BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:	)	
	)	
PROPOSED AMENDMENTS TO GROUNDWATER QUALITY 35 ILL. ADM. CODE 620	)	**R22-18 (Rulemaking – Public Water Supply)**
	)	
	)	
	)	

NOTICE OF FILING

PLEASE TAKE NOTICE that on September 15, 2022, we electronically filed with the Clerk ofthe Pollution Control Board of the State of Illinois, TESTIMONY OF NED BEECHER ON BEHALF OF PFAS REGULATORY COALITION REGARDING PROPOSED GROUNDWATER QUALITY STANDARDS, copies of which are attached hereto and served upon you.

Dated: September 15, 2022

Respectfully submitted,

PFAS REGULATORY COALITION

By: */s/ Fredric P. Andes*
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CERTIFICATE OF SERVICE

I, Fredric Andes, hereby certify that I have filed the attached NOTICE OF FILING and TESTIMONY OF NED BEECHER ON BEHALF OF PFAS REGULATORY COALITION REGARDING PROPOSED GROUNDWATER QUALITY STANDARDS upon the below service list by electronic mail on September 15, 2022.

Dated: September 15, 2022 */s/ Fredric Andes*

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BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

In the Matter of:	)	
	)	**No. R2022-018**
Proposed Amendments to Groundwater Quality (35 Ill. Adm. Code 620)	)	
	)	
	)	

TESTIMONY OF NED BEECHER ON BEHALF OF PFAS REGULATORY COALITION REGARDING PROPOSED GROUNDWATER QUALITY STANDARDS

I. Introduction

My name is Ned Beecher. I am providing this testimony on behalf of the PFAS Regulatory Coalition, concerning the proposed Part 620 groundwater regulations. This testimony focuses on the proposed regulation's numerical groundwater standards for PFAS – per- and polyfluorinated alkyl substances.

I am the former Executive Director for the North East Biosolids and Residuals Association (NEBRA), an independent 501(c)3 non-profit membership association advancing the management of biosolids and other organic residuals. NEBRA is one of several regional biosolids groups working on PFAS and other topics of interest to their members along with the Water Environment Federation (WEF), the National Association of Clean Water Agencies (NACWA) and state wastewater and biosolids groups, including the Illinois Association of Wastewater Agencies (IAWA). I have led several major nationwide biosolids projects, including, most recently, the National Biosolids Data Project, which provides the most comprehensive data on biosolids management in the U. S. (https://www.biosolidsdata.org). I am co-author of the BEAModel, a calculator of greenhouse gas emissions related to biosolids management, which has been updated in 2022 (https://www.BiosolidsGHGs.org). Over the past two decades, I have written numerous articles, fact sheets, and book chapters, and provided presentations on biosolids and related topics

throughout North America. I am the recipient of several awards, including the biosolids management award and the Elizabeth Cutone leadership award from the New England Water Environment Association. Since January 2017, I have been a leading expert on PFAS and biosolids, alerting the biosolids management profession about this most challenging issue, providing presentations and trainings nationwide and compiling key information at https://www.nebiosolids.org/pfas-biosolids.

I thank the Illinois Pollution Control Board (IPCB) and the Illinois Environmental Protection Agency (IEPA) for this opportunity to share my experiences and understanding.

A. There is an urgent need for the IPCB and IEPA to take a step back and complete a thorough analysis of the real-world feasibility and costs affecting a myriad of environmental programs throughout Illinois if the new proposed groundwater standards were to be adopted.

There are practical steps that IEPA and other state agencies can take to address the PFAS issue more globally and avoid the pitfalls that other states have experienced when they have set numerical standards without taking a holistic view of PFAS regulations across multiple programs.

If state regulators feel compelled, at this time, to create numerical regulatory standards for PFAS, I believe it is more prudent and efficient to set drinking water maximum contaminant levels (MCLs) before setting groundwater standards. IEPA has already stated that it has plans for a thorough stakeholder process for setting state MCLs for PFAS, including the evaluation of feasibility and costs. That should be done first, and the proposed inclusion of PFAS in the current Part 620 standards-setting should be suspended.

