POLLUTION CONTROL HEARINGS BOARD

STATE OF WASHINGTON

NISQUALLY DELTA ASSOCIATION, a non-profit organization, and ED KENNEY, Appellants, v. STATE OF WASHINGTON DEPARTMENT OF ECOLOGY, Appellee.	PCHB No. 22-057 MOTION FOR PARTIAL SUMMARY JUDGMENT

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I. INTRODUCTION

Appellants Nisqually Delta Association (NDA) and Ed Kenney (collectively, "Appellant") respectfully ask the Pollution Control Hearing Board ("PCHB" or "Board") to grant Appellants' Motion for Partial Summary Judgment on Issues 1, 4, 5, 8, and 9 in this appeal.

Biosolids, also known as sewage sludge, consist of the solid materials left over at the bottom of wastewater treatment plants. Septage are the same materials pumped from septic systems. In this appeal, NDA refers to these materials collectively as biosolids. Biosolids are the concentrated leftovers of everything modern society sends down the drain and sewer—which according to the United States Environmental Protection Agency (EPA) contain more than 700 chemicals, including the family of chemicals classified as hazardous substances and known as PFAS, as well as abundant microplastics. Biosolids are derived from a mix of waste from businesses including drycleaners and other users of dangerous chemicals, residential wastewater, leachate from landfills, and stormwater runoff that enters sewer systems.

The General Permit authorizes land application of at least one **billion** pounds of biosolids and septage over tens of thousands of acres in Washington over the next five years. Biosolids are employed as fertilizer on agricultural and forest lands. Once on the land, biosolids provide an exposure pathway to the environment and humans, via surface water and groundwater, intake by plants, intake by animals, and bioaccumulation in food webs. The General Permit fails to require testing, monitoring, or regulation of biosolids or application sites beyond nine heavy metals identified in an outdated 1993 rule. Ecology has violated its statutory and regulatory requirements by choosing to ignore the other contaminants documented to be present in biosolids. Similarly, Ecology clearly erred in its State Environmental Policy Act (SEPA) "determination of non-significance" by failing to conduct even basic effects analysis of the environmental impacts of biosolids application.

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II. STATEMENT OF ISSUES

Appellant moves the Board for summary judgment on Issues 1, 4, 5, 8, and 9 as set forth in the Board's Amended Pre-Hearing Order (April 13, 2023).

III. BACKGROUND

A. Biosolids Regulatory Framework.

Under Ecology regulations, "[s]ewage sludge is the solid, semisolid, or liquid residue generated during the treatment of domestic sewage in a treatment works. Biosolids are produced by treating sewage sludge to meet certain quality standards that allow it to be applied to the land for beneficial use. Septage is a class of biosolids that comes from septic tanks and similar systems receiving domestic wastes." WAC 173-308-005(1). Section 405 of the Federal Clean Water Act, 33 U.S.C. § 1345, constitutes the federal regulation of biosolids. Section 405 directs the United States Environmental Protection Agency (EPA) to create regulations to establish initial numeric limits for identified pollutants in biosolids, and to conduct a biennial review of additional potential pollutants. EPA promulgated the regulations at 40 C.F.R. Part 503 in 1993. The regulations identify nine heavy metals and set numeric limits for those metals. 40 C.F.R. § 503.13. There are also standards for pathogen and vector reduction and application rates. 40 C.F.R. Part 503 authorizes delegation to State programs for administration, but expressly does not preclude a state from imposing more stringent standards or regulating more pollutants in biosolids. 40 C.F.R. § 503.5. Washington State law, set forth in Chapter 70A.226 RCW, serves as the basis for delegation of the Federal program and imposes additional requirements on biosolids application. Ecology promulgates and implements rules at Chapter 173-308 WAC.

Additionally, under the Washington State Water Pollution Control Act, Ecology has "the jurisdiction to control and prevent the pollution of streams, lakes, rivers, ponds, inland waters,

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salt waters, water courses, and other surface and underground waters of the state of Washington." RCW 90.48.030.

In 2018 the EPA Office of Inspector General published a scathing report titled "EPA Unable to Assess the Impact of Hundreds of Unregulated Pollutants in Land-Applied Biosolids on Human Health and the Environment." The report criticized the agency's inability to complete the requisite biennial reviews and failure to update the contaminants regulated in biosolids since 1993.[1] EPA has taken more robust steps since, and in the most recent biennial review (2020-21), EPA stated that "[a] total of 739 chemicals have been identified in biosolids to date; about 250 of these are dioxins, furans, and PCBs." *See* Golding Dec. Exh. K at iv. Human health toxicity values were found for 70 chemicals identified during the curation process, and 64 previously identified chemicals. *Id.* The 2021 Biennial Report also identifies a study showing high levels of microplastics present in land applied biosolids, with significant likely "export of MPs to aquatic systems from the terrestrial environment." *Id.* at A-9.

B. Biosolids Generation, Content, and Land Application.

The attached expert report of Dr. Robert Hale explains the basic process of wastewater treatment and generation of biosolids. Wastewater treatment consists of several sequential steps. Initially, wastewater enters the facility headworks via a series of sewer lines. Grinders shred solids such as debris, diapers, paper, and plastic products to permit their passage and protect equipment. In the case of plastics, this process generates additional microplastics in the wastewater. Treatment then consists of a series of settling tanks in which biosolids accumulate

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[1] https://www.epa.gov/biosolids/office-inspector-general-reports-biosolids-program#:~:text=The%20Biosolids%20Program%20was%20evaluated,of%20biosolids%20for%20land%20application.

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in the bottom of the tanks. Chemical pollutants that are hydrophobic (e.g., brominated flame retardants) or those that exhibit a charge (e.g., some pharmaceuticals) may sorb to the biosolids.

To understand the complexity of contaminants of biosolids one must recognize the diversity of sources, the processes used to generate wastewater sludge, and the techniques applied to stabilize biosolids. Contaminant sources to sludges vary greatly and include all the entities and areas that have access to a sewer. These include diverse industries, businesses, leachate from landfills, military/governmental facilities, medical facilities, impermeable surfaces, and households. While pretreatment regulations exist for select major industries, these are not always enforced adequately and do not cover all sources or contaminants of concern. Seasonal or intermittent weather events may significantly alter the volume and composition of both wastewater and resulting biosolids. Stormwater can wastewater treatment systems, with associated mixtures of contaminants. Stormwater in Washington is of particular concern because it often contains 6ppd-quinone, which is lethal to coho salmon in parts per trillion.

Once land applied, persistent chemicals in biosolids will accumulate in soils and may render it unsuitable for agricultural use. This unfortunate scenario has recently been demonstrated in Maine for PFAS found in milk at dairies. Repeated applications of biosolids over time, as is customary for soil amendments, exacerbates persistent contaminant buildup.

C. Environmental and Human Exposure.

Land application of biosolids provides numerous pathways for exposure of contaminants. Delivery to water can occur through surface water runoff, wind-blown dust, and through groundwater. Because biosolids are used as fertilizer, the contaminants present in them can uptake into plants and, in turn, bioaccumulate in animals. There are also exposure pathways for

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individuals involved in biosolids application and subsequent agriculture, gardening (with bagged materials sold commercially), and forestry.

D. PFAS in Biosolids.

The attached expert report from Denise Trabbic-Pointer provides extensive background and explanation of PFAS contamination in biosolids. Per- and polyfluoroalkyl substances (PFAS) are a family of more than 9,000 synthetic organic chemicals. Often referred to as "forever chemicals," PFAS can withstand high temperatures and survive highly corrosive environments. They are used in the manufacture of coatings, surface treatments, and specialty chemicals in cookware, carpets, food packaging, clothing, cosmetics, and other common consumer products. Recent studies also demonstrate that they are present in often high concentrations in toilet paper, and thus, are regularly disposed of into waste streams. PFAS also have many industrial applications and are an active ingredient in certain types of firefighting foams (aqueous film-forming foams, or AFFF). PFAS coatings resist oil, grease, and water.

In virtually all settings besides land application of biosolids, Ecology has recently recognized PFAS as a very significant and harmful environmental concern. In its Chemical Action Plan, Ecology states that PFAS can bioaccumulate and "[e]pidemiological studies suggest links between PFAA exposure and several negative health outcomes in human beings, including increases in cholesterol levels, immune suppression, and lower birthweights. Higher exposures have also shown associations with some cancers, such as testicular and kidney cancers." *See* Golding Decl. Exh. E, Chemical Action Plan at 13. On June 21, 2022, EPA issued a health advisory recognizing that even very low concentrations of PFAS (parts per trillion) in drinking water are dangerous, and that "[h]uman studies have found associations between PFOA and/ or

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PFOS exposure and effects on the immune system, the cardiovascular system, development (e.g., decreased birth weight), and cancer." *See* 87 Fed. Reg. 36848 (June 21, 2022).

PFAS are present in biosolids. As detailed in Ms. Trabbic-Pointer's report, a 2020 study found that TAGRO Potting Soil, which is designed for use in containers and is composed of 20% biosolids, 20% sawdust and 60% screened bark, contained Total PFAS levels of 39.5 ppb. A 2021 Sierra Club and Ecology Center study that sampled and analyzed commercial biosolids-derived fertilizers and soil amendments, found that the Tacoma Central Wastewater Treatment Plant soil conditioner TAGRO Mix, which is about 50% Tacoma WWTP biosolids, contains significant levels of total organic fluorine and Levels of PFAS, including PFOA and PFOS. For reference, results for TAGRO are similar to concentrations found in fish collected in highly polluted areas and thousands of times higher than the amounts regulated in drinking water.

According to Ecology, "[n]early all municipal wastewater treatment plants have measurable levels of PFAS in their discharge."[2] In August 2021, Ecology published a report documenting testing for PFAS at three wastewater treatment plants. The testing demonstrated "PFAS concentrations in biosolids that are an order of magnitude higher than in aqueous substances and contain types of PFAS that are not found in influent and effluent." *See* Golding Dec. Exh L at 21.

E. Microplastics in Biosolids.

Microplastics are plastics measuring 5 mm or less. They are widely present in biosolids, and now comprise roughly one to five percent by volume of biosolids. These fragments of plastic are contaminants in their own right, and also attract other pollutants and act as efficient and dangerous vehicles. Microplastics can be taken in by plants, animals, and bioaccumulate

[2] https://ecology.wa.gov/Waste-Toxics/Reducing-toxic-chemicals/Addressing-priority-toxic-chemicals/PFAS/Wastewater

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throughout the food web. Plastics resist biochemical degradation in soils and may leach additives over time. The olefinic plastics are among the most common and persistent. Fluorinated polymers are also produced and concerns over their safety and possible release of PFAS are outstanding. Polymer additives, as well as fillers and processing aids, exist at substantial levels (percent by weight) in many plastics. Over 90% of microplastics entering wastewater treatment plants are typically sequestered in the solids and hence biosolids. Once land applied, these microplastics can migrate into water, wastewater, and surrounding soils. Decreasing plastic debris size increases particle surface areas and decreases the travel distance of additives to the particle surface, facilitating their escape. *See* Report of Dr. Hale at 11-12.

F. The General Permit and SEPA Process.

The General Permit is a programmatic five-year permit governing transfer, storage, treatment, and land application of biosolids. According to Ecology's response to comments on the permit, in 2020, about 103,000 dry tons of biosolids were land applied. Response to Comments at 21. Also in 2020, non-exceptional quality biosolids were applied to about 28,000 acres of land in Washington. *Id.* at 25. Meaning, if applications remain steady over a five-year period, more than 500,000 tons, or 1 billion pounds, of biosolids will be authorized for land application by the General Permit.

The General Permit largely mirrors 40 C.F.R. § 503 regulations and focuses on the nine regulated heavy metals, as well as pathogen and vector reduction. It sets buffers around surface waters and establishes minimum depths of groundwater, also based on the identified regulated nine contaminants. The General Permit does not require testing, monitoring, or regulation of other pollutants, including PFAS and microplastics. Some applicators may also require a later site-specific land application plan, which can trigger further SEPA and other review.

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Ecology released a draft General Permit, SEPA Checklist, and SEPA "determination of non-significance" on May 4, 2021. *See* Golding Dec., Exhs. A (General Permit), B (SEPA Checklist), and C (DNS). Ecology received over 100 critical public comments, many focused on the risks presented by pollutants, such as PFAS, that Ecology elected not to regulate. In June 2022, Ecology released an extensive response to comments. *See* Golding Dec., Exh. D. The responses largely defended the existing program and were at times combative. For example, in response to repeated and thorough comments raising concerns about PFAS, Ecology wrote:

> Discharges from homes to the sewer system, and septage from onsite wastewater treatment systems delivered to sewage treatment plants undoubtedly contribute to the occurrence of PFAS in biosolids. The point we have consistently made is that people have objected to relatively low concentrations of PFAS in biosolids, applied to an extremely small amount of land in Washington, but at the same time have not acknowledged that they are exposed on a daily basis through routine and socially acceptable activities to a range of pollutants, including PFAS, and at much higher levels than will ever be connected to biosolids. If the issue is PFAS, then the solution is to quit using it in the manufacture of products that are ubiquitous in our daily living.

Resp. at 64-65. Repeatedly, Ecology reiterated that the issues raised would not be addressed in the biosolids General Permit or analyzed in the SEPA process. The response states "Ecology's stance remains that the best approach to reducing public and environmental exposure to PFAS is to reduce or eliminate their use in manufacturing-their true source." Resp. at 77. The response continues "[w]e are disappointed that the commenter did not remark on the merit of removing contaminants at the source in order to have a better biosolids management problem. The total contaminants in biosolids are insignificant as compared to other sources." Resp. at 104.

With respect to microplastics, Ecology recognized a valid concern but responded that: "Ecology does not have resources to focus on microplastics at this time. We cannot tell if study conditions reflect likely real-world scenarios. The authors stated the observed effects were short-term and transient." Resp. at 109, *see also* Resp. at 124.

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On June 15, 2022, Ecology issued the final General Permit and final SEPA DNS. The SEPA Checklist and DNS remained unchanged.

IV. STANDARD OF REVIEW

Summary judgment is appropriate here as this motion raises purely legal issues. *Am. Express Centurion Bank v. Stratman*, 172 Wn. App. 667, 675-76, 292 P.3d 128 (2012). The summary judgment procedure is designed to eliminate unnecessary trial if only questions of law remain for resolution, and neither party contests the facts relevant to a legal determination. *Rainier Nat'l Bank v. Security State Bank*, 59 Wn. App 161, 164, 796 P.2d 443 (1990), *review denied*, 117 Wn.2d 1004 (1991). The party moving for summary judgment must show there are no genuine issues of material fact and the moving party is entitled to judgment as a matter of law. *Magula v. Benton Franklin Title Co., Inc.*, 131 Wn.2d 171, 182, 930 P.2d 307 (1997).

The Board reviews Ecology permitting decisions on a *de novo* basis in adversary proceedings. *Northwest Aquatic Ecosystems v. Ecology*, PCHB Nos. 05-087, 05-088 (Order Granting Summary Judgment) (Dec. 16, 2005). However, the Board reviews Ecology's SEPA threshold determination under a "clearly erroneous" standard. *Ass'n of Rural Residents v. Kitsap County*, 141 Wn.2d 185, 195-96, 4 P.3d 115 (2000). "A finding is 'clearly erroneous' when although there is evidence to support it, the reviewing court on the entire evidence is left with the definite and firm conviction that a mistake has been committed." *Murden Cove Preservation Ass'n v. Kitsap County*, 41 Wn. App. 515, 523, 704 P.2d 1242 (1985).

V. ARGUMENT

Biosolids contain the waste produced by modern life. The 1993 40 C.F.R. Part 503 rule identifies nine heavy metals that are regulated in biosolids. However, the content of wastewater and biosolids has changed greatly since 1993. Ecology and EPA now recognize that biosolids

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contain more than 700 chemicals, in addition to ubiquitous microplastics, which are both toxic and serve as a vector for contaminants.

