PO Box 422 ■ Tamworth, NH 03886-0422
www.nebiosolids.org

phone 603-323-7654
fax 603-323-7666
info@nebiosolids.org

nebra
North East Biosolids & Residuals Association
Cooperatively promoting the environmentally sound recycling of biosolids and other residuals

Board of Directors

President
Thomas Schwartz
Portland, ME

Treasurer
Andrew Carpenter
Belfast, ME

Secretary
Isaiah Lary
Lewiston, ME

Charles Alix
Westford, MA

Cheri Cousens
No. Andover, MA

Michael Hodge
Concord, NH

Chris Hubbard
Wakefield, RI

Michael Lannan
Waltham, MA

Lise LeBlanc
Mount Uniacke, NS

Deborah Mahoney
Boston, MA

Arthur Simonian
Cromwell, CT

Joshua Tyler
Williston, VT

Mark Young
Lowell, MA

Sarah Pillsbury
Groundwater Bureau
New Hampshire Department of Environmental Services
P. O. Box 95
Concord, NH 03302

delivered by email: sarah.pillsbury@des.nh.gov

November 9, 2018

Re: Technical input on deriving MCLs for drinking water (and groundwater)

Dear Ms. Pillsbury,

Thank you for the opportunity to provide technical input regarding the work of the Department of Environmental Services (DES) on establishing MCLs for several PFAS chemicals, as required by law. We greatly appreciate the Department's stakeholder input meetings held in mid-October, the handouts provided there, and the ongoing postings of information on the DES PFAS webpage (https://www4.des.state.nh.us/nh-pfas-investigation/), including the draft list of references posted November 8th.

These comments are submitted by NEBRA. We have, however, been working with several water quality groups and technical experts in the water quality field and municipal operations (including many NEBRA members) regarding understanding PFAS and its implications for water system operations. Our missions and goals align closely with those of DES and the broad public interest: to protect water resources throughout the State. Our members strive to always provide our communities with the highest levels of services and protections possible within the constraints of technical feasibility and budgets.

Our groups and our members are still learning about PFAS and are recognizing the complexity of PFAS chemistry, fate, transport, and impact, as well as related policy. We are aware that actions related to PFAS have been and can be expected to be costly, and we seek to work with DES and all stakeholders to find the right balance to ensure full protection of public health without overtaxing ratepayers and municipal and utility budgets.

Because of the complexities presented by PFAS, this letter provides only an overview and general questions and recommendations regarding the technical process and data for setting MCLs for the four specified PFAS. We give examples, but not exhaustive input, regarding parameters and calculations that we recommend DES address in order to provide a thorough assessment, as required by the process for setting MCLs. Our groups can provide more details and data upon request, especially regarding cost calculations. Careful assessments of costs and benefits are critically important if we, as a state, are going to find the right balance.

We look forward to DES responses to these concerns. And we look forward to working with the Department on this important step in public health and environmental protection.

This letter specifically addresses what DES has requested: technical input on the "approach, data and studies to be used for setting MCLs" for drinking water (and, by legal default, ambient groundwater quality) for PFOA, PFOS, PFNA, and PFHxS, including regarding the following:

1. "Beyond the studies considered in the recently released ATSDR Toxicity Profiles and the existing EPA Health Advisories, are there other studies or data that should be considered in deriving the health risk limits for each contaminant?
2. "What data and methodologies should the agency consider in deriving a benefit value?
3. "What data and methodologies should the agency consider in deriving a cost value?"

1. Assessing the Toxicology and Health Impacts – Additional Information

We have limited ability to assess the toxicology of PFAS compounds. We, and other stakeholders in this process, are relying heavily on the review being conducted for DES by Dr. Steve Roberts (Univ. of Florida) of the ATSDR draft Toxicological Profiles for PFOA and PFOS, as well as input from David Gordon of DES and the newly-hired toxicologist and newly-hired risk assessor. While we respect the credentials of these experts, we consider the process by which they are providing input to be less rigorous than, for example, the formal peer-review process by which EPA established its Public Health Advisory (PHA) levels for PFOA and PFOS published in May 2016. We urge the Department to give the appropriate level of extra weight to that EPA process. All but a handful of states - including New Hampshire so far – have given deference to that expert evaluation.