One important reason for this critical change in Illinois' response to PFAS is the fact that federal actions to address PFAS, mostly through USEPA, are accelerating. Most states have been waiting for federal actions on PFAS, rather than adding to the patchwork of state regulations that some states have created. I urge IEPA and other state agencies to continue to research, evaluate,

and advance understanding of PFAS contamination in Illinois before creating strict regulatory standards. Instead, the state should focus its actions on drinking water protection, high-contamination sites, PFAS source reduction, and further advancing understanding of background levels and feasibility and costs of regulatory standards.

One of my specific concerns is about the impact of the proposed standards on wastewater and biosolids management. The limited available research on PFAS in biosolids management shows considerable variability related to the most germane and significant question – the question of how much PFAS leaches to groundwater. *Gottschall, et al.* 2017 found several PFAS in tile drainage and shallow groundwater at levels close to the proposed Part 620 groundwater standards. In contrast, Pepper et al. 2021 found little transmission to groundwater at intensively irrigated sites in Arizona. Thus, it is challenging to assess the feasibility and costs that may be created for biosolids management if the proposed Part 620 groundwater standards are imposed. I think it is prudent for regulators to understand, in advance, all of the impacts of a regulatory action.

While the proposed Part 620 standards for PFAS may cause unanticipated consequences for biosolids, it also sets up scenarios that will be unclear and possibly contentious and litigious. For example, if a farm site is found to have PFAS in groundwater above the new Part 620 standard, it may be hard to determine whether the impacts are from biosolids or something else. There are myriad potential sources of PFAS on farms, including some farm chemicals, cleaning and waxing products, neighboring land uses (e.g. fire-fighting), and aerial deposition.

The next logical step in evaluating the potential feasibility and cost impacts of the proposed new Part 620 PFAS standards is this: if biosolids recycling programs are disrupted, where will the biosolids go? IEPA is responsible for regulating the management of sewage sludge, and biosolids recycling to soil is heavily relied on for this critical function. Wastewater solids (sludges) have to

be managed. Disrupt biosolids programs and water resource recovery facilities (WRRFs) will be forced to abandon investments, scramble to find disposal sites for their biosolids, and incur sudden and significant cost impacts that will affect their ratepayers and local taxes. Pressures will increase on landfills and other disposal options. Greenhouse gas emissions are likely to increase.

What would be the costs incurred? There is growing evidence of large cost increases being caused by regulatory actions or anticipated actions related to PFAS. In New England and Georgia and other parts of the country, landfill capacity is limited, and landfills cannot accept all the sludge/biosolids needing a home because of structural and odor concerns. Landfill tipping fees have risen at a fast pace in some states in the past two years, driven by those concerns and concerns related to PFAS liability. Maine's ban on biosolids land application resulted in biosolids management costs increasing by two times or more for some WRRFs. On average, as of 2020, a survey of WRRFs impacted by PFAS concerns found price increases averaging 37% in one year (NACWA, NEBRA, & WEF, 2020).

The chain of impacts could continue. Will biosolids or wastewater (septic/septage) sites used in the past require remediations, at considerable cost? Will CERCLA or similar state liability be imposed on landfills, on public wastewater agencies, and on farms receiving biosolids?

NOTE: In this testimony, the PFAS data and regulatory standards discussed relating to drinking water and groundwater are in ng/l, or parts per trillion. A part per trillion is equal to 1 second in ~31,700 years. When we speak of PFAS in soils, other solids, and biosolids, it is customary to use the units of ng/g, or parts per billion. A part per billion is 1,000 times more than a ppt, or 1 second in ~31.7 years.

II. Review of Past Testimony & Information Provided

I want to emphasize several of the concerns already stated in this proceeding by the PFAS Regulatory Coalition and by other parties, including the following:

- **It is prudent and efficient to adopt maximum contaminant levels (MCLs) for drinking water – before adopting groundwater standards.** This is because groundwater is protected largely in order to ensure that it is available as a potable source. If groundwater standards are set independently and/or first, they will likely have to be adapted to future drinking water MCLs.