Ecology acknowledges these risks but dismisses them for various reasons, claiming that it lacks authority or resources to regulate. These claims are incorrect and unlawful—Ecology has a statutory and regulatory obligation to minimize risk to public health and the environment from biosolids. This obligation includes the duty to significantly reduce manufactured inerts such as microplastics. Irrespective of its authorities, Ecology's SEPA one-paragraph determination of non-significance is clearly erroneous. SEPA imposes a statutory obligation to take a hard look at all the direct, indirect, and cumulative effects of the permitted action. However, the agency neglected to provide even the most basic analysis, failing to provide any meaningful analysis of anticipated volume and location of biosolids application, biosolids contamination levels, contamination accumulation over time, cumulative effects with other sources of contaminants, or meaningful mitigation measures. Ecology's perfunctory SEPA analysis is facially deficient.

A. Issue 1—the General Permit Violates RCW 70A.226.005(2) Because it Wholly Fails to Monitor or Regulate Contaminants Including PFAS and Microplastics.

RCW 70A.226.005(2) requires with respect to biosolids that:

> The legislature declares that a program shall be established to manage municipal sewage sludge and that the program shall, to the maximum extent possible, ensure that municipal sewage sludge is reused as a beneficial commodity and is managed in a manner that minimizes risk to public health and the environment.

Accordingly, the biosolids program must "to the maximum extent possible": 1) "ensure that municipal sewage sludge is reused as a beneficial commodity," and 2) be "managed in a manner that minimizes risk to public health and the environment." Both requirements must be met to authorize land application of biosolids.

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Ecology implements RCW Chapter 70A.226 through WAC Chapter 173-308 and through the issuance of the General Permit and site-specific review. Together, the regulations and permits comprise the biosolids "program" referenced in RCW 70A.226.005(2). The General Permit does not, to the maximum extent practicable, minimize risk to public health and the environment, because it wholly fails to monitor or regulate PFAS and microplastics despite the recognized risks of PFAS and microplastics by Ecology, the EPA, and other states.

1. The General Permit Fails to Monitor or Regulate PFAS in Any Manner.

The General Permit imposes no monitoring, standards, or restrictions relating to the presence of PFAS, even though the agency has repeatedly recognized the risks posed by PFAS in general and in biosolids in particular. For example, Ecology's "Chemical Action Plan" for PFAS acknowledges that PFAS are present in consumer products and leachate from landfills, and thus likely present in wastewater treatment plants. The Chemical Action Plan further acknowledges that PFAS arenot removed in wastewater treatment, and states that "[b]iosolids produced in WWTPs where PFAS are present can in turn be contaminated with PFAS." Golding Dec., Exh. E at 26-27.

In new wastewater discharge permits, Ecology now requires PFAS monitoring. According to Ecology's website relating to the West Point wastewater treatment facility permit:

> Ecology and the Washington Department of Health are working to minimize the public's exposure to PFAS — a widely-used class of chemicals that don't break down naturally in the environment. The draft West Point permit supports these efforts by proposing King County:
> (1) Monitor for PFAS in the wastewater it treats
> (2) Identify the industries that may discharge PFAS to their treatment system
> (3) Work with those industries to control this source of pollution[3]

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[3] Available here: https://ecology.wa.gov/Blog/Posts/April-2023/West-Point-Treatment-Plant-water-quality-permit-up

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Ecology has provided no rationale for why PFAS area risk worth monitoring in wastewater discharge from wastewater treatment plants, but not in biosolids produced by the same facilities.

In July 2022, Ecology determined that PFAS is a hazardous substance regulated under the Model Toxics Control Act and published recommended soil and groundwater cleanup levels for six of the most common PFAS compounds. *See* Exh. E, Focus Sheet. Ecology, on one hand, authorizes contamination of sites with PFAS under the Biosolids General Permit, and then on the other hand may require cleanup of land application sites under MTCA.

The Washington State Department of Health (DOH) also increasingly recognizes the risks posed by PFAS and requires monitoring and regulation. DOH issued a final rule that included groundwater State Action Levels for five PFAS compounds, which became effective on January 1, 2022. In 2023, DOH also completed rulemaking requiring regular monitoring for PFAS in drinking water supplies. *See* WAC 246-290-300 (10)(b). If PFAS are detected, follow up testing and monitoring and source investigation is required, as well as public notice. WAC 246-290-320. In December 2022, DOH also issued a fish consumption advisory for Lake Washington, Lake Meridian, and Lake Sammamish after finding perfluorooctane sulfonate (PFOS, a type of PFAS) in several types of fish. Golding Dec., Exh. G.

EPA has released a document titled "PFAS Strategic Roadmap: EPA's Commitments to Action 2021-24." The document identifies biosolids as an exposure point, noting that "[a]reas can be exposed due to their proximity to industrial sites, airports, military bases, land where biosolids containing PFAS have been applied, and other sites where PFAS have been produced or used and disposed of for specific and repeated purposes." Golding Dec., Exh. H at 7. EPA also states that "[b]iosolids, or sewage sludge, from wastewater treatment facilities can sometimes contain PFAS. When spread on agricultural fields, the PFAS can contaminate crops and livestock." *Id.* at 16.

Starting in the winter of 2022, EPA notes that it will "require pretreatment programs to include source control and best management practices to protect wastewater treatment plant discharges and biosolid applications." *Id.* at 14. EPA will complete the risk assessment for PFOA and PFOS in biosolids by Winter 2024. *Id.* at 16. EPA has also certified a testing method for PFAS in biosolids. In collaboration with the Department of Defense, EPA has developed a testing method, Method 1633, to detect PFAS in wastewater, soil, and biosolids.[4]

Several other states now regulate PFAS in biosolids. Vermont and Pennsylvania have monitoring and testing requirements for biosolids and biosolids application sites. Michigan imposes strict pretreatment rules for wastewater treatment plants. The Maine Legislature passed a bill – L.D. 1911, An Act to Prevent the Further Contamination of the Soils and Waters of the State with So-Called Forever Chemicals -which completely prohibits the land application of biosolids and the sale of compost or other agricultural products and materials containing sludge and septage in the state of Maine. This was due to PFAS concerns. L.D. 1911 was passed after at least two farms were significantly impacted by unintentional land application of PFAS-contaminated biosolids or other beneficial use solid wastes. *See* Trabbic-Pointer Report at 45.

In sum, other divisions in Ecology, as well as the Department of Health, United States EPA, the Department of Defense, and many other states' biosolids programs have all recognized the risks associated with PFAS exposure, and the viability and importance of monitoring, testing, and regulating for PFAS. Biosolids concentrate and generate PFAS from industrial and domestic use, and are a primary pathway for exposure in water, soils, and crops. Despite these clear risks,

[4] https://www.epa.gov/cwa-methods/cwa-analytical-methods-and-polyfluorinated-alkyl-substances-pfas

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the General Permit has no mechanisms at all for PFAS monitoring, testing, or regulation in biosolids or the lands where they are applied. This omission plainly does not, "to the maximum extent possible," manage biosolids "in a manner that minimizes risk to public health and the environment," and thus the General Permit violates RCW 70A.226.005(2).

2. The General Permit Fails to Regulate Microplastics in Any Manner.

The General Permit also imposes no monitoring, standards, or restrictions relating to the presence of microplastics, either in biosolids or the lands where they are applied. Microplastics are prevalent in biosolids and impose environmental risks both on their own and due to their tendency to carry and deliver other contaminants to water. According to Dr. Hale's report, "Land application of biosolids has been estimated to contribute massive amounts of microplastics to the terrestrial environment. Nizzetto et al. (2016) hypothesized that land application of biosolids may deposit up to 300,000 tons of microplastics annually to North American soils. This amount exceeds the cumulative total believed present in all the surface waters of the world ocean." Hale Report at 14.

Like PFAS, microplastics were not initially regulated by EPA, but are now a widely recognized environmental concern. Primary microplastics are plastics that are produced as small pieces and intentionally added to commercial products. Secondary microplastics are derived from larger plastics that break down and fragment over time. Primary microplastics in particular concentrate in biosolids because, among other sources, they are shed from clothing and other materials in domestic and commercial clothes washing. According to recent peer-reviewed scholarship, "sewage has been identified as the main source because purification systems do not seem to be able to remove them." Golding Dec. at Exh. I.

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Ecology recognizes that microplastics pose risks in biosolids but has argues it lacks sufficient funding to address the issue. *See* Golding Dec., Exh. D at 109, 124. While agencies operate within budgetary constraints, this does not excuse them from statutory obligations. Requiring monitoring of biosolids and application sites, is inexpensive for the agency and would be an important first step in determining whether regulation is needed. However, simply ignoring the problem violates Ecology's mandate to "to the maximum extent possible" manage biosolids "in a manner that minimizes risk to public health and the environment."

B. Issue 4—Approval of the General Permit is Arbitrary and Capricious Because the General Permit Does Not Require Testing, Monitoring, or Regulation of PFAS and Microplastics in Biosolids and Lands Where Biosolids are Applied.

In addition to reviewing regulatory compliance, the Board may determine whether to overturn arbitrary and capricious action by Ecology. *See, e.g.*, *Clallam County v. Ecology*, PCHB No. 19-044 (order denying motion for preliminary injunction) (Sept. 17, 2019). Agency action is arbitrary and capricious if it is willful, unreasoning, and taken without regard to the attending facts or circumstances. *Hillis v. State, Dep't of Ecology*, 131 Wn.2d 373, 383, 932 P.2d 139 (1997). Beyond its specific statutory authority to regulate biosolids, Ecology has broad jurisdiction and authority under the Washington State Water Pollution Control Act "to control and prevent the pollution of streams, lakes, rivers, ponds, inland waters, salt waters, water courses, and other surface and underground waters of the state of Washington." RCW 90.48.030. The Legislature has tasked Ecology with clear direction to take rigorous action in protecting the State's ground and surface waters:

> It is declared to be the public policy of the state of Washington to maintain the highest possible standards to insure the purity of all waters of the state consistent with public health and public enjoyment thereof, the propagation and protection of wild life, birds, game, fish and other aquatic life, and the industrial development of the state, and to that end require the use of all known available

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> and reasonable methods by industries and others to prevent and control the pollution of the waters of the state of Washington.

RCW 90.48.010. The Legislature has further commanded that "[c]onsistent with this policy, **the state of Washington will exercise its powers, as fully and as effectively as possible, to retain and secure high quality for all waters of the state.**" *Id.* (emphasis added).

In light of the clear goals and policies of RCW 90.48.010, Ecology's decision to not require any testing, monitoring, or regulation of PFAS and microplastics is arbitrary and capricious. Both contaminants are widely recognized as serious risks to the environment and human health. The agency cannot simply ignore dangerous contaminants to avoid regulating them. Ecology has recognized PFAS as a hazardous substance and microplastics as a pressing problem, but without a rational basis simply decided to ignore these contaminants and not even require testing or monitoring. This abdication of responsibility is arbitrary and capricious.

C. Issue 5—Ecology's Interpretation of WAC 173-308-205 As Applied in the General Permit Conflicts with the Plain Language of the Regulation By Omitting Regulation of Microplastics.

Manufactured inerts consist of "wastes such as plastic, metals, ceramics and other manufactured items that remain relatively unchanged during wastewater or biosolids treatment processes." WAC 197-308-080. Microplastics are "plastic[s]… that remain relatively unchanged during wastewater or biosolids treatment processes," and thus are manufactured inerts. WAC 197-308-080. There is no size minimum or maximum set forth in the regulatory definition of manufactured inerts.

WAC 173-308-205 reads as follows:

> (1) Except for sewage sludge approved for long-term disposal in accordance with WAC 173-308-300(9), all biosolids (including septage) or sewage sludge must be treated by a process such as physical screening or another method to significantly remove manufactured inerts prior to final disposition. Meeting this requirement

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> may occur at any point in the wastewater treatment or biosolids manufacturing process.
> (2) Options for meeting the requirement. Meeting the requirement in subsection (1) of this section can be accomplished by either of the following:
> (a) Screening through a bar screen with a maximum aperture of 3/8 inch (0.95 cm).
> (b) Obtaining approval from the department for an alternative method that achieves a removal rate similar to or greater than that achieved by the screening standard in (a) of this subsection.
> (3) Timing for meeting the requirement. The requirement in subsection (1) of this section must be met by July 1, 2012, or at the time of final disposition if the material will not be managed prior to July 1, 2012.
> (4) Regardless of the date that the requirement in subsection (1) of this section is met, biosolids (including septage) that are land applied or sold/given away in a bag or other container must contain less than one percent by volume recognizable manufactured inerts.

With respect to this regulation, the General Permit includes a statement that: "[p]rior to land application, biosolids must meet the requirements for removal of manufactured inerts in WAC 173-308-205." Permit at 4.3. The General Permit imposes no specific screening mechanism or requirement to assess whether biosolids contain less than one percent by volume recognizable manufactured inerts.

In commenting on the General Permit, Mr. Kenney noted serious concern regarding microplastics, pointing Ecology to recent peer-reviewed studies that document microplastics as typically being comprised of five percent of biosolids (five times more than the one percent regulatory maximum). See Golding Dec., Exh. J. In response, Ecology articulated its interpretation of the regulation as follows:

> The standard for removing manufactured inerts was established in rule at a time when Ecology (and we think most others) were not aware of issues related to microplastics. This is clearly evidenced by the cited standard of a bar screen with a 3/8" aperture (whereas microplastics are generally 5 millimeters or less). The threshold by percent is 1% recognizable inerts by volume. In this case, Ecology adopted the standard with ocular recognition in mind, literally what might be seen in a field.

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Thus, Ecology's official position is that because there was less recognition of microplastics in 2007, WAC 173-308-205 could not possibly regulate microplastics. Ecology unlawfully elevates the agency's perception of regulatory intent over the plain text.

Regulatory interpretation is a question of law subject to *de novo* review. *Columbia Riverkeeper v. Port of Vancouver USA*, 188 Wash.2d 80, 90, 392 P.3d 1025 (2017). The Board and courts "interpret administrative regulations using rules of statutory construction." *Id.* "If the plain language is subject to only one interpretation, [the] inquiry ends because plain language does not require construction." *HomeStreet, Inc. v. Dep't of Revenue*, 166 Wash.2d 444, 451, 210 P.3d 297 (2009).

Ecology incorrectly contends that WAC 197-308-205 does not apply to microplastics at all. Ecology's reasoning for this conclusion is wrong. The plain language of the regulation is unambiguous. The regulatory definition of "manufactured inerts" expressly includes plastics without size limitation. WAC 197-308-205 dictates that all biosolids "must be treated by a process such as physical screening or another method to significantly remove manufactured inerts prior to final disposition," and all biosolids "must contain less than one percent by volume recognizable manufactured inerts." Because the "regulation is clear and unambiguous," the Board "should apply its plain language and may not look beyond the language to consider the agency's interpretation." *Children's Hosp. & Med. Ctr. v. Washington State Dep't of Health*, 95 Wash. App. 858, 868, 975 P.2d 567, 574 (1999).