Given the importance of the DES review of the toxicology in setting MCLs, we ask that, in advance of proposing numbers, DES share with all stakeholders – and allow time for review of – reports by these experts. We need to see the rationale for the health risk assumptions they recommend. The list of references DES is looking at is large, but it is not as exhaustive as those that other teams of reviewers have looked at (e.g. the process of setting EPA's PHA or the Australian Health Expert Panel or the ATSDR draft Profiles). Good science dictates recognition of the limitations of the toxicology review that DES is able to manage in the time frame and with the resources it has available.[1]

[1] We were concerned to learn as recently as the October 19th stakeholder meeting, that the NH DES staff reviewing the toxicology were not even aware of the Australian Health Expert panel report, which was released in the spring, and which concluded "After considering all the evidence, the Panel's advice to the Minister on this public health issue is that the evidence **does not support** any specific health or disease screening or other health interventions for highly exposed

If DES decides to consider varying the MCLs for PFOA and PFOS away from the peer-reviewed EPA level, it should do so with great care, applying the mantra that "extraordinary conclusions require extraordinary evidence." Thus, DES should give equal effort to consideration of arguments for setting MCLs for PFOA and PFOS lower than 70 ppt and arguments for setting higher MCLs. We are aware of arguments being made for lower MCL numbers. But we are uncertain that the research being cited in support of those arguments has had the same level of scrutiny as was applied, for example, by EPA for setting its PHAs (which have been challenged also from both directions). We are also aware of arguments being submitted by other stakeholders in this process that suggest that the EPA PHAs for PFOA and PFOS are overly conservative for several reasons, including, but not limited to:

- multiple, layered uncertainty factors applied
- assumption that humans have greater PPARa response than the laboratory animals from which data for the risk level was extrapolated (the opposite is true),
- the selection of studies for data inputs that involved measured biological changes that were transient,
- EPA's reference dose is overly protective, and
- The assumed percentage of exposure from drinking water is likely overestimated.

For those of us who are not toxicilogists and risk assessors, all we can do is note that there are conflicting opinions. DES needs to assess to what extent staff involvement with this issue and the inputs received have created any level of embedded bias, one way or the other, and attempt to reduce its influence in this MCL-setting process.

Health impacts of PFOA and PFOS

There are abundant data and numerous documents debating the health risks association with PFOA and PFOS, some of which we have noted above. The ATSDR draft Toxicological Profile and the comments provided on it, along with the Australian Health Expert Panel report, provide plenty of information. We have nothing further to add at this time.

Health impacts of the less-studied PFNA and PFHxS

In the DES handouts for the stakeholder meetings for this MCL-setting process, there appears to be recognition of a paucity of robust data on negative health effects for PFNA and PFHxS. While PFOA and PFOS have been studied more extensively, there appear to be fewer data on these other two PFAS chemicals. However, at least for PFHxS, there is research cited by manufacturers that claim less risk from this shorter-chain compound, even though its half-life persistence in the human body seems to be longer than other PFAS (which is concerning).

In any case, looking at DES's handouts, one of the two health outcomes for PFNA and PFHxS listed by DES as a concern is "decreased antibody response to vaccines." This outcome is also listed for PFOA and PFOS. The research on antibody response to vaccines stems mostly from work with the population of the Faroe Islands. We have concerns that DES seems to be relying considerably on these studies. Questions arise: How have the researchers managed to isolate the impacts of

---

groups in Australia, except for research purposes" (emphasis in original). Expert Health Panel for PFAS – Summary, http://www.health.gov.au/internet/main/publishing.nsf/Content/ohp-pfas-expert-panel.htm

particular PFAS chemicals, separating these chemicals from the traces of other chemicals and elements found in the blood serum of this population and other populations? A recent paper from the same group (Hu et al., 2018) shows that even these scientists are still trying to figure this out themselves![2] Indeed, some of their research published in 2011 places the blame for this measured effect on PCBs.[3] How can these researchers and DES be sure which of the 4 PFAS chemicals being addressed in the MCL-setting process or some other PFAS or some other chemical is causing the "decreased antibody response to vaccines?"

Another related question: Does the reduced antibody response fall clearly outside of the range of the normal distribution of antibody response in the general population? This question should also be asked of the other reason for health concern about PFHxS: increases in serum lipids, especially cholesterols. There are numerous factors affecting cholesterol levels, and we are not convinced research has clearly discerned that PFHxS is a major factor. Does DES have convincing evidence? And, a related question: does the presumed amount of increase due to PFHxS actually have any significant health impacts? Those producing PFAS chemicals cite research they say indicates less concern about PFHxS and shorter-chain PFAS compounds. We cannot determine who is right. But we expect DES to be able to defend its MCLs based on sound research. For PFNA and PFHxS, the reasons for health concerns seem relatively meager.

