mouse[28,31]	=[22,25]	DW, SW, GW, Air				95000	76		13 (2-3500)	66% (2241)													
	PMPA$	3	5	$C_4HF_7O_5$	230.04	13.4[33]							Zebrafish[22]		=[22,25]	DW, SW				740	696.6		63 (2-8800)	92% (3117)	120 (120-140)	10% (3)	120 (120-190)	14% (8)									
	PFO2HxA	3	6	$C_4HF_7O_4$	246.04								Zebrafish[22]		=[22,25]	DW, GW, Air				8200	296.6		13 (1.5-2800)	73% (2495)													
	PEPA$	4	6	$C_5HF_9O_3$	280.04								Zebrafish[22]		=[22,25]	DW, SW				280			33 (2-2100)	23% (792)													
	PFO3OA	4	8	$C_8HF_{15}O_2$	312.04								Zebrafish[22,25]		=[22,25]	DW, SW, Air				7000	37.2		4.6 (1.3-490)	21% (704)													
	[redacted]																																					
	PFO4DA	5	10	$C_8HF_{11}O_5$	378.05								Zebrafish[22,25]	=24,25	=[22,25]	DW, GW, Serum, Air				330	5.9		3.5 (1.1-230)	6% (216)						2300 (400-13700)	98% (284)	2600 (700-8900)	100% (55)				
	PFO5DA	6	12	$C_9HF_{13}O_7$	444.06								Zebrafish[22,24,25*]	=24,25	=[22,25]	Air, Serum				153	0.2		5.1 (2.1-460)	1% (34)	<5 (LOD)	0% (0)	490 (10-1350)	22% (13)	300 (100-1000)	89% (256)	200 (100-400)	84% (46)				
	HydroEVE	6	10	$C_9HF_{15}O_6$	428.08								Zebrafish[22,24,25*]	=24,25	=[22,25]	Serum				<10																
	Nafion By-prod	7	10	$C_7HF_{13}O_5$	444.12											Air							4.6 (1.5-20)	0.4% (14)													
Ether Sulfonic Acids	Nafion by-prod	7	10	$C_7H_2F_{14}O_5S$	464.13								=24,25	Mouse[33]		Surface Water, Serum				<10	18.8		5.5 (1.1-110)	51% (1748)	<248 (LOD)	0% (0)	300 (250-1030)	77.6% (45	3200 (1000-8500)	99% (286)	1600 (600-3800)	100% (55)				

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PFAS Type	PFAS Group	PFAS Compoun	Toxicity Data: Nuclear Receptor Activity (mean fold inducton realtive to control)[9] PPARα[9]	PPARγ[9]	RXRβ[9]	ERα[9]	Other Active Sites[10]	Non-Mammalian	Mammalian	Relative Potency in Rat (as compared to PFOA)	Sampled Media	Environmental Data: Concentration in NC water (median (range)) ng/L ppt: DAQ Total Atmospher Chemours Area (n = 42)	Surface water: DWR Chemours Outfall 002 (n = 213+)	Surface water: Cape Fear, Lock & Dam[1]	Surface water: Chemours area (mean)[2] (n=100)	Surface water: DWR Lake data (n = 140)	Drinking Water Wells/ Groundwater: DEQ Chemours area (n=3406)	Drinking Water Wells/ Groundwater: % Detection (n)	Conc in NC Striped Bass Serum[4] [mean (range)] ng/L parts per trillion: Pamlico Field Lab (n = 29)	% Detectio n (n)	Cape Fear River (n= 58)	% Detection (n)	Biological Data: Blood Serum Data [median (range)] ng/L parts per trillion: Wilmington NC[5] Adults (n=289)	% Detection (n)	Children (n=55)	% Detection (n)	Fayetville Works Aduts (n=30)
Consent Order Compounds		PFPeA	1-12	1-21	1-18	1-9	CYP3A4, CYP2D6, CNG,	Daphnia, Trout[18] Zebrafish, Daphnia[14,21]	Rat, Mouse[26,28] Mouse[28]	0.01<RPF<0.05[36] 0.01<RPF<1[36]	DW, SW, Air	4.3-14	35 (5 - 310)	35	6.3	40 (17 - 260)	6.8 (2 - 53)	3.2% (109)									
		PFHpA									DW, SW, Serum	4.6	37 (2 - 82)	25	1.3	40 (13 - 280)	3 (0.9 - 43)	22% (740)					200 (100 - 1400)	59% (170)	400 (200 - 1000)	98% (54)	100 (<100 - 600)
	Ether Carboxylic Acids	PFMOAA	3 - 7	5.5 - 9	1.5 - 11	1 - 2	CYP2D6, HTTQ103, G9a, JMJD2A, ATXN, HT-1080-NT, DT40-hTDP1	Zebrafish[22]	Mouse[30,31]	~1[22,35]	DW, SW, GW, Air			95000	76		13 (2 - 3500)	66% (2241)									
		PMPA						Zebrafish[22]		~1[22,35]	DW, SW			740	696.6		63 (2 - 8800)	92% (3117)	120 (120 -140)	10% (3)	120 (120 - 190)	14% (8)					
		PFO2HxA						Zebrafish[22]		~1[22,35]	DW, GW, Air			8200	296.6		13 (1.5 - 2800)	73% (2495)									
		PEPA						Zebrafish[22]		~1[22,35]	DW, SW			280			33 (2 - 2100)	23% (792)									
		PFO3OA						Zebrafish[22,23]		~1[22,35]	DW, SW, Air			7000	37.2		4.6 (1.3 - 490)	21% (704)									
		PFO4DA						Zebrafish[22,23]	~24,25	~1[22,35]	DW, GW, Serum, Air			330	5.9		3.5 (1.1 - 230)	6% (216)					2300 (400 - 13700)	98% (284)	2600 (700 - 8900)	100% (55)	
		PFO5DA						Zebrafish[22,24,25~]	~24,25	~1[22,35]	Air, Serum			153	0.2		5.1 (2.1 - 460)	1% (34)	<5 (LOD)	0% (0)	490 (10 - 1350)	22% (13)	300 (100 - 1000)	89% (256)	200 (100 - 400)	84% (46)	
		HydroEVE						Zebrafish[22,24,25~]	~24,25	~1[22,35]	Serum			<10													
	Ether Sulfonic Acids	Nafion By-proc									Air						4.6 (1.5 - 20)	0.4% (14)									
		Nafion by-proc						~24,25	Mouse[33]		Surface Water, Serum			<10	18.8		5.5 (1.1 - 110)	51% (1748)	<248 (LOD)	0% (0)	300 (250-1030)	77.6% (45)	3200 (1000 - 8500	99% (286)	1600 (600 - 3800)	100% (55)	