Ecology's arguments fail for specific reasons as well. First, Ecology argues that the regulation cannot apply because "[t]he standard for removing manufactured inerts was established in rule at a time when Ecology (and we think most others) were not aware of issues related to microplastics." This interpretation is incorrect as a matter of law. "Manufactured

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inerts" is defined broadly in regulation to capture "waste…such as plastic." WAC 197-308-080. Ecology did not have to foresee every type of future, specific size, and type of plastic that might be generated. If Ecology wanted to set a minimum or maximum size, or a specific enumeration of types of plastics that qualify, it could have done so. Instead, the agency created a class of materials that expressly includes all forms of plastic. The agency "does not have a legitimate expectation that pollution control measures will be frozen in time to outdated or ineffective measures." *Snohomish Cnty. v. Pollution Control Hearings Bd.*, 187 Wn.2d 346, 373, 386 P.3d 1064, 1077 (2016), as amended (May 2, 2017) (citation omitted); *see also Enyart v. Nat'l Conference of Bar Examiners, Inc.,* 630 F.3d 1153, 1163 (9th Cir.2011) (rejecting the argument that the provision of auxiliary aids contemplated in the American Disability Act's implementing regulations are sufficient because "assistive technology is not frozen in time: as technology advances, testing accommodations should advance as well.").

Second, Ecology argues that "the cited standard of a bar screen with a 3/8" aperture" suggests that microplastics are not regulated. This argument also fails. The referenced text in WAC 197-308-205(2) sets forth methods by which "[m]eeting the requirement in subsection (1) of this section can be accomplished." This expressly does not apply to the substantive requirement of WAC 197-308-205(4), which sets the one percent by volume limit. The provision only sets the *maximum* aperture of the bar screen (contemplating smaller screens potentially being necessary), and uses the verb "can," instead of "shall." It does not alter the overarching requirement to "significantly remove manufactured inerts prior to final disposition."

Finally, Ecology contends that the use of the word "recognizable" in WAC 197-308-205(4) means that "Ecology adopted the standard with ocular recognition in mind, literally what might be seen in a field." The term "recognizable" is not defined in statute or regulation. The

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relevant dictionary definition of "recognize" is "to perceive to be something or someone previously known," with synonyms of "perceive" and "discern."[5] None of these terms suggest that they must be so large as to be "seen in a field." Numerous studies have determined the percentage by volume of microplastics in biosolids demonstrates that they are indeed recognizable. Further, microplastics often are visible to the naked eye. Ecology's apparent size minimum for microplastics is baseless.

In sum, the plain language definition of "manufactured inert" applies to microplastics because it expressly includes plastics, with no size minimum. WAC 197-308-080. Ecology has violated WAC 197-308-205 by interpreting the regulation to exclude microplastics.

D. Ecology's Determination of Non-Significance is Clearly Erroneous.

Ecology has generally contended that they generally lack the authority to impose standards for contaminants other than those covered by EPA regulations. While this argument is incorrect for a variety of reasons, it does not excuse Ecology from its obligation under SEPA, to fully consider the direct, indirect, and cumulative effects of the General Permit.

SEPA compels State agencies to protect citizens' ability to enjoy the natural environment and recognizes the role of the natural environment in promoting human health and well-being. RCW 43.21C.010. The goal of SEPA is that "presently unquantified environmental amenities and values will be given appropriate consideration in decision making along with economic and technical considerations…It is an attempt by the people to shape their future environment by deliberation, not default." *Norway Hill Pres. & Prot. Ass'n v. King Cty. Council*, 87 Wn.2d 267, 272, 552 P.2d 674, 677 (1976).

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[5] https://www.merriam-webster.com/dictionary/recognize#dictionary-entry-1; https://www.merriam-webster.com/dictionary/recognize#synonyms

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Prior to the issuance of a permit, SEPA requires preparation of a checklist and threshold review to determine if the sale has probable, significant adverse environmental impact. RCW 43.21C.031; WAC 197-11-330. "The SEPA process shall be integrated with agency activities at the earliest possible time to ensure that planning and decisions reflect environmental values, to avoid delays later in the process, and to seek to resolve potential problems." WAC 197-11-055(1). "The fact that proposals may require future agency approvals or environmental review shall not preclude current consideration, as long as proposed future activities are specific enough to allow some evaluation of their probable environmental impacts." WAC 197-11-055(2)(a)(i).

The threshold determination considers a proposal's significance and whether the impacts caused may be reduced or avoided. "Significant," as used in SEPA, means a reasonable likelihood of more than a moderate adverse impact on environmental quality. WAC 197-11-794. Significance involves both context and intensity, and context may vary with the physical setting. *Id.* When making the threshold determination, WAC 197-11-330(3) requires that agencies take into account that "[s]everal marginal impacts when considered together may result in a significant adverse impact" and that "[a] proposal may to a significant degree ... [e]stablish a precedent for future actions with significant effects." Agencies are required to consider the effects of a proposal's probable impacts combined with the cumulative impacts from other proposals. *Quinault Indian Nation*, *et al.* v. *City of Hoquiam*, SHB No. 13-012c (Order on Summary Judgment) (Dec. 9, 2013).

With respect to the Biosolids General Permit, Ecology's SEPA checklist is extremely limited. The checklist has virtually no information about anticipated environmental impacts, but rather simply asserts that all impacts are reduced by existing regulations. There is no disclosure of anticipated overall application volumes, identification of locations, discussion of specific contaminants, or evaluation of mitigation measures. Ecology did provide additional information

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in an associated permit fact sheet and extensive response to comments. However, Ecology did not revise its SEPA Checklist or DNS and did not appear to conduct any additional environmental review. Rather, Ecology used the response to comments to defend decisions already made.

Ecology's final DNS is a terse and conclusory paragraph that reads:

> The state biosolids program is based on, and meets or exceeds the requirements of the federal biosolids management program implemented by U.S. EPA under 40 CFR Part 503. Beneficial use is the primary means of management in Washington, and nationwide. Biosolids that meet appropriate standards for beneficial use do not pose a significant risk to human health or the environment when used in accordance with applicable rules, guidelines and permit requirements. The permit authorizes landfilling and incineration when biosolids do not meet applicable standards. The permit program implemented by Ecology allows the agency to impose additional or more stringent requirements for individual facilities and sites, as required, following review of a permit application, additional environmental review, and public hearings if required.

This perfunctory analysis does not satisfy the requirements of SEPA and violates SEPA regulations in the manner set forth below.

1. Ecology's DNS is Not Based on Adequate Information.

A fundamental premise of compliant SEPA review is that it must be based on adequate information. WAC 197-11-335. Without such information, the agency cannot possibly determine whether probable environmental effects are significant, and thus cannot comply with the letter and intent of SEPA to enhance informed decision making. The threshold determination "must indicate that the agency has taken a searching, realistic look at the potential hazards and, with reasoned thought and analysis, candidly and methodically addressed those concerns." *Wenatchee Sportsmen Ass 'n v. Chelan County*, 141 Wn.2d 169, 176 (2000). This information must adequately demonstrate that the agency has taken the requisite "hard look" at environmental impacts. *Pub. Util. Dist. No. 1 of Clark County*, 137 Wn. App 150, 158, 151 P.3d 1067 (2007).

The SEPA Checklist and DNS are largely devoid of any analysis of critical issues. The following fundamental information is lacking in the checklist: 1) Sources of wastewater and biosolids (industrial users, domestic users, combined sewer overflows, leachates, and otherwise); 2) Contaminants likely present in biosolids; 3) Projections of amounts of biosolids likely to be applied under the General Permit, and rationale for that assessment; 4) Likely locations of application (largely knowable based on existing sites); 5) Analysis of compounding affects over time with multiple applications; 6) Analysis of impacts to plants, fish, animals, or other wildlife; 7) Analysis of human health effects, 8) Evaluation of whether buffer requirements are adequate for identified contaminants.

The General Permit is a major agency action—it authorizes more than 1 billion pounds of biosolids to be spread across tens of thousands of acres of land. The SEPA Checklist and DNS provide only perfunctory and conclusory analysis. The SEPA threshold determination is facially deficient, far from the requisite hard look, and clearly erroneous.

2. Ecology Clearly Erred by Violating SEPA's Regulatory Requirements for Threshold Determinations.

In failing to take a hard look in the threshold determination, Ecology also repeatedly violated SEPA regulations.

Ecology failed to consider the direct, indirect, and cumulative effects of exposure to pollutants. Instead, the agency made the flawed determination that impacts were insignificant because biosolids are only applied to a small fraction of overall farmlands, other pathways for pollutant exposure may be more severe, or other treatment approaches may be more effective. These various rationales do not comply with SEPA's mandate to fully consider cumulative

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effects. WAC 197-11-330(3) requires that agencies take into account that "[s]everal marginal impacts when considered together may result in a significant adverse impact" and that "[a] proposal may to a significant degree ... [e]stablish a precedent for future actions with significant effects." Agencies are required to consider the effects of a proposal's probable impacts combined with the cumulative impacts from other proposals. *Quinault Indian Nation*, *et al.* v. *City of Hoquiam*, SHB No. 13-012c (Order on Summary Judgment) (Dec. 9, 2013).

For example, Ecology repeatedly asserts that PFAS should not be a concern because there are multiple other pathways for exposure. *See* Exh. D at 64-65 ("If the issue is PFAS, then the solution is to quit using it in the manufacture of products that are ubiquitous in our daily living"). This is a legally deficient analysis—an impact does not have to be the worst of its class to get consideration. Ecology's mandate under SEPA was to consider the impact of exposure to PFAS from biosolids in combination with other exposure pathways. Cumulatively, these relatively small levels of exposure lead to health risks that Ecology failed to address.

Ecology also violated WAC 197-11-330(5), which prohibits balancing the benefits of a project against the impacts to make a DNS. In the DNS, Checklist, and Response to Comments, Ecology repeatedly touts the beneficial uses of biosolids as a rationale for impacts not being significant. However, in the threshold determination phase it is impermissible to balance impacts in this manner. The regulations provide that: "[a] threshold determination shall not balance whether the beneficial aspects of a proposal outweigh its adverse impacts, but rather, shall consider whether a proposal has any probable significant adverse environmental impacts under the rules stated in this section." WAC 197-11-330(5). Indeed, the regulation provides as an example that "proposals designed to improve the environment, such as sewage treatment plants or pollution control requirements, may also have significant adverse environmental

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impacts." The biosolids General Permit is closely analogous to the referenced sewage treatment plant—there may well be environmental benefits, but those are irrelevant at the threshold determination stage.

Finally, Ecology failed to consider adequate and new information. SEPA regulations, including WAC 197-11-340(3)(a)(ii), require that the threshold determination be based on adequate information, and that if new information becomes available, integrate that information into analysis. In the year that passed between the initial checklist and the final permit issuance (2021-22), significant developments were made with respect to PFAS and microplastics study. However, Ecology did not update its SEPA Checklist or DNS and appears to have simply argued against, rather than integrated, new information presented.

E. Ecology Must Prepare an Environmental Impact Statement.

As discussed herein, the General Permit authorizes a broad biosolids program, including land application of more than 1 billion pounds of biosolids. Biosolids contain at least 726 chemicals, many of which are serious health and environmental concerns, but to the best of our knowledge Ecology has never prepared an EIS for the program. The attached expert reports of Dr. Hale and Denise Trabbic-Pointer clearly set forth the risks, uncertainties, and impacts likely to be caused by the Biosolids General Permit. Each report asserts their professional expert opinion that there are probable, adverse, and significant environmental effects. Preparation of an EIS is required.

VI. CONCLUSION

For all the reasons stated herein, summary judgment is appropriate and required.

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Dated this 12th day of May, 2023.

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CERTIFICATE OF SERVICE

I certify that on May 12, 2023, I served a copy of the foregoing Motion for Partial Summary Judgment upon the parties as indicated below:

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Expert Report on PFAS in Biosolids

Denise Trabbic-Pointer

1. Introduction and Summary.

Available data and research support the conclusion that biosolids land application in Washington under the Washington State Department of Ecology's ["Ecology"] Biosolids General Permit creates significant probable adverse environmental effects due to the presence of per- and polyfluoroalkyl substances (PFAS).

In the document *EPA Unable to Assess the Impact of Hundreds of Unregulated Pollutants in Land-Applied Biosolids on Human Health and the Environment*, the US Environmental Protection Agency (EPA) Office of Inspector General makes the following statements and conclusions.

> The EPA's controls over the land application of sewage sludge (biosolids) were incomplete or had weaknesses and may not fully protect human health and the environment. The EPA consistently monitored biosolids for nine regulated pollutants. However, it lacked the data or risk assessment tools needed to make a determination on the safety of 352 pollutants found in biosolids. The EPA identified these pollutants in a variety of studies from 1989 through 2015. Our analysis determined that the 352 pollutants include 61 designated as acutely hazardous, hazardous or priority pollutants in other programs.
>
> The EPA has reduced staff and resources in the biosolids program over time, creating barriers to addressing control weaknesses identified in the program. Past reviews showed that the EPA needed more information to fully examine the health effects and ecological impacts of land-applied biosolids. Although the EPA could obtain additional data to complete biosolids risk assessments, it is not required to do so. Without such data, the agency cannot determine whether biosolids pollutants with incomplete risk assessments are safe. The EPA's website, public documents and biosolids labels do not explain the full spectrum of pollutants in biosolids and the uncertainty regarding their safety. Consequently, the biosolids program is at risk of not achieving its goal to protect public health and the environment.
>
> Despite the data and control weaknesses, the EPA implies that, when used correctly, biosolids are safe. The EPA does not disclose the shortcomings of

> information used to assess safety, nor does it reveal that potentially harmful and unregulated pollutants are present in biosolids such as pharmaceuticals, steroids and flame retardants. EPA scientists working on biosolids told us that without completing risk assessments on all of the pollutants found in biosolids they cannot say whether biosolids are safe. Also, while the number of unregulated pollutants has expanded over time, the EPA has reduced its biosolids program.

Many states, including the State of Washington, have quoted the EPA statement that "when used correctly, biosolids are safe." Reliance on this statement is outdated, as the EPA itself has determined this statement not to be true. Continued authorization of land application of biosolids leaves Washington communities at risk of adverse impacts from unintended exposure to harmful chemicals that are in wastewater treatment plant (WWTP) sludge/biosolids and septage.

The following are salient points provided in this Report regarding the risks and hazards of land applying biosolids that contain PFAS.

- PFAS exhibit a wide range of different physical and chemical characteristics that can affect their behavior in the environment. This adds to the complexity of fate and transport assessments and highlights the risk in making broad assumptions based on the behavior of a few well-studied PFAS.
- There is no known safe level of PFAS to human health. The human body has no need for any level of PFAS.
- Wastewater treatment plants (WWTPs) can act as unintended conduits of PFAS to the environment through effluent discharges and the land application of biosolids.
- Sources of PFAS are common across the US and this collective knowledge should be used as a basis to determine state-specific actions.
- There is mounting evidence in Washington of the presence of PFAS in the environment at contaminated sites, in drinking water, surface water and in WWTP biosolids. There are also admitted gaps in this information, especially as it relates to WWTP biosolids.
- Because of the persistent, bioaccumulative nature of PFAS, concentrations of PFAS compounds in soil will buildup and increase over time and with repeat applications, particularly long-chain PFAS compounds.

- Known risks to the environment from the current and continued use of PFAS-contaminated biosolids and the transport from one medium to another, include impacts to flora and fauna as well as wildlife and domestic animals.
- There are multiple sources, pathways and routes of exposure that contribute to adverse risks to the general public from PFAS in the environment and the exposures are often cumulative, particularly in environmental justice areas. It is important to identify all possible sources of exposure to PFAS to the general public. Sampling and analysis of potential sources for PFAS is critical to protecting people and the environment.
- PFAS in wastewater, surface water, and groundwater is a systemic and cyclical problem and requires addressing the source at all points of the cycle, including disposal of biosolids.
- The cyclical movement of PFAS to surface and groundwater poses a significant risk to community and individual drinking water systems. Land application of PFAS-impacted biosolids is a known cause for PFAS to enter community and individual drinking water systems. EPA's proposed Maximum Contaminant Levels (MCLs) and goals, for six PFAS in drinking water, highlights the need to not only control the PFAS supply chain but to also stop literally spreading the cyclical problem.
- Emissions of PFAS to air is an important and not well understood issue, particularly as it relates to emissions from incinerators and industrial stacks and emission control systems.
- The General Biosolids Permit does not address or acknowledge the significant potential and relevant risk of the presence of what is becoming an increasingly pervasive and dangerous possibility of per- and polyfluoroalkyl substances (PFAS) in wastewater treatment plant sludge/biosolids. Without acknowledgement, testing, and monitoring, there is no mitigation of risk.
- Ecology has been inconsistent in its treatment of PFAS. While the Chemical Action Plan recognizes PFAS as a serious risk to human health and the environment, there is an observed lack of urgency on the part of Ecology in the Biosolids General Permit and many of their public comment responses. Delaying actions to quantify PFAS in Washington biosolids and the lack of regulation to control PFAS at the source is a continued risk to the people in the State of Washington.