- **Some of the proposed numerical standards are among the lowest in the world for any waters (drinking water or groundwater).** For many reasons, including significant levels of uncertainty, different jurisdictions (states) around the country and around the world are looking at the same research and coming up with widely varying standards. One obvious source of differences in PFAS water standards in different jurisdictions are the uncertainty factors being applied in the equations. Illinois state toxicologists are layering conservative assumptions upon conservative assumptions, as several other states have done, resulting in the very low proposed standards. As I discuss below, USEPA emphasizes, and is required to assess, feasibility and costs and benefits before establishing maximum contaminant levels (MCLs). IEPA has similar requirements and has stated that, as it develops state-level MCLs, it will consider feasibility and costs. We urge IEPA to recognize and publicly state the need for similar evaluations of feasibility and costs related to groundwater regulation and the proposed Part 620 groundwater standards. The questions asked previously by the Coalition remain inadequately answered: Why are the proposed Illinois groundwater standards different from those in other states? What specific parameters are different or differently used in the equations? Are these differences meaningful in the real world, or are they just the result of following certain risk calculation protocols?

- **The toxicology is still being debated, as are exposure routes and relative risks from PFAS in various forms and matrices.** Is PFAS at background levels in groundwater, at the very low proposed Part 620 levels, of greater risk to humans than the exposures from other PFAS sources? Given the challenges with feasibility and costs that I will discuss extensively below, it is imperative to be sure that the particular regulatory limits being set are a necessity.

- **The patchwork of state regulations is unworkable.** Many commenters have noted with concern the developing patchwork of state regulations. While USEPA had been slow in taking action on PFAS, its pace has increased, and USEPA will soon take some important regulatory steps. Why should Illinois continue the process of setting standards when a national picture will begin emerging relatively soon? This elevates the importance of IEPA articulating how any state standards – such as the proposed Part 620 regulations – will relate to USEPA and other states' standards. Why spend time, money, and energy producing standards that will be

questioned and may need adjustments within the next few years as USEPA implements its PFAS actions?

Only about fifteen states have any groundwater standards for PFAS, and most regulate only PFOA and PFOS at the level of the 2016 U. S. EPA public health advisory (70 ng/L or ppt for PFOA and PFOS combined). Most of the states that regulate groundwater for PFAS at lower levels are in the Northeast (New England, New York, New Jersey), and they have the lowest drinking water and groundwater regulatory limits for PFAS *in the world.* See Table 1 for comparisons.

Table 1: Comparing proposed IL Part 620 groundwater regulatory standards for groundwater to other U. S. states & other countries

Contaminant	**2021 IEPA proposed standard in mg/L or ppm (ng/L or ppt)**	**2019 IEPA standard in mg/L or ppm (ng/L or ppt). The 2021 IEPA health advisory levels are the same, except for PFBS (560,000 ppt) and PFOA (2 ppt)**	**2022 Michigan Standards in mg/L or ppm (ng/L or ppt)**	**2022 U. S. EPA RSL for DW/GW (and 2019 OLEM Interim Recommendations for PFOA & PFOS only) ppt**	**2019 Massachusetts, 2019 Vermont (for 5, not 6 PFAS), and 2021 Maine: Groundwater Class 1 standards are the same as drinking water standards: 20 ppt for sum of 6 PFAS, including PFDA & PFHpA (not shown in this table) ppt**	**2019 New Hampshire: Groundwater standards are the same as drinking water standards ppt**	**2021 Texas ppt**	**2018 Germany (and 2021 Denmark health-based groundwater standards: 100 ppt for all of the PFAS below, and others)**	**2020 Netherlands**
Perfluorobutane Sulfonic Acid (PFBS)	0.0012 (1,200)	0.14 (140,000)	.00042 (420)	6,000	No standard	No standard	34,000	6,000 (100)	No standard
Perfluorohexane Sulfonic Acid (PFHxS)	0.000077 (77)	0.00014 (140)	.000051 (51)	390	20	18	93	100 (100)	No standard
Perfluorononanoic Acid (PFNA)	0.000012 (12)	0.000021 (21)	.000006 (6)	59	20	11	290	60 (100)	No standard
Perfluorooctanoic Acid (PFOA)	0.000002 (2)	0.000021 (21)	.000008 (8)	60 (40)	20	12	290	100 (100)	170,000

Perfluorooctane Sulfonic Acid (PFOS)	0.0000077 (7.7)	0.000014 (14)	.000016 (16)	40 (40)	20	15	560	100 (100)	56,000

Sources of table: *https://www.dickinson-wright.com/news-alerts/illinois-epa-proposes-groundwater-standards*
https://www.jdsupra.com/legalnews/illinois-epa-proposes-groundwater-3321030/
ITRC, 2022: PFAS Water and Soil Values Table, updated June 2022: https://pfas-1.itrcweb.org/fact-sheets/