We also want to express here our concerns about the increasingly common practice of regulatory agencies in this region of lumping PFAS chemicals together for regulatory simplicity. There are valid reasons for doing so, although the science does not really support the practice: half-lives and measured effects differ significantly between these chemicals. However, at the very least, if regulatory agencies – including DES – utilize this approach, it should be with recognition that they are actually applying yet another layer of uncertainty factor tipping the balance toward even more

---

[2] "The relative importance of different PFAS exposure sources has proven difficult to discern, both within and across populations. This information is essential for attributing adverse effects to particular PFASs or mixtures and for prioritizing actions to minimize health risks. Complex mixtures of PFASs in human sera may be further altered by variability in toxicokinetics." Hu et al., 2018.
https://www.researchgate.net/publication/322875074_Can_profiles_of_poly-_and_Perfluoroalkyl_substances_PFASs_in_human_serum_provide_information_on_major_exposure_sources#pfd

[3] "A total of 587 children participated in the examinations at ages 5 and/or 7 years. At age 5 years, before the booster vaccination, the anti-diphtheria antibody concentration was inversely associated with PCB concentrations in milk and 18-month serum. Results obtained two years later showed an inverse association of concentrations of antibodies against both toxoids with PCB concentrations at age 18 months; the strongest associations suggested a decrease in the antibody concentration by about 20% for each doubling in PCB exposure. At age 5 years, the odds of an antidiphtheria antibody concentrations below a clinically protective level of 0.1 IU/L increased by about 30% for a doubling in PCB in milk and 18-month serum. In conclusions developmental PCB exposure is associated with immunotoxic effects on serum concentrations of specific antibodies against diphtheria and tetanus vaccinations. The immune system development during the first years of life appears to be particularly vulnerable to this exposure." - Weihe and Grandjean, 2012.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3305740/

conservative numerical standards. This is not a transparent way of adding additional uncertainty factors.

Conclusion

Again, we are not the experts on the toxicology and risk assessment. And the above discussion only gets into a few questions and concerns. What we want to emphasize is that:

- There are many uncertainties and assumptions that will go into the Department's ultimate risk calculations;
- Those assumptions need to be very solidly grounded in the full preponderance of peer-reviewed science.
- DES needs to provide extraordinary evidence for diverging from EPA's PHA.

Given the potential costs for addressing PFAS levels in drinking water and other waters in the state, it is critically important that the Department be able to defend the toxicology it selects.

It is important to note – and humbling – to recognize that very few jurisdictions have decided to adopt MCLs lower than the EPA PHA. The vast majority of jurisdictions, both in the U. S. and overseas, have not gone in that direction (Tables 1 and 2).

Table 1. State advisories & standards for drinking water that are different from EPA Public Health Advisory levels for PFOA + PFOS of 70 ng/l (ppt) (mostly from ITRC Regulations, Guidance, and Advisories Fact Sheet)

	PFOA	PFOS	PFNA	PFHxS	PFHpA	PFBS	Notes
Alabama							
Alaska							
Arizona							
Arkansas							
California							
Colorado					70		
Connecticut	70 (sum of 5 PFAS)						
Delaware							
Florida							
Georgia							
Hawaii							
Idaho							
Illinois							
Indiana							
Iowa							
Kansas							
Kentucky							
Louisiana							
Maine							
Maryland							
Massachusetts	70 (sum of 5 PFAS)						
Michigan	420	11					2014, non-cancer values
Minnesota	35	27		27		2000	
Mississippi							
Missouri							
Montana							
Nebraska							
Nevada	667	667				667,000	Basic comparison levels
New Hampshire							
New Jersey	14	13 proposed	13				
New Mexico							
New York							
North Carolina							
North Dakota							
Ohio							
Oklahoma							
Oregon							
Pennsylvania							
Rhode Island							
South Carolina							
South Dakota							
Tennessee							
Texas							
Utah							
Vermont	20 (sum of 5 PFAS)						
Virginia							
Washington							
West Virginia							
Wisconsin							
Wyoming							

Table 2. International standards for drinking water (ITRC Regulations, Guidance, and Advisories Fact Sheet, updated Table 4.1, November 2017)