- Continued land application of biosolids without knowing the levels of PFAS in them and the fields where they will be applied, will likely cause significant environmental impacts.

Reducing PFAS contamination requires a systemic approach which addresses every phase of the chemical's manufacture, use, and disposal. The preferred method for reducing PFAS in all environmental media from all sources is to discontinue the manufacture and use of PFAS for all except agreed essential purposes. In the meantime, rigorous testing and control of PFAS in land applied biosolids is necessary to protect human health and the environment.

2. Relevant Education and Experience.

Experience

May 2019 – present

Toxics & Remediation Specialist, Sierra Club

- Conducts research into complex community exposures to chemical and biological hazards, compiles and assesses large volumes of data and documented information and provides written and/or verbal conclusions and recommendations. The majority of research is in regard to per- and polyfluoroalkyl substance (PFAS) and specifically, its presence and transport in wastewater treatment plant effluent and sludge/biosolids.
- Evaluates draft environmental permits, environmental site assessments, and other impactful regulatory reports and provides written assessments of potential impacts or proposes public comments to effect change.
- Reviews the potential impact of proposed new federal and/or state laws or regulations and assists with stated objections or support, based on Sierra Club policies.
- Facilitates educational programs concerning the chemical and biological hazards facing impacted communities, how to avoid exposure, and recommends effective methods of communicating concerns to responsible agencies and community leaders.
- Conducts and communicates community quantitative cumulative risk assessments as it relates to human health and the environment.

November 2012 – January 2019

Global Environmental Competency Leader, Axalta coating systems

- Supported global environmental compliance and risk matters for all global manufacturing and non-manufacturing facilities.
- Controlled global resources and assets for department activities to comply with industry standards and government regulations.
- Supervised site investigations, report issues and escalated those that required further assistance.
- Oversaw global acquisition environmental site assessments and partner relationships, enabling footprint expansion into new markets.

November 1989 – October 2012

Environmental and Health Coordinator, DuPont

- Planned and conducted research, analyzed data, and communicated and reported information to employees, regulators, and senior management.
- Scheduled and conducted regular inspections and audits, reported findings, and implemented solutions, including for other company business units and facilities.
- Assured compliance with relevant federal, state, and local regulations. Maintained, managed, and organized company environmental records for > 23 years.
- Supported several other North American sister facilities, training centers, and warehouses in meeting applicable regulatory and company requirements.

Publications

- Co-author of the Sierra Club publication "Sludge in the Garden: Toxic PFAS in home fertilizers made from sewage sludge". Contributions to the report include:
    - Researched, purchased, and sampled commercial biosolids-derived products, following documented protocols to assure uncompromised results.
    - Compiled and analyzed the results and assured data quality.
    - Assisted in writing the report, including initial design of charts and tables to illustrate results.
    - Calculated and assessed environmental PFAS loading from multiple. applications of the selected commercial products.

- Collected, researched, and reported source wastewater treatment plant (WWTP) processes to determine if process differences impacted final results.

Education

May 1995

Bachelor of Science in Hazardous Materials Management

University of Findlay, Chemical Engineering

Certificate in Hazardous Materials Management and a minor in Industrial Hygiene

December 1999

Master of Science in Chemical Engineering Waste Management

Wayne State University, Chemical Engineering

Certificate in Hazardous Waste Control and a minor in Industrial Hygiene

3. Summary of Materials Reviewed.

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- Jake T. Thompson et al…, *Per- and Polyfluoroalkyl Substances in Toilet Paper and the Impact on Wastewater Systems*, (2023), https://doi.org/10.1021/acs.estlett.3c00094
- Southern Environmental Law Center et al…, *Comments on EPA's National Enforcement and Compliance Initiatives for Fiscal Years 2024-2027, Docket No. EPA-HQ-OECA-2022-0981* (2023)

4. Per- and Polyfluoroalkyl Substances (PFAS).

a. What type of chemicals the term describes.

Per- and polyfluoroalkyl substances (PFASs) are a large group of chemicals widely used in industrial and consumer applications since the 1950s, most usually where extremely low surface energy or surface tension and/or durable water- and oil-repellency is needed, e.g., chromium metal plating, various fire-fighting foams, or for surface treatment of textiles, carpets and papers.

PFAS are a group of organic chemicals that contain a stable (unreactive) fluoro-carbon segment. Polyfluorinated PFAS contain both fluorocarbon and hydrocarbon segments where the non-fluorinated part can degrade and ultimately form perfluorinated PFAS acids, such as PFOA and PFOS. While the long-chain PFAS accumulate in humans, animals and sediment/soil, the short-chain PFAS accumulate in the environment (German EPA, 2017,

2018) due to their persistency and high mobility in air and water. Long chains refer to:

- perfluorocarboxylic acids (PFCAs) with carbon chain lengths C8 and higher, including perfluorooctanoic acid (PFOA);
- perfluoroalkane sulfonic acids (PFSAs) with carbon chain lengths C6 and higher, including perfluorohexane sulfonic acid (PFHxS) and perfluorooctane sulfonate (PFOS); and
- precursors of these substances that may be produced or present in products.

From the Interstate Technology & Regulatory Council (ITRC): "There is no universally accepted definition of PFAS. However, in general, PFAS are characterized as having carbon atoms linked to each other and bonded to fluorine atoms at most or all of the available carbon bonding sites. An early and widely recognized technical definition of PFAS is provided by Buck et al. (2011), who defined PFAS as, "highly fluorinated aliphatic substances that contain one or more carbon (C) atoms on which all the hydrogen (H) substituents (present in the nonfluorinated analogues from which they are notionally derived) have been replaced by fluorine (F) atoms, in such a manner that they contain the perfluoroalkyl moiety[1] C_nF2_{n+1} –.

The definition of PFAS continues to evolve to reflect continued study of these compounds and takes different forms depending on the operational criteria used and the intended scope and application of the included list of chemicals. For example, the definition of PFAS used in one study (OECD 2018) expanded the Buck et al. (2011) definition to include "chemicals that contain the – C_nF_{2n} – moiety in addition to the C_nF_{2n+1} – moiety, which encompasses chemicals with both ends of the carbon-fluorine chain connected to a hydrogen or a functional group, as well as cyclic analogs of linear PFAS."

There are reportedly at least 4,700 different PFAS compounds with associated Chemical Abstracts Service (CAS) registry numbers but the National institutes of Health estimates that more than 9,000 PFAS have been identified.

[1] A specific group of atoms within a molecule that is responsible for characteristic chemical reactions of that molecule (Helmenstine 2019).

b. **General behavior (persistence, movement in water, etc…).**

The physical properties of chemicals are extremely important to assessing the risk to human health and the environment. How will the chemical(s) “act” if emitted to air or released to soil, surface water and/or groundwater can, indicate the potential routes of exposure and/or whether the chemical will float on water or sink and cling to sediments.

Most chemicals have very specific and well-tested physical properties such as: vapor pressure, density, solubility, and more complex properties such as Henry’s Law Constant (K_h)[2] or Octanol/Water Partition Coefficient (K_{ow})[3]. As in many other respects, PFAS are not as simple or as well-tested. The following are some generally known and important physical properties associated with PFAS.

- Most PFAS are solids, often crystalline or powdery in form, at room temperature; however, shorter chained compounds (the acid forms of PFCA and PFSA, FTS and FTOH with a 4- to 6-carbon tail) tend to take liquid form at room temperature.
- Density[4] is important to knowing how PFAS compounds will act in water. In general, if the density of a liquid is greater than that of water, the liquid has the potential to migrate downward through the water column in groundwater or surface water as a dense nonaqueous phase liquid (DNAPL). But PFAS is not always so predictable. In the case of PFOA and PFOS, which are both denser than water, high concentrations of floating separate-phase liquid layers have been observed (Costanza et al. 2019). However, the formation of these layers appears to be driven by the tendency of Perfluoroalkyl acids (PFAAs) to accumulate and aggregate at air-water interfaces, and not by density.

[2] The Henry’s law constant (K_h), as well as the air-water partition coefficient (Kaw), indicate the relative concentrations of a compound between an aqueous solution and gas phase at equilibrium (air-water distribution ratio) and provide an indication of the propensity of a chemical to remain dissolved in water versus volatilizing into the gas phase. A chemical with lower solubility and higher volatility will have a higher Henry’s law constant than a chemical with higher solubility and lower volatility.

[3] The K_{ow} is defined as “the ratio of a chemical’s concentration in the octanol phase to its concentration in the aqueous phase of a two-phase” (USEPA 2015[909]). The K_{ow} is a useful descriptor of the tendency of a compound to associate with hydrophobic or hydrophilic substances.

[4] Density (ρ) is the mass per unit volume of a substance.

- Solubility[5] is also important to knowing how PFAS might act in water. PFAS compounds typically are soluble in water, although some are more readily miscible than others. For example, PFOA at environmental pH has an estimated water solubility of 9,500 mg/L and PFOS has an estimated water solubility of 680 mg/L. Due to their solubilities in water and resistance to breakdown, PFAS are environmentally mobile and persistent chemicals.

  Solubility is also important to how PFAS act in soil and sludges. Again, with PFOA and PFOS as the example, PFOA, because it is more soluble, will tend to stay in surface water and/or move to groundwater, while PFOS will tend to remain in the soil or sludge. This property is well illustrated in the high levels of PFOS found in wastewater treatment plant sludge/biosolids.

- Vapor pressure[6] is especially important to knowing whether a chemical might be airborne and therefore an inhalation hazard. Very little data on measured vapor pressure values for PFAS exist, and much of the data on PFAS is extrapolated or modeled. The best, most up-to-date reference for all PFAS physical properties is the ITRC Table 4-1. To make it even more complex, it is known that several PFAS compounds, including the well-known PFOA compound in Teflon®, will sublime[7] from a solid to a vapor at room temperature.

- One of the unusual traits of PFAS in surface waters like lakes, rivers and streams is that it will often create foam on the surface of the water. There are reasons for naturally occurring foam on surface water but there are key identifiers that you can use to distinguish PFAS foam from naturally occurring foam. Generally, PFAS foam:
  - can be bright white
  - is usually lightweight
  - can be sticky

[5] Solubility (S) refers to the ability of a given substance, the solute, to dissolve in a solvent. It is measured in terms of the maximum amount of solute dissolved in a solvent at a specified temperature and pressure. Typical units are milligrams per liter (mg/L) or moles per liter (mol/L).
[6] Vapor pressure is an indication of the tendency of a substance to partition into the gas phase. Vapor pressure is a measure of volatility in that the higher the vapor pressure of a compound, the more volatile it is.
[7] Sublimation is the transition of a substance directly from the solid to the gas state, without passing through the liquid state.

- tends to pile up like shaving cream
- can blow onto the beach

Foam can have much higher concentrations of PFAS than the body of water it is found in and should be avoided. Care needs to be taken to immediately rinse off foam, not only on yourself and children, but also pets that have contacted PFAS foam.

The cause of PFAS foaming in the environment is still being researched but there are several physical properties that likely contribute to this phenomenon. The amphiphilic structure of PFAAs (hydrophobic tail with hydrophilic head) is cause for it to tend toward the surface of water with the head in the water and tail in the air. These strong surface-active properties and propensity toward self-assembly into films is what makes PFAAs extremely effective and widely used in a variety of applications such as water/grease repellent packaging and aqueous film-forming foam (AFFF) used in firefighting and fire protection systems.

The following are some generally known and important chemical properties associated with PFAS.

- Perhaps the most important chemical property of PFAS is the unique and very strong carbon-fluorine bond. Properties such as the high electronegativity and small size of fluorine lead to a strong C-F bond, the strongest covalent bond in organic chemistry (Kissa 2001[664]). The low polarizability of fluorine further leads to weak intermolecular interactions, such as Van der Waals interactions and hydrogen bonding (Kissa 2001[664]). These unique properties of fluorine give many PFAS their mutually hydro- and lipophobic (stain-resistant) and surfactant properties and make them thermally and chemically stable.

  The impact of the C-F bond on destroying or remediating PFAS in the environment is significant and is why they are often called “forever chemicals”. The efficacy of technologies used to destroy PFAS or to remove them from environmental media are constantly evolving and continual review of available studies is required in order to keep up with these evolving technologies.

- Thermal stability, the degree to which a chemical remains intact under thermal stress, is an important property to predict how long a chemical will persist in the environment. PFAAs, such as PFOA and PFOS, are extremely stable, thermally and chemically, and resist degradation and oxidation. Reports on temperature needed to destroy PFAS vary, but it seems that to destroy PFAS in soil, temperatures upwards of 1,000º C may be required (Colgan et al. 2018).

  The combined impact of the strong C-F bond and the thermal stability of PFAS, impedes our ability to effectively destroy PFAS compounds in wastes and other environmental media. There is much debate currently about the ability of incinerators to destroy PFAS even at temperatures theorized to be able to break the C-F bond. Deposition of PFAS compounds have been found in soil and surface water surrounding numerous commercial and municipal incinerators. Even surrounding incinerators that reportedly consistently meet temperatures in excess of 1000º C within their combustion chambers. Deposition of PFAS compounds from incinerator stacks appears to be a result of products of incomplete combustion (PIC) that reform after the gases have moved past the combustion chamber and into the incinerator stack. There are many studies ongoing to understand this phenomenon and how to address and totally destroy PFAS by thermal means.

- Partitioning is also an important chemical property of PFAS that provides insight into how it will act in the environment. The key to understanding the environmental fate and transport of PFAS compounds is their surface-active behavior. The fluorinated backbone is both hydrophobic (water repelling) and oleophobic/lipophobic (oil/fat repelling) while the terminal functional group is hydrophilic (water loving). This means that PFAS compounds tend to partition to interfaces, such as between air and water with the fluorinated backbone residing in air and the terminal functional group residing in water. The PFAS partitioning behavior also is affected by the alkyl chain length and the charge on the terminal functional group. In general, PFASs with shorter alkyl chain length are more water soluble than those with longer lengths. Adsorption to soil surfaces has been shown to be greater for PFASs with longer alkyl chain length (Anderson et al. 2016).

Illustration from ITRC, Section 4.2 Partitioning to Fluid-Fluid Interfaces

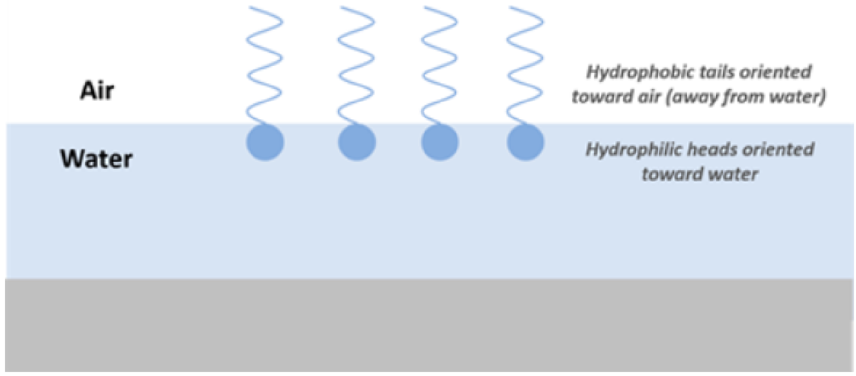


Figure 4-1. Example of expected orientation and accumulation of PFAS at air-water interface.