- **I am very concerned that the State of Illinois, as well as several other states, are adopting enforceable standards for parameters for which there is no agreed-upon, multi-lab validated, approved analytical method!** Different commercial labs continue to utilize different protocols for PFAS analysis in matrices other than drinking water, resulting in disparate data that cannot be compared from one lab to the next. At the very least, IEPA should clarify that implementation of any numerical standards for PFAS will not go into effect until there are USEPA-approved analytical methods applicable to the matrix/matrices covered by the regulation. The draft USEPA Method 1633, which is encouraged for use by the Department of Defense (DoD), is being used by more labs – but it is still undergoing multi-lab validation and analysis.

- **Most importantly, I urge IEPA to thoroughly assess feasibility and costs, now.** All stakeholders need a thorough analysis of costs and feasibility related to the imposition of the proposed Part 620 PFAS numerical standards. In responses to comments, IEPA stated that it was choosing to narrowly focus on establishing the Part 620 groundwater standards without considering the broader implications of these actions. That is inadvisable, because setting groundwater standards impacts numerous activities, many of which have important environmental and public health benefits. Such benefits include wastewater and biosolids management, for example – functions that Coalition members provide for the public good.

The proposed groundwater standards are at or close to measured background groundwater levels in numerous places, as I discuss elsewhere. We strongly urge IPCB and IEPA to evaluate costs, benefits, and feasibility associated with the proposed Part 620 standards *now*, before proceeding with adopting regulatory standards. Otherwise, IEPA runs the risk of significantly disrupting other important environmental programs, such as waste management and wastewater and biosolids management.

In other IEPA documents, IEPA emphasizes the importance of considering feasibility and costs: "Prior to proposing Illinois-specific MCLs for PFAS, additional work must be completed. In addition to the final report by USGS on the prevalence and occurrence of PFAS in Illinois, technical feasibility and economic reasonableness documents and studies must be completed. Illinois EPA will also coordinate with the Illinois Department of Public Health to review and

develop necessary risk assessment and health effects data in support of any proposed state MCLs. Illinois EPA will conduct outreach with stakeholders on proposed PFAS MCLs prior to submitting a formal proposal to the Illinois Pollution Control Board (Board). Illinois EPA will then initiate the proposed rulemaking process as prescribed by the Illinois Environmental Protection Act and Board Procedural Rules" (from a March, 2022 IEPA news release).

As part of its analysis of feasibility and costs, IEPA should complete a comprehensive big-picture policy discussion that includes comparative risk and prioritization related to PFAS. An evaluation of comparative risk would place the PFAS issue in context of other contaminants of emerging concern (CECs) and other regulatory programs, providing the agency with guidance on the relative levels – prioritization – of urgency and resources. Then, within the agency's PFAS program, prioritization would determine the costs and benefits of the various policy options.

We urge IEPA to look at the experiences in other states to understand and contrast the relative benefits and cost efficiencies of different policy approaches. For example, IEPA should evaluate actions in Maine and Michigan with regards to wastewater and biosolids management:

- *Maine caused a large amount of public costs to be spent with limited if any benefit to public health and the environment.* The specific PFAS of concern that has affected several farms and communities is the legacy substance PFOS, which has been phased out. Its presence and impacts are mostly from past activities. Current wastewater and biosolids being used on farms in recent years contain only low levels of PFOS (as well as other PFAS) and thus pose relatively little risk. Banning land application of biosolids – effective in July 2022 – did little to impact the legacy PFOS issue. The sites where past PFOS has caused significant concerns were not remedied or protected in any significant way. But the regulation caused large cost increases and feasibility concerns for wastewater treatment facilities statewide, increased greenhouse gas emissions (e.g. from additional trucking of biosolids to farther disposal locations and increased landfill methane emissions), and impacted farmers' budgets significantly just when global fertilizer prices soared.

- *In contrast, Michigan regulators prioritized PFAS source reduction as much as the setting of standards.* Working cooperatively with industries and wastewater treatment facilities, they reduced PFAS levels in industrially-impacted wastewater

> and biosolids by 90% or more in several instances, thereby reducing any potential risks. They did not shut down all biosolids programs, avoiding dramatically disrupting wastewater treatment.