Location	Year	PFOA	PFOS	PFNA	PFBA	PFBS	PFHxS	PFHxA	PFPeA	PFHpA	PFOSA	PFDA	6:2 FTS
Australia	2017	560	70				70						
Canada	2016	200	600	200	30000	15000	600	200	200	200			
Denmark	2015	100	100	100	100	100	100	100	100	100	100	100	100
Germany	2006	300	300										
		100	100										
Italy	2017	500			7000	3000		1000	3000				
Netherlands	2011		530										
	2011		5.3										
Sweden	2014		90										
	2014	90	90			90	90	90	90	90			
UK	2009	10000	300										
	2009	300	300										
	2009	10000	1000										
	2009	90000	9000										

2. Benefits

"What data and methodologies should the agency consider in deriving a benefit value?"

Public health protection is costly, and cost alone should not be a deciding factor when setting an MCL for drinking water. Those of us involved in water quality protection apply this fact daily.

However, in our water quality work, we are always aware of the fact that the costs – no matter what the scale – need to be justified by tangible public health protection improvements. Therefore, we ask that DES *comprehensively* calculate costs and benefits in setting these MCLs. Because PFAS are particularly complex and unusual chemicals – persistent, highly mobile and dispersive in waters, presenting groundwater implications via air emissions (!), etc. – setting drinking water MCLs for them will potentially create unintended consequences, affecting programs other than just drinking water (as discussed under "Costs," below).

We understand – and are pleased – that DES is engaging academic experts for assistance is quantifying benefits for this MCL-setting process. We have two areas of concern and recommendations:

1. As DES evaluates the benefits of setting an MCL at one number versus some other number, it is important to recognize the fact that, because of the range of values being considered, we are talking about *marginal* benefits. There is no option of not setting an MCL. And we

understand that it may be unlikely – and perhaps just for socio-political reasons – for DES to consider setting MCLs in the 100s of ppts (where some other countries have landed; see Table 2). ***So, wherever DES ends up in setting MCLs, the vast majority of the potential health benefit has already been attained***.[4] ***DES needs to keep this fact in mind when defining and calculating the benefits. A decision cannot be grounded on comparison to a "no MCL" option.*** For example, for PFOA and PFOS, the proper calculation of benefits should involve comparison of the current 70 ppt PHA and, perhaps, the 20 ppt standard set in Vermont and the 200 ppt (PFOA) and 600 ppt (PFOS) values used in Canada. What will be the relative benefits within that narrow range of options? These benefits are what are then compared to the cost differences calculated for the same possible MCL values.

2. The "benefit" of addressing PFAS concerns with a particular MCL should also involve the "opportunity costs" (for lack of a better term) of the funds expended. Opportunity costs are discussed below.

3. Costs

"What data and methodologies should the agency consider in deriving a cost value?"

There are unusual challenges in trying to estimate costs related to establishing MCLs for the four targeted PFAS chemicals. Below, we discuss some of the questions and concerns we have, but we expect there may be additional ones. We hope DES will consider these in developing the MCLs.

Note that for all the examples, below, the full costs need to be calculated to include:

- The cost of any technology, such as a treatment system using granulated activated carbon (GAC);
- Local labor and materials, such as for investigation, sampling & analysis (pre- and post-treatment), site work, system installation, and ongoing maintenance (this involves at least public utility/municipal labor and private consultant labor);
- Indirect costs, such as salaries and fringe benefits of existing staff whose time is required or any new staff required to meet the mandate;
- The cost of hiring consultants such as engineers or attorneys;
- The cost of computer programming or reprogramming;
- Costs such as printing of forms or travel expenses; and
- DES labor and materials, such as for investigation, oversight, mitigation plan review, post-mitigation follow-up, record-keeping, and reporting/communicating to the public.

We guess that DES will develop and present full cost calculations for two or three proposed levels of MCL – such as 20 ppt (like VT), 70 ppt (EPA's PHA) and 200 & 600 ppt (Canada). These will illustrate the considerably greater costs involved when far more systems have to be treated, which will be the case with a lower MCL. The increased costs are likely to be mostly caused by there being more situations to address, rather than the unit costs of treatment being greater if you want a lower level in the final water; for example, GAC systems appear to remove the key target PFAS chemicals well

[4] Indeed, for PFOA and PFOS, the fact that these chemicals have been phased out of use in the U.S has resulted in dramatically reduced human exposure already, as evidenced by NHANES blood serum sampling.

enough to get below 20 ppt for the same cost as getting below 70 ppt. This assumption may be accurate for drinking water treatment, but might not apply to treatment in other systems (e.g. wastewater).