Source: D. Adamson, GSI. Used with permission.

In sum, the physical and chemical properties of PFAS are varied. According to ITRC: "Given the wide variety of PFAS, it is not surprising that they collectively exhibit a wide range of different physical and chemical characteristics that can affect their behavior in the environment. This adds to the complexity of fate and transport assessments and highlights the risk in making broad assumptions based on the behavior of a few well-studied PFAS."

The physical and chemical properties of PFAS shape their behavior in wastewater and biosolids. What is clear is that wastewater treatment does not remove PFAS from wastewater or biosolids. In some instances, treatment and subsequent land application may actually increase the presence of PFAS. According to Ecology's document *PFAS Concentrations in Effluent, Influent, Solids, and Biosolids of Three Wastewater Treatment Plants*, "Transformation of PFAS within a treatment plant is a well-known occurrence, though not well understood. There are multiple biotransformation pathways for PFAS in WWTPs. Abiotic transformation pathways include hydrolysis, photolysis, and oxidation. All of these processes create new PFAS rather than removing them (Houtz et al., 2016). For example, Fluorotelomers such as 5:3 FTCA are known to readily degrade and/or transform in a treatment plant and PFPEA and PFHxA are known degradation products of multiple other PFAS substances (Van Hees, 2013)."

According to ITRC: Transformation of PFAS also occurs in the environment. For example, fluorotelomer sulfonates can break down to PFCAs (PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFNA) and long-chain fluorotelomers (8:2 FTS) can breakdown to PFOA. Short-chain fluorotelomer sulfonates (6:2 and 4:2 FTS) can breakdown to shorter chain PFCAs (PFBA, PFPeA, PFHxA, 5:3 FTCA).

A March 2023 study, *Per- and Polyfluoroalkyl Substances in Toilet Paper and the Impact on Wastewater Systems,* further supports this transformation of certain precursors to terminal PFAS in the wastewater treatment plant process. The study specifically discusses the contribution of 6:2 fluorotelomer phosphate diester (6:2diPAP) and concluded that, "Complicating this discussion, however, is the fact that the dominant PFAS family observed in toilet paper and wastewater treatment sludge, the diPAPs, are precursor species and have the capacity to be transformed into terminal PFAS. Terminal species such as PFHxA, PFOA, or PFDA are formed from the biologically mediated transformation of 6:2 diPAP and other diPAP homologues, and these chemicals are the growing targets of regulatory attention due to the expanding body of knowledge regarding their human health and environmental impacts. Additional research is needed to explore whether toilet paper might be a greater contributor to total PFAS in North American wastewater and if the diPAPs from toilet paper might be transforming through the wastewater collection and treatment system." Certainly the supply chain that allows for and causes diPAP to enter the WWTP process through toilet paper needs to be addressed, but the point to be taken here is that these compounds are already there, are transforming to the more hazardous terminal PFAS, and have already impacted the WWTP process into biosolids.

These are examples of known and relevant transformations that occur during the WWTP process and once PFAS are in the environment. This phenomenon is important to recognize because it indicates that simply analyzing biosolids as it leaves the WWTP does not necessarily indicate the hazards to the land where it will be applied. That is, even if regulated PFAS such as PFOA and PFOS are not present or above guidelines or regulatory levels in the finished WWTP biosolids, that does not mean that it won't contribute these longer chain PFAS compounds to the soil, ground and surface water above screening or regulatory levels where it will be applied. Understanding the relevant fate and transport processes for PFAS is critical in answering whether an understanding of fate and transport processes provides the basis for defensible predictions about occurrence, migration, persistence, and potential for exposure.

c. Associated health risks.

According to the EPA, current peer-reviewed scientific studies have shown that exposure to certain levels of PFAS may lead to:

- Reproductive effects such as decreased fertility or increased high blood pressure in pregnant women.
- Developmental effects in children, including lower birth weight, bone variations, or behavioral changes.
- Increased risk of some cancers, including kidney, and testicular cancers.
- Reduced ability of the body's immune system to fight infections, including reduced vaccine response.
- Interference with the body's thyroid, liver and kidney function.
- Increased cholesterol levels and/or risk of obesity.

EPA goes on to say: Scientists at EPA, in other federal agencies, and in academia and industry are continuing to conduct and review the growing body of research about PFAS. However, health effects associated with exposure to PFAS are difficult to specify for many reasons, such as:

- There are thousands of PFAS with potentially varying effects and toxicity levels, yet most studies focus on a limited number of better known PFAS compounds.
- People can be exposed to PFAS in different ways and at different stages of their life.
- The types and uses of PFAS change over time, which makes it challenging to track and assess how exposure to these chemicals occurs and how they will affect human health.

Many PFAS also bio-magnify in food chains such that concentrations of PFAS increase in predator fish, birds and other animals having higher levels of PFAS than plants and animals at the bottom of the food chain. The concentrations of PFAS in people's blood are hundreds of times higher than in the water they drink. There is no known safe level of PFAS for human beings and, unlike certain natural elements (e.g., iodine) that are beneficial to humans at some concentrations and only harmful in high doses. The human body has no need for any level of PFAS.

These known impacts have led EPA to propose that PFAS, and specifically PFOA and PFOS, their salts and structural isomers, be designated as hazardous substances under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), also known as “Superfund.” In the EPA announcement EPA Administrator Michael S. Regan stated that **“**Under this proposed rule, EPA will both help protect communities from PFAS pollution and seek to hold polluters accountable for their actions.”

The announcement goes on to say that many known and potential sources of PFAS contamination are near communities already overburdened with pollution. If finalized, the rulemaking would trigger reporting of PFOA and PFOS releases, providing the Agency with improved data and the option to require cleanups and recover cleanup costs to protect public health and encourage better waste management.

Discussions are ongoing and the rule will likely not punish farmers for unknowingly using PFAS-impacted biosolids and it also will likely not retroactively blame WWTPs for existing biosolids superfund sites. But going forward, reporting and potential clean-up may be regulated for farms fields and other properties where PFAS-containing biosolids have been land applied above the RQ. The mechanism and who will pay is yet to be determined.

5. Presence of PFAS in Biosolids Generally.

a. Likely sources.

The presence of PFAS in WWTP sludge is well documented. Michigan and Maine in particular, have performed a significant number of investigations and evaluation of PFAS impacts from municipal and industrial WWTP effluent and treatment sludge/biosolids. Potential sources of PFAS in biosolids include normal household activities such as laundering PFAS coated clothing, cleaning furniture and carpets, washing coated pans, surface run-off from lawns where biosolids-based fertilizers are used, and even normal sanitary sewage wastes from the presence of PFAS in people's bodies. The previously mentioned study, *Per- and Polyfluoroalkyl Substances in Toilet Paper and the Impact on Wastewater Systems,* determined that toilet paper is also a significant contributor of PFAS in WWTP influent, effluent and biosolids. Small industry can also be sources of PFAS. Due to the widespread use of PFAS in many industries and consumer products, industrial discharges are expected to be the primary sources of PFAS to WWTPs. Industrial discharges are not limited to manufacturing plant discharges. Examples of industrial discharges that could be PFAS sources to municipal WWTPs, even in small cities and rural areas, include the following.

- Electroplating and Metals Finishing
- Landfills (leachate)
- Centralized Waste Management Facilities
- Airfields – Commercial, Private, and Military
- Department of Defense Facilities
- Fire Department Training Facilities
- Industrial Laundries
- Petroleum or Petrochemical
- Chemical Manufacturers
- Plastics Manufacturers
- Textile and Leather Facilities
- Pulp and Paper Facilities

b. Ability to persist through wastewater treatment.

The unique physio-chemical properties of PFAS compounds make them difficult to remove using conventional wastewater treatment technologies. In fact, because the traditional treatment process can break down *poly*fluorinated precursor compounds into shorter *per*fluorinated compounds, it is not uncommon to have higher concentrations of two key PFAS chemicals (PFOA, perfluorooctanoic acid and PFOS, perfluorooctane sulfonate) in the treated effluent than in the influent.

Wastewater treatment plants (WWTPs) can act as unintended conduits for many recalcitrant anthropogenic[8] compounds, such as PFAS, to the environment through effluent discharges and the land application of biosolids. Similar to other environmental compartments, hydrophobic partitioning in WWTPs is the dominant sorption mechanism,

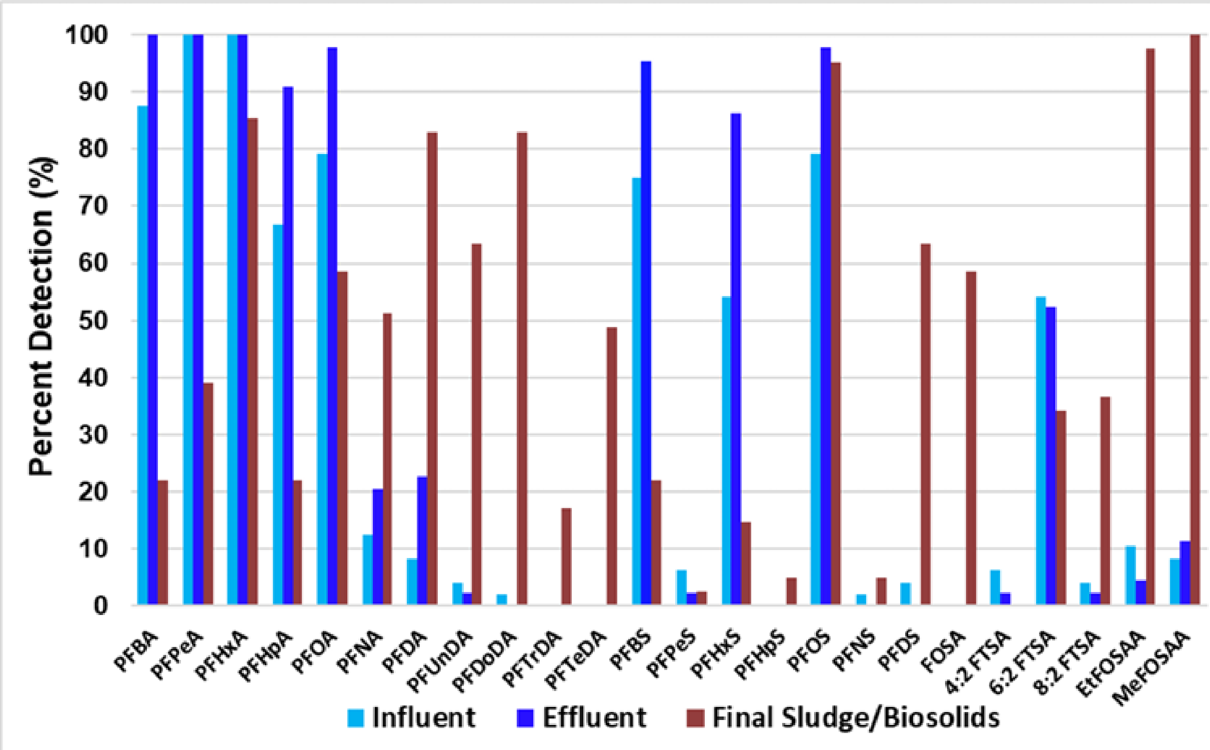
[8] Anthropogenic effects, processes, objects, or materials are those that are derived from human activities, as opposed to those occurring in natural environments without human influences.

which results in long-chain PFAAs partitioning to WWTP solid matrices. Typical wastewater treatment processes are unable to remove PFAS from the final effluent. In some studies, concentrations of compounds such as perfluorocarboxylic acids (PFCA) and perfluorosulfonic acids (PFSA) have increased from influent to final effluent. The increase of PFAAs has been attributed to the degradation of the PFAS precursor compounds, fluorotelomer sulfonoates (FTS) and fluorotelomer alcohols (FOTH), that have been shown to transform to stable PFAAs in WWTP sludge.

Michigan and Maine data, in particular, indicates that the levels of PFAS, and particularly PFOS, are much higher in biosolids verses WWTP effluent. In general, long-chain PFAS, such as PFOS, are expected to accumulate in the biosolids/sludge. The highest variation was observed for 6:2 FTSA and PFOS. PFAS precursors that are known to degrade to PFOS, such as FOSA, EtFOSAA, and MeFOSAA, were also detected and found to accumulate in biosolids/sludge.

Figure 4 Percent Detection of PFAS in Influent, Effluent, and Final Biosolids/Sludge from Michigan Department of Environment, Great Lakes, and Energy (EGLE), 2020, “Initiatives to Evaluate the Presence of PFAS in Municipal Wastewater and Associated Residuals (Sludge/Biosolids) in Michigan” below shows all detected PFAS compounds and their relative levels in WWTP influent, effluent and biosolids. What is clearly illustrated by these results and in all of the subsequent studies that have been performed is that the typical technologies used at WWTPs not only allow pass-through of PFAS to effluent and biosolids, the process concentrates and transforms long chain PFAS in sludges/biosolids.

Figure 4. Percent Detection of PFAS in Influent, Effluent, and Final Biosolids/Sludge*



The following table is from the from the same report and illustrates the difference in levels of PFOS and PFOA in biosolids versus effluent. It is important to note that PFOA and PFOS levels in water are in parts per trillion (ppt) and levels in biosolids are in parts per billion (ppb).

	Lower Impacted WWTPs			Higher Impacted WWTPs		
Environmental Matrices	**Total PFAS**	**PFOS**	**PFOA**	**Total PFAS**	**PFOS**	**PFOA**
Effluent (ng/L)	4 - 15	2 - 5	2 - 11	300 - 143,360	169 - 635	ND - 10
Biosolids (µg/Kg)	34 - 214	3 - 90	ND - 18	1,173 - 2,358	1,060 - 2,150	ND - 5
Soil (µg/Kg)	ND - 15	ND - 9	ND - 2	1 - 182	1 - 172	ND - 2
Groundwater[2] (ng/L)	ND - 97	ND - 2	ND - 6	ND - 541[1]	ND - 18[1]	ND - 61[1]
Surface Water[2] (ng/L)	ND - 52	ND - 5	ND - 6	2.5 - 2,647	ND - 2,060	ND - 64
Tile Drain[2] (ng/L)	ND - 58	ND	ND - 6	9 - 2,495	1 - 2,080	ND - 95
Ponded Water[2] (ng/L)	6 - 346	ND - 2	ND - 53	17 - 968	ND - 533	2 - 53

[1]Perched groundwater at one location had Total PFAS = 41,823 ng/L, PFOS = 35,300 ng/L, and PFOA = 1,930 ng/L.
[2]Groundwater, surface water, tile drain, and ponded water samples were not collected in every agricultural field.

6. Presence of PFAS in Biosolids in Washington.

a. Why it tends to be similar across U.S.

The list of likely sources itemized in 5.a. are generally found in every state in the United States. Airfields, military bases, landfills and former dumps, commercial laundries, waste management and recycling facilities, fire departments and training centers, and sites contaminated by historic use are present in every state.

Former and operating landfills are particularly problematic for receiving WWTPs because, many times, the leachate from landfills is sent to the local WWTP. There are a multitude of hazardous contaminants documented in landfill leachate, including PFAS, 1,4-dioxane, synthetic hormones and pharmaceuticals, persistent pesticides, flame retardants in furniture and electronics, and Dioxins & Furans.