To summarize: setting standards without assessing their impacts on the full variety of state environmental programs results in illogical and awkward outcomes. Wastewater, biosolids, septic systems, and waste management programs could all be affected by low groundwater standards. The state should not take action in one area at the cost of other regulatory programs.

The rest of my testimony, below, will present further details on analyzing the feasibility and costs associated with the proposed Part 620 regulatory standards for PFAS. It will also focus on the need for improved understanding of PFAS background levels.

III. More About Analyses of Costs & Feasibility

A. More understanding is needed related to background levels of PFAS.

We applaud IEPA for its thorough sampling and testing of community water systems (CWSs) as reported in March 2022. The results showed that about one quarter of the systems sampled have some detectable PFAS[1]. We look forward to the further reports promised from that study. Those further reports should, of course, be completed and considered before setting drinking water MCLs. They can also inform the Part 620 groundwater rulemaking, where cost and feasibility are important factors. Knowing background levels of PFAS is important to rulemaking.

There are some important, more subtle details in the USGS/IEPA findings of PFAS in CWSs. Notably, the PFAS found most commonly are PFOA and PFOS. This has been the case in

[1] *See* IEPA news release re groundwater sampling: "With the completion of sampling, Illinois PFAS detections were found to be similar to other Midwest states. Of the 1,017 CWSs sampled, 126 (or **12.4%**) had confirmed PFAS detections. Of those 126 systems with detections, 120 systems had detections for Perfluorooctanoic Acid (PFOA) and/or Perflurooctanesulfonic acid (PFOS). In addition, of the 126 systems that had confirmed PFAS detections, 68 (or 53.9%) of the systems' detections are **below** health advisory guidance levels issued by Illinois EPA."

other jurisdictions. Those are legacy substancs at this point – a fact that is critical to understand when setting policy. Less PFOA and PFOS is coming from products now. Some continues to enter the environment from older products and waste streams. But the levels of PFOA and PFOS are going down in humans and waste streams such as biosolids, and dramatically, by some measures (ATSDR, 2022; Venkatesan and Halden, 2013; MassDEP 2022). Phasing out PFAS use, as was done with PFOA and PFOS, has been the #1 most effective action for significantly reducing risk in measurable ways (e.g. U. S. Centers for Disease Control NHANES data show the marked decline in PFOA and PFOS in human blood serum samples – down as much as 70% in the past 20 years).[2]

In addition to completing the sampling of CWSs, it is important to also understand background levels in other media. What are the typical levels of PFAS in soils and surface waters and their sediments? A couple of states have conducted random soil sampling; Vermont was the first of which we are aware. That study involved soil sampling at over 60 randomly chosen locations, some near potential PFAS sources and some in very rural areas without sources other than aerial deposition. PFOS was found in every sample. Other PFAS were found as well, in varying amounts of up to 5 ug/kg (parts per billion).

Where is background PFAS coming from? There are thousands of uses of PFAS, because their properties are so unique and helpful. Two research papers we find helpful provide some sense of how PFAS have become so widely distributed, including in waste streams. *Gluge, et al* (2021) summarized uses of PFAS, and *Whitehead, et al.*, 2021 looked more closely at one particular group of products – cosmetics. They found "PFAS concentrations ranged from 22–10,500 ng/g product

[2] *See* ATSDR, Agency for Toxic Substances and Disease Registry, 2022. PFAS in the U.S. Population. https://www.atsdr.cdc.gov/pfas/health-effects/us-population.html, accessed Sept. 13, 2022.

weight, with an average and a median of 264 and 1050 ng/g product weights, respectively." (These results are in parts per billion.)

One of the most damaging steps we have witnessed in several other states that have hurriedly acted on PFAS standards is the failure to understand background levels of PFAS in various media. For example, at the time when Maine regulators imposed screening levels for PFOA and PFOS in biosolids, they did not know whether or not their public wastewater treatment agencies' biosolids would be able to meet those screening levels. They had not reviewed existing data or tested their states' biosolids. Thus, they were surprised when only one or two of the state's ~55 biosolids products failed to meet the screening levels. Suddenly, the Maine regulators were put in the position of possibly having to shut down nearly every biosolids recycling program – at huge cost and disruption. They figured out an alternative: their screening standard allows for biosolids producers to calculate theoretical cumulative loadings and demonstrate that their biosolids will not cause the screening levels to be exceeded in the soils after a hundred years of application. Some Maine environmentalists saw this as a sneaky circumvention of the screening levels, and it did not improve public confidence in Maine DEP. We urge IEPA to learn from Maine's mistakes.