Targeting PFAS in NC for Regulatory Effort

- What compounds are the priority?
  - Do we use the PFAS that are at the nexus of those most frequently detected and those that we have the most data for?
    - Detections may be due to being in the most widely sampled areas

Most frequently detected PFAS in North Carolina~

PFAS Type	PFAS Group	PFAS Compound	Toxicity Data: Nuclear Receptor Activity (mean fold induction realtive to control)[9] PPARα[9]	PPARγ[9]	RXRβ[9]	ERα[9]	Other Active Sites[10]	Non-Mammalian	Mammalian	Relative Potency in Rat (as compared to PFOA)	Sampled Media	Environmental Data: Concentration in NC water (median (range)) ng/L ppt DAQ Total Atmospher Chemours Area (n = 42)	Surface water: DWR Chemours Outfall 002 (n = 213+)	Cape Fear, Lock & Dam[1]	Chemours area (mean)[2] (n=100)	DWR Lake data (n = 140)	Drinking Water Wells/ Groundwater: DEQ Chemours area (n=3406)	% Detection (n)	Conc in NC Striped Bass Serum[4] [mean (range)] ng/L parts per trillion: Pamlico Field Lab (n = 29)	% Detection (n)	Cape Fear River (n= 58)	% Detection (n)	Biological Data: Blood Serum Data [median (range)] ng/L parts per trillion: Wilmington NC[5] Adults (n=289)	% Detection (n)	Children (n=55)	% Detection (n)	Fayetteville Works Aduts (n=30)
Consent Order Compounds	★	PFPeA	1-12	1-21	1-18	1-9	CYP3A4, CYP2D6, SNS	Daphnia, Trout[18]	Rat, Mouse[26,28]	0.01<RPF<0.05[36]	DW, SW, Air	4.3-14	35 (5 - 310)	35	6.3	40 (17 - 260)	6.8 (2 - 53)	3.2% (109)										
	★	PFHpA						Zebrafish, Daphnia[11,18]	Mouse[28]	0.01<RPF<1[36]	DW, SW, Serum	4.6	37 (2 - 82)	25	1.3	40 (13 - 280)	3 (0.9 - 43)	22% (740)					200 (100 - 1400)	53% (170)	400 (200 - 1000)	98% (54)	100 (<100 - 600)
	★	PFMOAA	3 - 7	5.5 - 9	1.5 - 11	1 - 2	CYP2D6, HTTQ103, G9a, JMJD2A, ATXN, HT-1080-NT, DT40-hTDP1	Zebrafish[22]	Mouse[30,31]	*[22,35]	DW, SW, GW, Air			95000	76		13 (2 - 3500)	66% (2241)										
	★	PMPA						Zebrafish[22]		*[22,35]	DW, SW			740	696.6		63 (2 - 8800)	92% (3117)	120 (120 -140)	10% (3)	120 (120 - 190)	14% (8)						
	★	PFO2HxA						Zebrafish[22]		*[22,35]	DW, GW, Air			8200	296.6		13 (1.5 - 2800)	73% (2495)										
	★	PEPA						Zebrafish[22]		*[22,35]	DW, SW			280			33 (2 - 2100)	23% (792)										
	★	PFO3OA						Zebrafish[22,23]		*[22,35]	DW, SW, Air			7000	37.2		4.6 (1.3 - 490)	21% (704)										
	★	PFO4DA						Zebrafish[22,23]	*[24,25]	*[22,35]	DW, GW, Serum, Air			330	5.9		3.5 (1.1 - 230)	6% (216)					2300 (400 - 13700)	98% (284)	2600 (700 - 8900)	100% (55)	
	★	PFO5DA						Zebrafish[22,24,25*]	*[24,25]	*[22,35]	Air, Serum			153	0.2		5.1 (2.1 - 460)	1% (34)	<5 (LOD)	0% (0)	490 (10 - 1350)	22% (13)	300 (100 - 1000)	89% (256)	200 (100 - 400)	84% (46)	
		HydroEVE						Zebrafish[22,24,25*]	*[24,25]	*[22,35]	Serum			<10														
	Ether Sulfonic Acids	Nafion By-prod									Air						4.6 (1.5 - 20)	0.4% (14)										
		Nafion by-prod						*[24,25]	Mouse[33]		Surface Water, Serum			<10	18.8		5.5 (1.1 - 110)	51% (1748)	<248 (LOD)	0% (0)	300 (250-1030)	77.6% (45)	3200 (1000 - 8500)	99% (286)	1600 (600 - 3800)	100% (55)	