The type of landfill often does impact the types and levels of PFAS in the leachate and PFAS is not just found in hazardous or private industrial landfills. Municipal Solid Waste (MSW) landfills have documented PFAS in the leachate, primarily from household items that contains PFAS such as carpets, furniture, and clothing. Construction and debris (C&D) landfills normally have higher levels of PFAS than MSW landfills because many building products contain or are coated with PFAS products. The levels of PFAS in the leachate and the volumes of wastewater treated through any WWTP will dictate the extent that landfill leachate contributes to PFAS in WWTP influent. Data from many states indicates that there are significant levels of PFAS in biosolids from even small town WWTPs and the cause is often landfill leachate.

There are landfills in Washington that send their leachate to a nearby wastewater treatment plant (WWTP) for treatment where PFAS in the leachate will pass through to effluent and WWTP biosolids. The Ecology Chemical Action Plan makes the following statement regarding landfill leachate:

> Landfill leachate has been recognized as a potential pathway for PFAS release into the environment under certain circumstances.

> Under current State requirements, landfill leachates that are collected are sent either to WWTPs or evaporation ponds. Ecology does not collect data regarding volumes of leachate produced. Ecology staff conducted an informal survey of MSW landfill operators to collect data quantifying the volumes of leachate typically produced (Carter, 2020).

The survey identified seven (7) landfills in Washington that sends their leachate to WWTPs.

There is data from other states that indicates significant levels of PFAS compounds in landfill leachate. While there is general agreement that landfill leachate that is sent to WWTPS can contribute to levels of PFAS in WWTP effluent and sludge/biosolids, there are differing conclusions that have been made about whether the contribution is significant. The North East Biosolids & Residuals Association (NEBRA) Lists several reports that they summarize as concluding "that accepting landfill leachate usually does not raise PFAS levels in wastewater and biosolids significantly – **unless** the landfill leachate is a very high percentage of total wastewater flow." The "unless" qualifier is important and needs to be further researched. There are observed situations where landfill leachate sent to WWTPs has resulted in significant impacts in WWTP effluent and biosolids. One example is the North Kent Sewer Authority in Grand Rapids, MI, The primary PFAS discharges to the WWTP are two (2) solid waste (non-hazardous) landfills, one State and one local. Leachate at the State landfill indicated a maximum 68 ppt PFOA and 68 ppt PFOS. The local landfill indicated 1860 ppt PFOA and 640 ppt PFOS with Total PFAS at 7,099 ppt. Resulting levels of PFOS in biosolids were 160 ppb and Total PFAS at 332.5 ppb. This WWTP was and still is landfilling their biosolids.

Another example is the Great Lakes Authority (GLWA) in Detroit, Michigan, that is responsible for the Detroit Water and Sewerage Department (DWSD), which is one of the largest wastewater treatment plants (WWTPs) in North America, serving the City of Detroit and 76 suburban communities. In a May 2022 PFOA/PFOS Minimization Program Status Update, GLWA reports that eight (8) of their forty-five (45) remaining PFAS-impacted significant industrial users (SIU) are landfills. The contribution of PFOA/PFOS from these landfills are significant enough that they and Centralized Waste Treaters have separate reporting requirements outlined in GLWA Industrial Pretreatment Program (IPP) Rules. Specifically, GLWA Rules require that impacted landfills "shall, develop, submit and implement a comprehensive “PFAS Compound Program” describing methods and procedures to identify, control, reduce, dispose of, eliminate and/or treat wastes and Wastewaters containing PFAS Compounds.” Follow the defined components of a PFAS Compound Program, GLWA Rules state: “Following acceptance of the facility’s PFAS Compound Program, the Control Authority shall review and incorporate its PFAS Compound Program into a Wastewater discharge permit or equivalent control mechanism, as an enforceable part of the permit.

b. Evidence of presence in Washington specifically.

There is mounting evidence in Washington of the presence of PFAS in the environment at contaminated sites, in drinking water, surface water and in WWTP biosolids.

PFAS in Surface Water

In 2008 and again in 2016, Washington Ecology conducted a study to assess PFAS in rivers and lakes in Washington. Fourteen waterbodies were tested and results indicated total PFAS concentrations ranging from 1.11 – 185 ng/L in the spring and < 0.9 – 170 ng/L during the fall. The highest concentrations in the study were recorded at West Medical Lake, South Fork Palouse River (SFPR), and Lake Washington. The report found that the elevated concentrations at West Medical Lake and the SFPR are likely caused by WWTP effluent discharges. Four WWTP effluent samples were retrieved concurrent with surface water sampling, Spokane, West Medical Lake, Sumner, and Marine Park. Concentrations of total PFAS in WWTP effluent ranged from 61 – 418 ng/L in the spring and from 73 – 188 ng/L in the fall. The highest concentration (418 ng/L) was recorded at the Spokane WWTP during the spring sampling event. During the 2016 study, Ecology collected surface water from 15 waterbodies for analysis of 25 PFAS compounds. Wastewater treatment plant (WWTP) effluent was tested at the same four WWTPs as the 2010 study plus Pullman WWTP (receiving water South Fork Palouse River). Spring T-PFAA concentrations ranged from 42.1 to 107 ng/L, with a median of 68.9 ng/L. Fall T-PFAA concentrations were similar, ranging from 41.8 to 125 ng/L, with a median of 71.4 ng/L. 8:2 diPAP concentrations ranged from 6.32 to 14.1 ng/L. Concentrations of PFOSA, 6:2 diPAP, and 6:6 PFPi were 2.8 ng/L, 5.65 ng/L, and 19.3 ng/L, respectively. Effluent discharging to West Medical Lake had the highest concentrations of PFASs, and effluent discharging to the Lower Columbia River contained the lowest concentrations. These study results are strong indicators that PFAS is present in wastewater and biosolids in Washington.

PFAS in Fish

The Washington Ecology Chemical Action Plan concluded that "Environmental concentrations of PFAAs in Washington surface waters, WWTP effluent, and freshwater fish tissue sampled in 2016 were consistent with PFAS levels in other parts of the U.S. not impacted by PFAS manufacturing facilities. Additional sampling in 2018 confirmed that PFAS concentrations in freshwater fish collected from Washington urban lakes are consistent with other urban water bodies in North America."

The Washington State Department of Health (DOH) has issued a fish consumption advisory for Lake Washington, Lake Meridian, and Lake Sammamish after finding perfluorooctane sulfonate (PFOS) in several types of fish. Some species, primarily predator fish such as large and small bass, were designated as "do not eat" while yellow perch were recommended to eat in smaller quantities. Concentrations of PFOS in Largemouth Bass range from 24.2 to 37.8 ppb and in Smallmouth Bass from 62.1 to 93.8 ppb while PFOS in Yellow Perch ranged from 10.8 to 15.4 ppb.

PFAS in Biosolids

According to Washington Ecology's "PFAS Chemical Action Plan" ["Action Plan"], Revised September 2022, "Biosolids produced in WWTPs where PFAS are present can in turn be contaminated with PFAS. Fundamental PFAS concentration data to characterize Washington biosolids is lacking. Toxicity, concentration, and pathway of exposure determine the risks that PFAS in biosolids pose to human health and the environment." The Action Plan includes recommended key steps to address the current data gaps but does not set timelines to complete the action steps. The Action Plan also does not include preliminary review of other states' biosolids data and experience with regards to the connection between land applications of PFAS-contaminated biosolids and contamination of soil, surface and ground water, plants and animals. There is a significant amount of information available for PFAS in WWTP effluent and biosolids and the environmental media mentioned above. A baseline review of that information would help to fill in current data gaps, would focus Washington's efforts and reduce the time and cost of the effort.

As mentioned, there is limited data of PFAS in WWTP sludge/biosolids in Washington. One data point for PFAS in biosolids are results from a 2020 study by Lazcano et al…, *Characterizing and Comparing Per- and Polyfluoroalkyl Substances in Commercially Available Biosolid and Organic Non-Biosolid-Based Products* found that TAGRO Potting Soil, which is designed for use in containers and is composed of 20% biosolids, 20% sawdust and 60% screened bark, contained Total PFAS levels of 39.5 ppb. A 2021 Sierra Club and Ecology Center study that sampled and analyzed commercial biosolids-derived fertilizers and soil amendments, found that the Tacoma Central Wastewater Treatment Plant soil conditioner TAGRO Mix, which is about 50% Tacoma WWTP biosolids, contains significant levels of total organic fluorine and Levels of PFAS, including PFOA and PFOS. Actual TAGRO results: Total Organic Fluorine[9] (13,000 ppt), Pre- and Post-TOP[10]: Total PFAS 87 ppt and 457 ppt respectively. For reference, Post-TOP results for TAGRO are similar to concentrations found in fish collected in highly polluted areas and thousands of times higher than the amounts that are regulated in drinking water.

A 2019 study was performed by a Canadian residuals management company, Sylvis, for the City of Tacoma. Sylvis' draft report, "PFAS Characterization in Biosolids and TAGRO Soils" indicates PFAS at lower levels in TAGRO Mix than that those found in the Sierra Club study where the Sylvis report found Total PFAS (maximum of 3 samples) in TAGRO Mix at 36.6 ppb. The report also includes analysis of Tacoma Central WWTP biosolids that indicated Total PFAS (maximum of 3 samples) at 120.4 ppb. TAGRO Potting soil was also tested in the Sylvis study and indicated Total PFAS at 22.6 ppb for the sample PFAS

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[9] Total Organofluorine (TOF) analysis gives a quantitative assessment of both the same PFAS compounds that are currently reported by LC/MS/MS and other fluoroorganic compounds not readily determined by standard PFAS testing. Although we don't know if these fluorochemicals are polymers like plastic, or mystery PFAS chemicals, they could pose a significant concern for people and the environment.

[10] "Total Oxidizable Precursor" or TOP Assay. TOP provides an indirect measurement of some PFAS chemicals by reducing complex PFAS chemicals to the perfluoroalkyl carboxylates and sulphonates measured by the LC/MS/MS assay. The most common objective of using TOP analysis is to understand the fate and transport of PFAAs and their precursors and estimate future risk from transformation of PFAA precursors. EPA is considering the development of a method, based on existing protocols, to identify PFAS precursors that may transform to more persistent PFAS.

compounds analyzed in the Lazcano study, which found Total PFAS in TAGRO Potting Soil at 39.5 ppb.

The question for all of these studies is whether the results indicate risk. Based on the new EPA drinking water health advisories for PFOS/PFOA, risks to human health from biosolids that enter surface or groundwater, the advisory limit is functionally "detection." Maine's former screening levels for PFAS in biosolids are the lowest at 2.5 ppb for PFOA and 5.2 ppb for PFOS. The levels of PFAS in the Sierra Club report for TAGRO Mix for PFOS and PFOA are above Maine's screening levels. The Sylvis report indicates that PFOA/PFOS in TAGRO Mix are below Maine screening levels. Sylvis results indicate that PFOA in TAGRO Topsoil is greater than Maine screening levels and Tacoma Central WWTP biosolids are above Maine screening levels for PFOS.

Both studies support the presence of PFAS in biosolids, which presents cumulative risk to human health and the environment. The primary difference between the two studies is that the Sierra Club samples were collected directly from a commercially purchased bag of TAGRO Mix that any homeowner might buy and the Sylvis study collected 3 samples of each TAGRO product at the Tacoma Central WWTP. It is not clear where the samples were collected (i.e., finished product bags or from bulk product). According to the report, “each sample of biosolids is a composite of 8 equal volume subsamples.” Specific sampling locations and methods are not clear in the Sylvis report. There is also an open question as to whether the “draft” Sylvis report was ever approved and/or finalized. The report that is posted on the City of Tacoma website continues to indicate that it is a draft.

PFAS in Drinking Water

On March 14, 2023, EPA announced the proposed National Primary Drinking Water Regulation (NPDWR) for six PFAS including perfluorooctanoic acid (PFOA), perfluorooctane sulfonic acid (PFOS), perfluorononanoic acid (PFNA), hexafluoropropylene oxide dimer acid (HFPO-DA, commonly known as GenX Chemicals), perfluorohexane sulfonic acid (PFHxS), and perfluorobutane sulfonic acid (PFBS). The proposed PFAS NPDWR does not require any action until it is finalized. The proposed enforceable limit for

PFOA and PFOS is 4 ppt and a combined hazard index of 1.0 for the other 4 PFAS. The proposed rule would also requires public water systems to:

- Monitor for these PFAS
- Notify the public of the levels of these PFAS
- Reduce the levels of these PFAS in drinking water if they exceed the proposed standards.

PFAS in drinking water is a growing, persistent, and expensive problem. A review of available initial drinking water results indicate that the following public drinking water systems and aquifers are PFAS impacted or are being treated to remove PFAS. This list includes sites that are the cause for PFAS-contaminated public drinking water and are highlighted with an asterisk (*). The source of PFAS contamination for all of the sites designated with an asterisk is from historic use of aqueous film-forming foam (AFFF) for fire protection and training.

- Yakima Training Center *
- Plateau Aquifer
- Lower Issaquah Valley Aquifer – Impacting the City of Issaquah *
- Naval Base Kitsap – Bangor *
- Vancouver
- Spokane
- Lakewood
- Naval Air Station Whidbey Island *
- Fairchild Air Force Base *
- Moses Lake Well Field – Superfund Site *
- Joint Base Lewis – McChord *
- City of DuPont
- Fort Lewis Water – Cantonment *

To date, available data indicates that Washington has focused on drinking water sources near airfields and military bases. According to the Washington Department of Health, in 2021, a new state rule requires all community and nontransient-noncommunity public water systems to test for PFAS. Under the state rules, over 2,600 Washington water systems will test for PFAS in the next 3 years. The Ecology website says “PFAS in firefighting foam (also known as AFFF) is the suspected source of all PFAS-contaminated drinking water in Washington." This statement is another example of pre-supposing a conclusion without supporting facts, and inappropriately discounts likely other sources of PFAS contamination acknowledged in Ecology's own Chemical Action Plan and extensive literature.

7. Risks Associated with Presence of PFAS in Biosolids.

a. Delivery to surface water.

PFAS present in unsaturated soils are subject to downward leaching during precipitation, flooding, or irrigation events that promote dissolution and migration of contaminant mass. This process can result in PFAS transport from surface soils to surface water and groundwater because PFAS releases often involve surface applications (for example, AFFF and biosolids) or atmospheric deposition. Application of biosolids to agricultural soil may result in PFAS accumulation in shallow soil depths, and eventual leaching to surface water, groundwater, as well as uptake by agricultural products (Ghisi et al. 2019). The fate and transport of PFAS originating from biosolids is an area of active research (Johnson 2022; Pepper et al 2021).

The following are examples of the short and long-term impacts to surface water from the land application of biosolids. In these examples, land application of biosolids containing PFAS resulted in surface water contamination.

- Eastern St. Clair County AOI (Formally Fort Gratiot AOI) (Fort Gratiot Township, St. Clair County) – historic land application of biosolids
- Consumption Advisory: Grostic Cattle Company of Livingston County Beef Sold Directly to Consumers May Contain PFOS – historic land application of biosolids
- Evaluation of Gaylord, Jackson, Midland, and South Huron Valley Wastewater Treatment Plant (WWTP) Biosolids Sites – The purpose of the investigation was to determine the impact, if any, from the land application of PFAS-impacted biosolids from wastewater treatment plants (WWTP) in the soil and adjacent surface water bodies, including standing perched water and tile drains.
- Wixom WWTP Biosolids Fields, Michigan – historic land application of biosolids

Based on these examples and the physical and chemical properties of PFAS in biosolids, it is clear that land application of biosolids under the challenged Permit is likely to result in contamination of surface waters.

b. Delivery to groundwater.

Delivery of PFAS to groundwater from the land application of biosolids and other PFAS-containing solid wastes is similar to the delivery to surface water. The primary difference between the two is that delivery to groundwater is much more dependent on the soil type, geology, and hydrology of the specific field and location. The following are examples of investigations that have illustrated the transport of PFAS to groundwater as a result of land applying contaminated biosolids.