There are other examples that highlight the importance of understanding background levels. For example:

- The April 2022 Minnesota PFAS air and deposition study found their most remote site had significant levels of background PFAS, suggesting aerial transport and deposition are important (Minnesota Water Pollution Control Agency, 2022).

- PFAS in precipitation has also been measured various studies, such as in the Integrated Atmospheric Deposition Network (https://www.epa.gov/great-lakes-monitoring/great-lakes-integrated-atmospheric-deposition-network), which showed levels of summed PFAS at 1,000 ppt.

- Vermont sampled soil from more than 60 randomly-selected sites around the state. PFOS was found in every soil sample, even from remote locations (Zhu et al., 2019).
- A few states have now collected some samples and data on background levels of PFAS in groundwater, surface waters, and soils.
- There is published research of background levels of PFAS in disparate locations around the globe, including very remotes locations.

Most relevant to the Part 620 regulations, limited data from Illinois and elsewhere show groundwater PFAS levels at or near the proposed standards, even in random background areas with no obvious direct source. Numerous modern human activities are impacting groundwater near the proposed groundwater standards, including important beneficial programs such as home septic systems (Schaider et al., 2015) and recycling and landfilling and wastewater and biosolids management.

Now, a very recent research paper emphasizes the ubiquitous low levels of PFAS in the environment and how regulatory goals for PFAS levels in waters are at or below these background levels. "On the basis of the four PFAAs considered, it is concluded that (1) levels of PFOA and PFOS in rainwater often greatly exceed US Environmental Protection Agency (EPA) Lifetime Drinking Water Health Advisory levels, and the sum of the aforementioned four PFAAs (Σ4 PFAS) in rainwater is often above Danish drinking water limit values also based on Σ4 PFAS; (2) levels of PFOS in rainwater are often above Environmental Quality Standard for Inland European Union Surface Water; and (3) atmospheric deposition also leads to global soils being ubiquitously contaminated and to be often above proposed Dutch guideline values. It is, therefore, concluded that the global spread of these four PFAAs in the atmosphere has led to the planetary boundary for chemical pollution being exceeded." The data cited by this paper includes a study of PFAS in precipitation. Pike et al. (2021) found mean levels of 4 PFAS in rainwater in the U. S. to be as

follows (in ng/l or ppt): PFOA= 1, PFOS = 5.4, PFNA = 0.5, and PFHxS = below the detection limit of 0.017 (as reported in *Cousins et al.*, 2022).

Does IEPA understand these and other background levels of PFAS in Illinois and how the proposed Part 620 groundwater standards and other potential regulatory actions relate to them?

We urge IEPA to collect further background data, understand the mass balances and meaning of various levels of PFAS in various media and products, compare information and experiences in other states, and avoid setting standards that can be costly and disruptive and not reduce risks as much as intended.

B. More about the full costs involved.

IEPA should now be using the data from its own CWS sampling and the increasing volumes of data on background PFAS levels elsewhere in order to understand what the costs will be for all these systems to meet not only the current state standards, but also the proposed Part 620 groundwater standards. What are the feasibility and costs at each regulatory level?

With regards to costs, IEPA and all stakeholders are dealing with a massive lack of analysis and understanding. Here are just a few of the questions that are most critical to answer:

- How much will it cost for all the CWSs who IEPA has shown have PFAS to treat to non-detectable levels? (For this and all cost questions, an additional question is always present: Is it even feasible?)

- How much will it cost to treat groundwater at numerous sites?

- How much will it cost to treat wastewater, or biosolids, or solid wastes that receive PFAS from diverse waste streams, many of which don't have any significant, obvious industrial or AFFF inputs? Even purely domestic wastewater and septage contain PFAS and can impact groundwater or surface waters at levels close to the proposed regulatory numbers.