Department of Environmental Quality

Targeting PFAS in NC for Regulatory Effort

- What compounds are the priority?
  - Do we use the PFAS that are at the nexus of those most frequently detected and those that we have the most data for?

PFAS Compoun	Toxicity Data								Sampled Media	Environmental Data							Conc in NC Striped Bass Serum[4] [mean (range)] ng/L parts per trillion				Biological Data			
	Nuclear Receptor Activity (mean fold induction realtive to control)[9]					Non-Mammalian	Mammalian	Relative Potency in Rat (as compared to PFOA)		Concentration in NC water (median (range)) ng/L ppt											Blood Serum Data (median (range)) ng/L parts per Wilmington NC[5]			
										DAQ Total Atmospher	Surface water				Drinking Water Wells/ Groundwater								
	PPARα[9]	PPARγ[9]	RXRβ[9]	ERα[9]	Other Active Sites[10]					Chemours Area (n = 42)	DWR Chemours Outfall 002 (n = 213+)	Cape Fear, Lock & Dam 1	Chemours area (mean)[2] (n=100)	DWR Lake data (n = 140)	DEQ Chemours area (n=3406)	% Detection (n)	Pamlico Field Lab (n = 29)	% Detectio n (n)	Cape Fear River (n= 58)	% Detection (n)	Adults (n=289)	% Detection (n)	Children (n=55)	% Detection (n)
PFMOAA	3 - 7	5.5 - 9	1.5 - 11	1 - 2	CYP2D6, HTTQ103, G9a, JMJD2A, ATXN, HT-1080-NT, DT40-hTDP1	Zebrafish[22]	Mouse[30,31]	•[22,35]	DW, SW, GW, Air			95000	76		13 (2 - 3500)	66% (2241)							
PMPA						Zebrafish[22]		•[22,35]	DW, SW			740	696.6		63 (2 - 8800)	92% (3117)	120 (120 - 140)	10% (3)	120 (120 - 190)	14% (8)				
PFO2HxA						Zebrafish[22]		•[22,35]	DW, GW, Air			8200	296.6		13 (1.5 - 2800)	73% (2495)								
PEPA						Zebrafish[22]		•[22,35]	DW, SW			280			33 (2 - 2100)	23% (792)								
PFO3OA						Zebrafish[22,23]		•[22,35]	DW, SW, Air			7000	37.2		4.6 (1.3 - 490)	21% (704)								
PFO4DA						Zebrafish[22,23]	•[24,25]	•[22,35]	DW, GW, Serum, Air			330	5.9		3.5 (1.1 - 230)	6% (216)					2300 (400 - 13700)	98% (284)	2600 (700 - 8900)	100% (55)
PFO5DA						Zebrafish[22,24,25•]	•[24,25]	•[22,35]	Air, Serum			153	0.2		5.1 (2.1 - 460)	1% (34)	<5 (LOD)	0% (0)	490 (10 - 1350)	22% (13)	300 (100 - 1000)	89% (256)	200 (100 - 400)	84% (46)

Request to the Science Advisory Board

Board's input to DEQ on:

1. What is missing, and should they be added to the PFAS list for North Carolina?
   a. Have we missed any compounds and what type of data are available for them?
2. Do we start with the PFAS that are at the nexus of those most frequently detected and those that we have the most data for?
3. Do we include the PFAS in EPA's list but may be many years away from finalization?
4. What compounds should be grouped based on availability of data?

Board's recommendation for DEQ to focus on?

1. What compounds should be the prioritized for initial standards setting actions?
2. What compounds should be prioritized for additional research needed?

Thank you

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