- Wixom WWTP Biosolids Fields, Michigan – historic land application of biosolids
- Evaluation of Lapeer WWTP Biosolids Site 08n11e33-SK01 – historic land application of biosolids
- Managing PFAS in Maine Final Report from the Maine PFAS Task Force January 2020 – historic land application of biosolids
- Massachusetts Natural Fertilizer Company, Inc. (Mass Natural) – historic blending and use of biosolids-derived compost

Again, these examples combined with the scientific literature and the physical and chemical properties of PFAS in biosolids support the conclusion that land application of biosolids under the challenged Permit is likely to result in contamination of groundwater.

c. Buildup in soils over time.

Repeat applications of PFAS-impacted biosolids over time is important, whether on a homeowners' lawn or on farm fields. Because of the persistent, bioaccumulative nature of PFAS, concentrations of PFAS compounds in soil will buildup and increase exponentially over time and with repeat applications, particularly long-chain PFAS compounds. The extent and concentration levels of PFAS in soil where there have been historic, repeat applications is somewhat dependent on the geological and hydrogeological characteristics of the property. According to EGLE's June 2020, "Initiatives to Evaluate the Presence of PFAS in Municipal Wastewater and Associated Residuals (Sludge/Biosolids) in Michigan" summary report, "Screening of agricultural fields that received biosolids applications found significantly higher PFAS concentrations in various environmental matrices associated with WWTPs with elevated levels of PFAS in their biosolids. However, site specific environmental conditions were determined to be very important when evaluating potential impacts and exposure pathways." Investigations into PFAS-impacted farm fields generally indicate that fields that received biosolids with higher levels of PFAS and that have had repeated application over time, have higher levels of PFAS in soil and surface water.

According to the Northeast Biosolids & Residuals Association (NEBRA):

> When biosolids and other organic residuals are applied to soil, the amount used is determined by the agronomic rate. This means that the number of tons per hectare or acre is determined based on the amount of nutrients in the biosolids/residuals and the amount of nutrients needed by the crop being grown.
>
> Usually, and by law, Class B biosolids are applied based on the amount of nitrogen (N) needed. However, more and more states are requiring calculation of the agronomic rate based on phosphorus (P). Either way, the agronomic rate limits the amount of biosolids or other residual applied, which further reduces risks from excess nutrients that could impact groundwater (e.g., nitrate N) or surface water (P) or from traces of chemical contaminants.

Note that Washington does not require consideration of Phosphorus levels in fields or biosolids as a criteria for land application.

This practice of using Nitrogen and Phosphorus levels in biosolids or even in commercial biosolids-derived fertilizers and soil amendments, is also how repeat applications are determined. "Cumulative pollutant loading rate", which, in Washington, is defined as "the maximum amount of a pollutant that can be applied to an area of land from biosolids that exceed the pollutant concentration limits established in Table 3 of WAC 173-308-160" is key to regulating what and how much of the listed contaminants can be present in the biosolids destined for land application.

TABLE 3 - POLLUTANT CONCENTRATION LIMITS

pollutant	limit monthly average in milligrams per kilogram (dry weight basis)
Arsenic	41
Cadmium	39
Copper	1500
Lead	300
Mercury	17
Nickel	420
Selenium	100
Zinc	2800

Only a few states include consideration of PFAS concentrations in biosolids for agronomic application rates for either initial or repeat applications. Federal Rule 503 currently also does not provide consideration or guidance for emerging bioaccumulative chemicals like PFAS in calculating application rates. Because of the widespread presence of PFAS in WWTP biosolids and the obvious interest in most states for using such wastes as fertilizers and soil amendments, it makes sense to impose risk-based limits of PFAS in WWTP sludge/biosolids, along with other agronomic requirements, prior to land application. These considerations should be part of a comprehensive program to reduce levels of PFAS in soil, surface water and groundwater.

d. Environmental impacts.

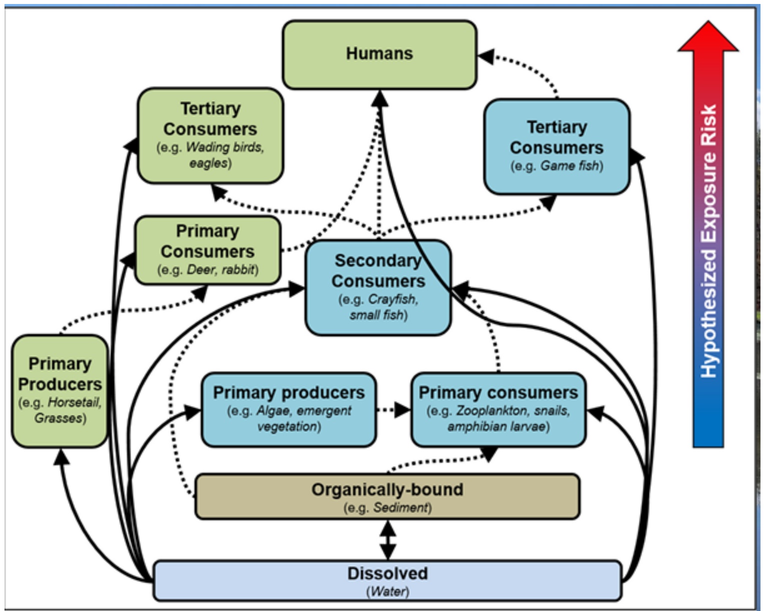
Known risks to the environment from the current and continued use of PFAS-contaminated biosolids and the transport from one medium to another, include impacts to flora and fauna as well as wildlife and domestic animals. Known adverse effects to animals include:

- Developmental effects
- Reproductive effects
- Liver effects
- Endocrine effects (thyroid)

- Immune effects
- Tumors (liver, testicular* (PFOA only), pancreatic)

A study regarding the impact of PFAS to wetlands and all living organisms that depend on them was performed by Wes Flynn from Perdue University in cooperation with: Perdue Agronomy, Forestry and Natural Resources, and Discovery Park Center for the Environment; Michigan Department of Natural Resources (MDNR); Michigan Department of Environment, Great Lakes, and Energy (EGLE); and Projects and Funding. Strategic Environmental Research and Development Program (SERDP). The study found that Clark's Marsh near Oscoda, Michigan was an ideal system to assess the effects of environmental exposure because: 1) there is an abundance of available data, 2) the environmental gradient[11], 3) there remains an intact food web, and 4) because the location is readily accessible. Clarks' Marsh is impacted by PFAS related to the historic use of AFFF at the Former Wurtsmith Air Force Base (Oscoda, Iosco County, Michigan) and using existing data from the marsh, allowed the researchers to bridge the gap between lab and field studies. *Wetlands and PFAS: Understanding the Potential for Impacts on Amphibian Communities* summarizes the findings from this effort and includes the following illustration of the Quantifying Distribution and Transfer of PFAS in Wetland Food Webs.

[11] An environmental gradient, or climate gradient, is a change in abiotic (non-living) factors through space (or time). Environmental gradients can be related to factors such as altitude, depth, temperature, soil humidity and precipitation. Often times, a multitude of biotic (living) factors are closely related to these gradients; as a result of a change in an environmental gradient, factors such as species abundance, population density, morphology, primary productivity, predation, and local adaptation may be impacted.



The observed general trend in PFAS levels were:

- Water < Sediment < Algae < Primary Consumers < Secondary Consumers < Fish
- Accumulation in taxa more closely mirrors composition of sediment PFAS than PFAS in water
- PFOS, PFOSA, and PFHxS largest contributors to PFAS body burdens
- Clark's Marsh food web has higher concentrations and more diverse PFAS than wetland food web impacted PFAS tannery waste

The effects listed below were primarily observed in amphibians living in PFAS-impacted wetlands.

- PFAS can reduce growth and development
- Lack of consistent dose-response
- Variation in responses among species, chemicals, and exposure routes
- Potential for synergism[12]
- Exposure can increase susceptibility to disease

[12] the interaction or cooperation of two or more organizations, substances, or other agents to produce a combined effect greater than the sum of their separate effects.

e. Public health impacts.

There are multiple sources, pathways and routes of exposure that contribute to adverse risks to the general public from any harmful chemical in the environment and the exposures are often cumulative, particularly in environmental justice[13] areas. According to the Washington Ecology Chemical Action Plan, "studies identify food and drinking water as the likely main routes of non-occupational exposure for people." Dermal exposure and airborne hazards near sources of PFAS are other possible route of exposure, including particulate matter from blowing surface soils and breathing particulate where impacted biosolids are being land applied. The dermal contact route of exposure does not just include the potential for small chain PFAS to enter the body through skin but it also can be cause for ingestion of PFAS if people do not wash their hands prior to eating, drinking or chewing gum. What complicates and makes PFAS exposure from these sources more insidious is the fact that residents cannot control them and cannot easily escape them. Many Washington communities are exposed to all of these routes of exposure from PFAS at varying levels in addition to daily use of products that contain PFAS and residual dust in their homes, primarily from stain-resistant carpeting.

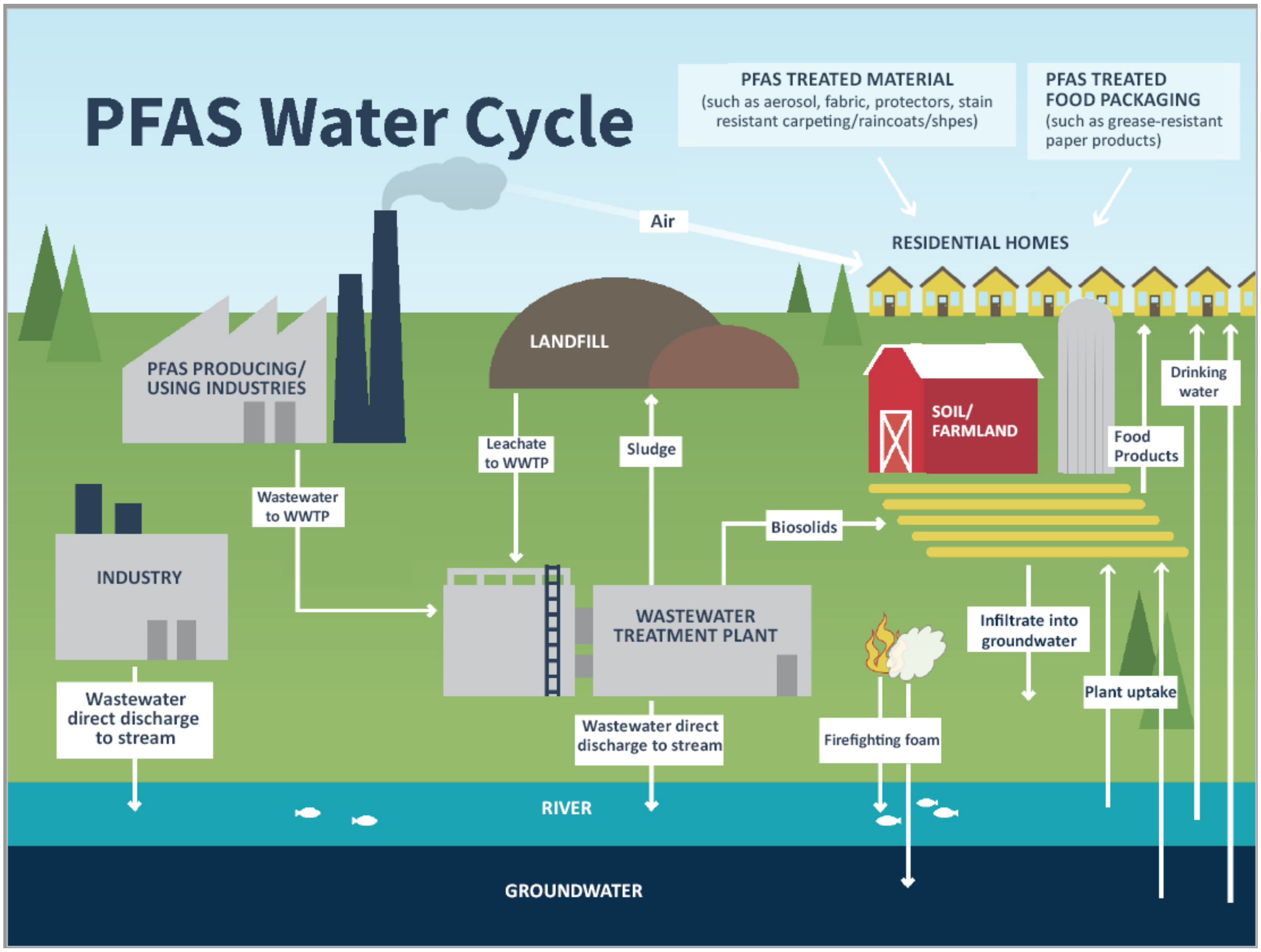
The obvious first step to avoiding exposure to communities from pathways outside of their homes is for Ecology to identify all possible sources of PFAS. Sources of PFAS in the environment have not been found to be state-specific and this means that lessons ca be learned from other states as well as those that exist within the State of Washington. Ecology has performed some amount of PFAS source investigation, primarily with regard to the historic use of AFFF at and near military bases. Where Ecology admittedly has data gaps is in understanding the levels of PFAS and potential impacts from wastewater treatment plant (WWTP) discharges and land application of biosolids. WWTPs discharge effluent to surface and groundwater, often used as sources of drinking water, and most WWTPs also land apply their biosolids. This is happening every day, every hour, year after year at significant volumes and currently, not much is being done about identifying the extent of

[13] According to the EPA: Environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. This goal will be achieved when everyone enjoys the same degree of protection from environmental and health hazards, and equal access to the decision-making process to have a healthy environment in which to live, learn, and work.

risk and impacts to public health in Washington. The need for Ecology is to act more urgently and to be proactive by considering the data and knowledge that has been gathered and analyzed by other states and Federal EPA and to continue to gather information specific to Washington.

WWTPs are unintentional receivers of PFAS-containing discharges from homes, landfill leachate, commercial and industrial facilities, and from already impacted ground and surface waters. The wastewater treatment process allows pass-through of PFAS into their effluent and biosolids and back to soil, ground, and surface waters. This cyclical process is well documented and the only way to stop or slow it is to stop the manufacture of PFAS and to address the current sources to the extent feasible at any and all points of the cycle.

The following is an EPA depiction of this systemic problem, which expressly acknowledges biosolids as a source of PFAS infiltration to groundwater. EPA designed this graphic and many states use it to illustrate the insidious nature of this "forever chemical" as it makes its way through the environment to all of the various points where it can repeatedly and negatively impact ecological, animal, and human systems.



In 2021, the Washington State Department of Ecology (Ecology) carried out a study to evaluate concentrations of PFAS from three municipal WWTPs that receive influent likely to contain PFAS. The report titled, *PFAS Concentrations in Effluent, Influent, Solids, and Biosolids of Three Wastewater Treatment Plants*, found that "PFAA [perfluoroalkyl acid] concentrations in the effluents tested for this study were within the range of non-industrial WWTP effluent found throughout the United States." And that "PFOS concentrations in the biosolids and sludges were (1) lower than what other states consider industrially impacted, and (2) similar to or lower than national and state averages of PFOS in biosolids lacking industrial PFAS sources." The study further found that "Concentrations of PFPeA and PFHxA in Plant C effluents were an order of magnitude higher than the non-industrial national average. PFBS concentrations were also slightly above the national average in the effluent of Plant A and B."

The study made the following recommendations:

- The limited sample size of this study precludes the ability to make recommendations on a WWTP PFAS monitoring program. A larger scale study with more data, both in frequency and location, is recommended before requiring WWTPs to regularly monitor influent, effluent, and/or biosolids for PFAS. It would be helpful to have (1) more data on PFAS concentrations found at WWTPs across Washington state, (2) samples taken across a larger time scale, and (3) sampling coordinated when there are known industrial releases.
- More research is needed to determine if PFAS from biosolids causes localized PFAS contamination.