- How much will it cost small businesses in liability for past practices and to meet the proposed Part 620 groundwater standards around local fire stations, small businesses like carwashes, cleaning agencies, furniture and carpet conveyers,

transfer stations, schools and other institutions, and other mom-and-pop businesses that happen to unknowingly use small amounts of PFAS-containing products? For example, several schools in New England have been found to have groundwater and school drinking water well contamination caused by years of floor cleaning with PFAS-containing cleaners and waxes.

- Liability is, and has long been, a major concern for those stakeholders involved in managing waste streams, including landfill operations and wastewater treatment facilities. Does IEPA have a plan for how it will manage these concerns? This needs to be understood before groundwater standards and associated site remediation expectations are created. If landfills and wastewater treatment utilities are subject to liability for site and groundwater remediation, the costs involved could be enormous.

- What will be the costs of disposal (sequestration) or destruction of all IL PFAS waste?

- How much will it cost for IEPA to implement programs for education and enforcement for all the activities mentioned above?

We urge IEPA to develop a process with all the stakeholders to fully understand the implications and costs associated with state PFAS policies and regulations, before adopting Part 620 or any other numerical regulatory standards.

We urge IEPA to consider the question that naturally follows discussions of costs: Where will the hundreds of millions of dollars needed for these actions come from?

C. More about feasibility.

In addition to understanding background levels and likely costs associated with setting groundwater standards, along with other state and federal regulatory actions related to PFAS, it is important to understand what is feasible. Questions about feasibility include:

- How shall we dispose of separated PFAS waste? It is fairly routine now to use granulated activate charcoal (GAC) or resin or other systems to clean drinking water. But the spent GAC, with higher levels of PFAS, is proving challenging and costly to manage. Likewise, products containing PFAS, such as fire-fighting foams, are being stockpiled, waiting for a solution. The Department of Defense, earlier this year, suspended incineration of AFFF – fire-fighting foam containing PFAS.

IEPA and Illinois stakeholders, including our Coalition members, will need a plan for how to manage PFAS separated from soil, groundwater, drinking water, or other media.

We urge IEPA to evaluate the available disposal resources. How much landfill and incinerator capacity is available in and out of state, and what are the costs for using that capacity? IEPA should do a full analysis, comparing likely volumes of enriched, separated PFAS waste generated in-state vs. disposal (sequestration) or destruction capacity and costs – including the add-on costs of, for example, greenhouse gas emissions.

Part of this analysis will involve tracking today's current intense research, invention, and technology development related to PFAS destruction. To date, the only apparently viable and common way to break the C-F bonds in PFAS was high temperature incineration. It was commonly considered necessary to burn them at 1000° C. or higher. But some stakeholders have raised questions about the fate of fluorine and issues with air emissions. Others have decried the energy costs involved. But, as concentrated, separated PFAS wastes from remediation treatment processes and confiscated fire-fighting foams, etc. have accumulated, the Department of Defense (DoD) and other organizations have been using incineration – until, in late April 2022, DoD halted the practice (for AFFF in particular) in response to concerns (https://www.eenews.net/articles/defense-department-hits-the-brakes-on-pfas-incineration/).

In 2019, a research team at Princeton discovered some degradation of PFAS by certain soil microbes (Jaffe et al., 2019; *see* https://smartwatermagazine.com/news/princeton-university/microbe-chews-through-pfas-and-other-tough-contaminants).

Now, there are promising developments regarding other approaches to PFAS destruction. The 2021 USEPA "destroy PFAS" challenge resulted in identifying some options, most notably the "HALT" process that involves addition of alkaline material and heat to break the C-F bonds in PFAS. The process is currently being scaled up for piloting in real-world applications. And, just recently in the summer of 2022, researchers discovered a simple, somewhat similar chemical mixture that, when heated, cleaves the carbon and fluorine bonds. The paper on this new research (Trang et al. 2022) notes that "[h]arsh PFAS degradation methods include incineration, ultrasonication, plasma-based oxidation, electrochemical degradation, supercritical water oxidation, ultraviolet-initiated degradation using additives such as sulfite or iron, and other combinations of chemical and energy inputs.... Leveraging the reactivity of perfluoroalkyl species might, however, offer milder alternatives to address the PFAS contamination problem."