The costs developed for two or three possible MCL levels for each chemical in this way will provide valid comparison to the benefits calculated, as discussed above.

Drinking Water Systems

At the stakeholder meetings, DES stated that there are ample data on the costs of treating drinking water. DES can access data from the following prominent examples of installed treatment systems:

- large public drinking water well at Pease International Tradeport
- public school well at Marlow
- water line extensions around the industrially-impacted areas in Amherst and Merrimack
- private home wells

In calculating potential costs related just to treating drinking water, DES will presumably create representative estimates of the unit costs considering each of the bulleted items above. These unit costs will then be multiplied by the number of actual wells or situations testing above the proposed MCL.

Municipal Wastewater Treatment Systems, Septic Systems, & Lagoons

DES sampling and analysis, and data from other states and the literature, indicate that the four PFAS in this MCL-setting process are pretty much always found in wastewater. They have been found and should be anticipated in septic systems[5], wastewater and septage lagoons, and biosolids and residuals (e.g. paper mill residuals). This is because of their ubiquitous use in consumer products. Tens of parts per trillion of several different PFAS are found in domestic wastewater. And parts per billion (single numbers to 10s of ppb) are found in solids of small towns with no industrial sources whatsoever.

The behavior of PFAS in these materials and in soils is not well known. However, DES is understandably concerned about the potential for migration of at least some PFAS from these materials to groundwater and/or surface water at levels that are in the range of MCLs being considered. This is the challenge of PFAS.

These facts mean that the management of wastewater, both in centralized wastewater treatment facilities and in septic systems, has come under scrutiny and will be affected by how low the MCL is set. The costs for treating wastewater to low levels would be very high – far higher than treating drinking water, because of the higher levels of particles and other contaminants that will quickly deplete a GAC system or, more likely, require pre-cleaning of the water through further filtration before treating it for PFAS removal.

[5] Septic systems likely are impacting groundwater and drinking water; a study on Cape Cod (Schaider et al, 2013) found PFOS & PFOA in 40% and 10% of wells, respectively. And the maximum concentrations were 97 and 22 ppt. That could mean more small drinking water wells will be above a, for example, 20 ppt MCL for one or more of the four PFAS chemicals.

We are not sure if DES has in place regulatory structures for addressing all of the questions that arise. For example:

- If wastewater effluents exceed the drinking water MCL upon discharge, how will DES address that? Will dilution factors be calculated in, as is common with other contaminants covered in discharge permits?[6]
- Some wastewaters are discharged to groundwater through sand filtration systems. How will DES address these situations where there is less dilution? If treatment of wastewater effluent became necessary, the costs to a town the size of Merrimack could be several million dollars, plus ongoing increased operating costs.
- We find PFOA and PFOS in parts per billion in our blood serum and in wastewater solids, and yet we are regulating them in drinking water at levels two orders of magnitude lower. In other words, only 1% of the PFAS in wastewater solids (be it land applied or in a landfill) has to get into drinking water or groundwater to contaminate that drinking water or groundwater at or above the MCL.

How will DES quantify the potential costs of a low MCL on the management of these materials? At what level of MCL will these materials become seen as hazardous and thus requiring of alternative management? And how will DES measure the opportunity costs of spending money on reducing PFAS in these materials versus putting equivalent funds into reducing other risks?

Already, concerns about PFAS have resulted in disruptions to wastewater solids management programs in New York, New Hampshire, Massachusetts, and Vermont. Some of these disruptions have been directly caused by rushed regulatory actions and some have been caused by private interests worried about the potential for future regulatory actions creating newly-recognized liability. If these programs that recycle biosolids to soils are further impacted in New Hampshire, a crisis in the management of solids could ensue.

Already, the uncertainty about PFAS and future regulations has generated increased costs for one New Hampshire municipality: a landfill that was taking screenings from a biosolids management process was charging $30/ton for using it as daily cover. That use has been discontinued by the landfill, because of concern about future liability. They are requiring additional testing for PFAS, even just to take the material for disposal in the landfill, which would cost $65/ton. In case the landfill decides not to take the material because of PFAS levels (which are actually low and typical of any wastewater solids), the municipality has looked into its only other option, incineration; that would cost $235/ton. In addition to these changed costs, this example municipality would abandon a functional solids management system that cost more than $2 million in recent years. Those costs would be sunk.