- The analysis of feasibility must include understanding of background levels of PFAS in soils, groundwater, and surface water in Illinois... What will be the costs of imposing different numerical standards in MCLs, in groundwater, and in surface

waters? The lower the numerical standard, the more PFAS-contaminated systems and sites become subject to the regulation and must be addressed. While IEPA found ~12% of community water systems had detectable levels of PFAS, with only 2 exceeding the previous USEPA health advisory level (70 ng/l or ppt for PFOA + PFOS), when a lower standard is used, then more systems will need treatment. How many more? And where is a reasonable standard that reduces risk but does not require chasing ubiquitous low PFAS levels in every groundwater and surface water at unmanageable cost to local stakeholders and society as a whole?

- As with other contaminants, IL and other regulators need to recognize that feasibility and cost factors mean acceptance that some level of risk cannot be eliminated. The best IEPA and IPCB or any regulatory agency can do is to conduct risk prioritization around PFAS, compare those risks to other public health risks, and set priorities designed to address the greatest potential risks first (e.g., when it comes to PFAS, the greatest priorities are identifying and remediating drinking water issues and addressing specific industrial and fire-fighting sites that may have impacted waters at high levels).

The proposed Part 620 groundwater standards are close to background levels. I can't imagine that IEPA is expecting to be able to clean up all groundwater in myriad smaller situations statewide. For example, Illinois, like other states, relies on septic systems for wastewater treatment in rural areas, and an estimated 20% of Illinois households have septic systems. It is likely that nearly all of these are releasing some PFAS to groundwater, even if there is no industrial or PFAS-specific activity in the area. As noted above, Schaider et al., 2015 showed private water wells on Cape Cod, MA contaminated by septic systems.

In addition to that ubiquitous background PFAS, routine pumping of septic systems is ongoing and necessary for the proper functioning of septic systems and protection of the environment. As in all states, an industry manages septage, often through land application regulated by IEPA and health departments or through other treatment and disposal processes. Testing of septage in Maine found levels of PFAS in typical septage to be 1.5 to 2 times higher than in municipal biosolids. Thus, IEPA might expect that septage management sites will have created PFAS levels in nearby groundwater that are close to or exceed the proposed Part 620 regulatory limits. That could be a lot of locations. In NH, a much smaller state, nearly all of the septage management lagoons and treatment locations have caused exceedances of that state's low groundwater standards (in the teens ng/l or ppt for 4 PFAS). A few wastewater treatment facilities that discharge effluent to groundwater, also show exceedances in groundwater monitoring wells. And many small business septic systems have also caused impacts that exceed the standards. Yet these situations mostly involve background, minor consumer levels of PFAS.

- These are just a few examples of ubiquitous PFAS. Will IEPA require remediation of groundwater at all these kinds of sites? What will the costs be? What is the feasibility of addressing these minor situations, and will they achieve meaningful reductions in risks? Right now, NH is stymied and is not enforcing its groundwater standards in most of these kinds of situations, because of the disruptions and unintended consequences they would cause. In contrast, and as we have been stating, what New Hampshire is able to do is clean up the major industrial and fire-fighting sites; those are clear situations of concern where actions are reducing potential risks. Those state actions make sense. We urge IEPA to, at the very least, only establish groundwater and any other standards that make it possible to address such industrially-impacted PFAS sites. Standards can always be adjusted later. But IEPA should avoid immediately imposing the kinds of low PFAS standards currently proposed for the Part 620 regulations, especially when IEPA has minimal understanding of the feasibility and costs associated with the myriad unintended consequences affecting many media and programs.

Understanding feasibility leads to questions about relative risks and whether or not actions are really helping reduce real risks. Are the end-of-pipe treatments that some states have focused on – site cleanups, groundwater remediation, wastewater and landfill treatments, and the Maine biosolids ban – more useful at reducing potential exposures and human health risks than, for example, phasing out PFAS uses and focusing on source controls?

We urge IEPA to integrate all of the above feasibility and cost considerations into comprehensive PFAS policy across all its environmental programs before setting enforceable numerical standards such as those proposed for the Part 620 groundwater standards.

IV. Conclusion

For all of the reasons stated above, I urge IEPA to remove PFAS from the current proposed Part 620 groundwater standards rulemaking.

I urge IEPA to complete the comprehensive review of all its policies and actions on PFAS, conduct relative risk comparisons to help set priorities for the most cost-effective and efficient PFAS risk reductions, collect additional PFAS background information and data, and analyze feasibility and costs related to setting drinking water and, later, groundwater and other standards.

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