As of yet, no NH municipality has had to change their wastewater solids management program. However, some plans for improvements to such programs have been put on hold, pending clarity on the PFAS issue. Using numbers from one facility that produces about 10 wet tons/day of wastewater solids that are currently recycled to soils in a very successful beneficial use program, we estimate that the added net cost to the municipality for solids disposal at a landfill would be $850,000/year for

[6] A typical dilution factor applied for contaminants in effluent is 70, which means effluent below 1400 ppt would be permissible if the MCL were set at 20 ppt.

tipping fees, trucking, and labor (assuming a normal landfill will accept the material, which, again, is not a contaminated solids – it has PFAS levels typical of all domestic wastewater solids). Such large increases in wastewater facility operation costs will require increases in sewer use fees, impacting residents and businesses. And the environmental impacts of that landfill disposal of solids – with greenhouse gas impacts – will be significant. How will DES integrate these costs into its MCL-setting calculations?

Municipal (and private) Solid Waste Management Sites: Landfills, Transfer Stations

Many of the same arguments discussed for wastewater and wastewater solids also apply to municipal solid waste (MSW) management. Municipalities and their waste management systems (wastewater facilities, transfer stations, and landfills) are not *sources* of PFAS. The municipality ends up dealing with an issue imposed on it. As with wastewater, if MSW must be managed differently because of PFAS concerns and possible impacts to drinking water or groundwater exceeding a given MCL, the costs will be large. How will DES integrate these costs in its calculations in the MCL-setting process?

If it is found that a low MCL might require changes in wastewater and MSW management, will the state provide funding? Or will DES create exemptions for such activities or certain situations?

Fire Stations, Schools, & Other Municipal Infrastructure

Because of use in various products, other municipal infrastructure and land may be contaminated with PFAS at levels that threaten groundwater and drinking water. Whether or not this is an issue in just a few or many situations will depend on the MCLs set.

Private Entitites

We have not addressed another set of stakeholders who may bear considerable costs, depending on where the MCLs for these four PFAS are set. Clearly, St. Gobain and other industrial facilities using PFAS chemicals are and will continue to bear significant costs. But there are other entities that may be impacted, such as car washes. Will DES consider these entities when estimating costs in its MCL-setting calculations?

Opportunity Costs

Finally, in cost calculations, DES and the State as a whole should consider alternative uses of the funds expended in chasing lower levels of PFAS in drinking water. This is, unfortunately, a reality that those of us in the municipal and utility sector have to deal with every day. Would the same funds yield higher benefits if they were used to address other public health issues? Even within the drinking water world, are PFAS at levels above 70 ppt or 20 ppt more significant threats than arsenic or lead? And, looking beyond the drinking water world, would the same funds provide greater benefits addressing the opioid crisis or climate change, for example? The DES justification for selected MCLs should include at least a qualitative determination that spending the anticipated funds to protect drinking water to a particular level will produce more benefits from limited public (and private) funds than equal investment in other public health protections.

Feasibility / Practicality

The MCL-setting process, and the New Hampshire law requiring this process, require evaluation of the practicality and feasibility of a particular action. We have concerns about the following:

- Because an MCL automatically becomes a groundwater standard in New Hampshire, it is important to note that still, at this time, there is no EPA-approved method for analysis of PFAS

in any matrix other than drinking water. This includes groundwater, although relatively clean groundwater presents little concern. (Data from testing dirtier groundwater continues to be somewhat suspect and may not be comparable from one lab to another.)

- Detection and reporting limits continue to improve, but remain relatively close to some of the extremely low MCLs that some have proposed, e.g. 1- 10 ppt).
- Because of the ubiquitous dispersion of some PFAS in the environment and their uses in products, cross contamination is a concern.
- A ppt is very small: 1 second in ~31,700 years. It is important to remember that only a few contaminants are regulated at the ppt level, and they are all very unusual, rare contaminants – not like the ubiquitous PFAS.
- For the foreseeable future, there will be significant challenges with sampling, testing, and analysis of PFAS – and DES should recognize this and the costs of these added challenges

We thank you for your consideration of these comments and look forward to the ongoing, challenging process ahead. We thank you for your due diligence and your involvement of stakeholders.

Sincerely,

Ned Beecher
Executive Director