With or without further Washington-specific data, there is enough information known from studies in other states that would allow Ecology to begin requiring WWTPs to monitor and report PFAS in influent, effluent and biosolids in their National Pollutant Discharge Elimination System (NPDES) permits as recommended by EPA in a December 6, 2022 announcement. The current General Biosolids Permit is silent on the potential risk of PFAS in WWTP biosolids and does not recommend or require that permittees sample and report PFAS levels in their biosolids or compost products.

The potential impacts to public health in the absence of more urgent actions by Ecology are potential continued and unknown exposures to PFAS. Even if there are no direct exposures indicated as a result of future investigations, people have the right to know the sum total of their cumulative exposures.

8. Testing and Protections that are Reasonable and Available.

a. Current available technology for testing, treatment.

Current Available Technology for Testing

Currently available approved test methods for PFAS are outlined on the PFAS Analytical Methods Development and Sampling Research webpage and are copied below (as of

December 23, 2022). These analytical methods are adopted by states as regulatory standards in laws and environmental permits.

Media	Method	Description
Drinking (Potable) Water EPA develops drinking water methods in support of the Safe Drinking Water Act (SDWA). Information on SDWA method development protocols <https://epa.gov/dwanalyticalmethods>	Method 537.1: Determination of Selected PFAS in Drinking Water by SPE and LC/MS/MS (2018/2020)	EPA method for the determination of 18 PFAS in drinking water, including HFPO-DA (one component of the GenX processing aid technology). First published in 2009 for the determination of 14 PFAS, this method was updated as more PFAS, that have the potential to contaminate drinking water, have been identified or introduced as PFOA/PFOS alternatives in manufacturing. Note: *Method 537.1 was updated in 2020 to version 2.0. The only updates were editorial and did not include any technical revisions.*
	Method 537: Determination of Selected PFAS in Drinking Water by SPE and LC/MS/MS (2009 - *listed for historical purposes*)	EPA method for the determination of 14 PFAS in drinking water. Note: *This is referenced for historical purposes only. Method 537 was updated in 2018 to Method 537.1 (above).*
	Method 533: Determination of PFAS in Drinking Water by Isotope Dilution Anion Exchange SPE and LC/MS/MS <https://epa.gov/dwanalyticalmethods/method-533-determination-and-polyfluoroalkyl-substances-drinking-water-isotope> (2019)	EPA isotope dilution method developed to support measurements for the Fifth Proposed Unregulated Contaminant Monitoring Rule (UCMR) sampling effort. This method targets "short chain" PFAS (none greater than C_{12}), including perfluorinated acids, sulfonates, fluorotelomers, and poly/perfluorinated ether carboxylic acids. Method 533 measures a total of 25 PFAS.

Media	Method	Description
Non-Potable Water and Other Environmental Media EPA develops methods for aqueous and solid (e.g., soil, biosolids, sediment) samples primarily through the Clean Water Act (CWA) and methods for solid waste (SW-846) under the Resource Conservation and Recovery Act (RCRA). CWA analytical methods <https://epa.gov/cwa-methods> Solid waste methods for RCRA <https://epa.gov/hw-sw846/guidance-methods-development-and-methods- validation-resource-conservation-and-recovery-act>	Method 8327: PFAS Using External Standard Calibration and MRM LC/MS/MS <https://epa.gov/hw-sw846/sw-846-test-method-8327- and-polyfluoroalkyl-substances-pfas-liquid-chromatographytandem> (2019)	Direct injection method for non- drinking water aqueous (groundwater, surface water, and wastewater) samples. Validated for 24 analytes.
	Draft Method 1633 <https://epa.gov/cwa- methods/cwa-analytical-methods-and-polyfluorinated- alkyl-substances-pfas>	Draft, single-laboratory validated, direct injection EPA method for 40 PFAS in wastewater, surface water, groundwater, soil, biosolids, sediment, landfill leachate, and fish tissue. Note: EPA and the Department of Defense are collaborating on the development of this method. A multi-laboratory validation study will be conducted by DoD, in collaboration with EPA.

Media	Method	Description
Source (Air) Emissions There are diverse sources of emissions, including chemical manufacturers, commercial applications, and thermal treatment incineration processes. EPA is developing test methods for measuring PFAS source emissions.	Other Test Method (OTM)-45 <https://epa.gov/emc/emc-other-test-methods#other%20test%20methods>	EPA method that measures PFAS air emissions from stationary sources. This method will help other federal agencies, states, tribes, and communities have a consistent way to measure PFAS released into the air. Currently, OTM-45 can be used to test for 50 specific PFAS compounds. In addition to testing for these 50 specific PFAS, the method can also be used to help identify other PFAS that may be present in the air sample, which will help improve emissions characterizations and inform the need for further testing. EPA intends for the scientific community to provide feedback on OTM-45. EPA will consider and incorporate feedback to keep improving the method. Scientists and stakeholders can learn more about the process for submitting feedback in the introduction text of the method document. Direct link to OTM-45 (pdf) <https://epa.gov/sites/production/files/2021-01/documents/otm_45_semivolatile_pfas_1-13-21.pdf>. Field test study supporting OTM-45, in collaboration with Department of Defense. <https://www.serdp-estcp.org/serdp-estcp/program-areas/environmental-restoration/er19-1408/er19-1408>

Media	Method	Description
	SW-846 Test Method 0010: Modified Method 5 Sampling Train <https://epa.gov/hw-sw846/sw-846-test-method-0010-modified-method-5-sampling-train-0>	For semi/non-volatiles. A performance-based, Modified Method 5 that uses an isotope dilution train approach for GC/MS targeted and non-targeted analysis.
	Modified Method TO-15 <https://www3.epa.gov/ttnamti1/files/ambient/airtox/to- 15r.pdf>	For volatiles. Uses SUMMA canisters for GC/MS targeted and non- targeted analysis.
Ambient Air EPA is considering both sampling and analysis methods, targeted and non- targeted for PFAS ambient air measurements. Applications will include fenceline monitoring for fugitive emissions, deposition, and receptor exposure.	Ambient/Near-Source *(coming soon)*	Field deployable Time of Flight/Chemical Ionization Mass Spectrometer for real time detection and measurement.
	Semivolatile PFAS *(coming soon)*	A performance-based method guide by EPA TO-13a.
	Volatile PFAS *(coming soon)*	Uses SUMMA canisters and sorbent traps for GC/MS targeted and non- targeted analysis.
Total	Total Organic Fluorine (TOF) *(coming soon)*	EPA is developing a potential rapid screening tool to identify total PFAS presence and absence. This eventual standard operating procedure will be used to quantify TOF. Note: *EPA is working to develop this method in 2021.*

These types of methods aim to quantify large groups of PFAS in environmental samples.	Total Organic Precursors (TOP) *(coming soon)*	EPA is considering the development of a method, based on existing protocols, to identify PFAS precursors that may transform to more persistent PFAS. Note: *TOP methods are commercially available. EPA will consider the need for a thorough multi-laboratory validation study in 2021.*

Current Available Technology for Treatment

Current available technology for treatment of PFAS in various environmental media is a dynamic and evolving science. It is necessary to keep up by frequent review of scientific studies and to attend seminars and virtual presentations where technologies are studies in various application. There is currently no magic bullet for cleaning up existing PFAS in the environment. Each situation is unique and those in the remediation and consulting business have the challenge of determining the best and most cost-effective technology(ies) for any given project. According to the Interstate Technology & Regulatory Council (ITRC), "Selection of a remedy, with confidence that treatment targets can be achieved, depends on a number of key factors, including the ability to reliably define the nature and extent of contamination, the availability of proven treatment technologies, and the capacity and tools to measure progress and compliance with desired regulatory criteria." Many contaminated sites have contaminants other than PFAS and this adds to the challenge.

Both EPA and the ITRC websites provide centralized resources for some of the most promising remediation and PFAS destruction technologies without promoting any individual vendor. EPA research and guidance for treating drinking water is arguably the most advanced because of the urgent need to assure the public is protected from ingestion of PFAS-impacted drinking water. Granular activated carbon (GAC), ion exchange, and reverse osmosis (RO) systems are all proven and frequently employed treatment systems, singly or in combination, to treat PFAS-impacted drinking water. Each technology has challenges or limitations that need to be considered when determining the best technology. For example, both Granular Activated Carbon (GAC) and Ion/Anion Exchange systems present faster breakthrough times for shorter chain versus longer chain PFAS under certain influent and other conditions. They both also require either regeneration or disposal of spent media. Reverse Osmosis (RO) will treat most all PFAS, long and short chain, but generates a high volume (~10% of flow) of concentrate (reject water) that must be managed. Treatment of wastewater, surface water and groundwater is a bit more complex in that there is often a need to pre-filter solids from the waste stream prior to treatment. Following filtration, the same treatment systems used to remove PFAS from drinking water are often employed.

EPA's PFAS Innovative Treatment Team (PITT) developed a series of Research Briefs that provide an overview of four technologies that were identified by the PITT as promising technologies for destroying PFAS in more than just drinking water. Their focus technologies include Electrochemical Oxidation, Supercritical Waste Oxidation, Mechanochemical Degradation, and Pyrolysis and Gasification. Part of the challenge for determining if any treatment technology will work is that sometimes, what works in theory, lab and/or pilot studies, is not always effective in full scale or actual field applications.

Treatment of PFAS in soil, sludges, and sediments is also complicated and expensive. Treatment technologies range from stabilization, both in situ and prior to landfilling, to phytoremediation[14], to incineration. Again, there are limitations and associated complications for each treatment technology.

Treatment and control of PFAS in emissions to air is perhaps the most difficult to control because of the physical and chemical properties of PFAS and the difficulty in

[14] Phytoremediation uses plants to clean up contaminated environments. Plants can help clean up many types of contaminants including metals, pesticides, explosives, and oil. However, they work best where contaminant levels are low because high concentrations may limit plant growth and take too long to clean up.

breaking the carbon-fluorine bond. Incineration or thermal combustion are the most common systems employed for control of PFAS emissions. Theoretical temperatures required to break the C – F bond range from 1,000º C +/- 100º but it is becoming more and more evident that, even if the C – F bond is broken in the incinerator combustion chamber, products of incomplete combustion (PICs) will form in combustion chamber exhaust streams and reform into other PFAS compounds. PFAS emissions from an incinerator or thermal oxidizer stack are known to deposit on nearby soils, many times, miles away from the source. Inhalation of PFAS from an incinerator or manufacturing facility is not a primary route of exposure but deposition of PFAS to surrounding soil and surface water has been an exposure problem for a growing number of communities. One example of historic emissions from using PFAS in a manufacturing facility and where PFAS compounds were deposited to soil and surface water occurred at Saint-Gobain Performance Plastics (SGPP) in Merrimack New Hampshire. SGPP ultimately reached an agreement to permanently provide safe drinking water to approximately 1,000 properties located in portions of the towns of Bedford, Hudson, Litchfield, Londonderry and Merrimack, New Hampshire. Another recent example of deposition from industrial activity is PFAS contamination found in drinking near the 3M facility in Cordova, Illinois. PFAS-contaminated drinking water was found in Iowa, upriver and clearly not due to 3M Cordova water discharges to the Mississippi River. The subsequent EPA Administrative Order on Consent (AOC) that has been entered into with 3M Cordova assesses that the contaminated drinking water within at least a 3-mile radius of the Cordova site is due, in part, to airborne deposition of PFAS from 3M Cordova site manufacturing operations, including the thermal oxidizer emissions control system. The AOC specifically states "Though EPA has not done specific modeling at the Facility, EPA's PFAS atmospheric transport studies at other major PFAS manufacturing facilities suggest a likelihood that PFAS compounds from the Facility have been transported via the air and deposited into the soils and waters in Illinois and/or Iowa."

There are documented incidents of commercial and/or municipal incinerator stack depositing PFAS to surrounding soil and surface water. The most well-known of these is the Norlite incinerator in Cohoes, New York.

This phenomenon of deposition from industrial and commercial/municipal incinerator stacks has led to EPA banning the use of incineration for PFAS-contaminated wastes from Department of Defense (DOD) facilities and specifically, the destruction of aqueous film-forming foams (AFFF) derived wastes. EPA and DOD are actively working on better understanding what happens to PFAS during thermal combustion as well as alternative technologies for dealing with historic impacts of PFAS to the environment.

As far as source control technologies for PFAS in air emissions from incinerators and manufacturing facilities, much more research is needed. New Hampshire is currently the only state that has defined the best available control technology (BACT) for PFAS in air emissions. The New Hampshire Department of Environmental Services (NHDES) Air Resources Division issued a Temporary Permit (i.e., Permit to Construct) to in February 2020 which authorized Saint-Gobain Performance Plastics (SGPP) mentioned above, to install a regenerative thermal oxidizer (RTO) to meet BACT standards, specified under “NH RSA 125-C:10-e, Requirements for Air Emissions of Perfluorinated Compounds Impacting Soil and Water”.

Clean Harbors announced in November 2022, that they had a third-party test PFAS emissions from their hazardous waste incinerator stack in Aragonite, Utah, and that 99.99% destruction efficiency was achieved. The flaw in the study is that C1 and C2 PFAS and products of incomplete combustion (PIC) were not measured. As stated above, much more research is needed and ultimately every municipal and industrial incinerator must be required to assess emissions of PFAS to ambient air. This is especially important for sewage sludge incinerators (SSI) and/or biochar systems[15].

[15] Biochar is a stable solid, rich in carbon that is made from organic waste material or biomass that is partially combusted in the presence of limited oxygen.

BACT must be defined for destruction of PFAS from all thermal treatment systems in order to assure emissions from the systems do not deposit onto surrounding soil of surface waters.

b. Protections provided in other jurisdictions.

Part 503 – Standards for the Use or Disposal of Sewage Sludge, outlines Federal EPA requirements for states to follow for management of sludge/biosolids from wastewater treatment plants, including land application, land disposal and incineration. Part 503 sets out the minimum requirements but states are allowed to go above and beyond these provisions.

A review of state programs indicates that thirty-seven (37) states have requirements that are more stringent than Rule 503. Washington is not one of them.

Examples of more stringent requirements in other states include:

- Virginia and West Virginia: increased setbacks from surface waters, drinking water supplies, and dwellings; slope restrictions; pH restrictions; and soil permeability requirements. Virginia also requires a Nutrient Management Plan for all fields receiving biosolids
- Florida: increased setbacks and field condition requirements that must be met that are more stringent than Part 503
- Michigan's pathogen and/or vector attraction reduction limits and pollutant (trace metals, etc.) limits are not more restrictive. Nitrogen and phosphorus are the basis for the agronomic loading rate for land application. Michigan uses testing based on available P in the soil to manage or control the application of phosphorus in biosolids.
- Vermont rules establish different/additional minimum isolation distances and prohibited areas. Vermont's pathogen and/or vector attraction reduction limits and trace metal limits are more restrictive. Additional monitoring at Class B land application sites is required. Vermont controls the application of phosphorus in

biosolids and has established a policy-based maximum application rate of 5.0 dry tons/acre for any biosolids that contain phosphorus-removal sludge.

- New Jersey regulations include buffers based on site characteristics or as recommended in a site-specific Conservation Plan. The state requires additional monitoring at Class B land application sites, with pH testing and Mehlich 3 soil fertility tests for K, Ca, Mg, and P. Nitrogen, lime equivalency, or P-based – whichever is most limiting – are the basis for the agronomic loading rate for land application. New Jersey does require formal nutrient management plans.
- Massachusetts Department of Environmental Protection (MassDEP) requires PFAS monitoring requirements for residuals that have an Approval of Suitability (AOS) and are permitted to be reused through land application. MassDEP has also started to require PFAS monitoring/reporting in state NPDES permits.
- The Vermont Department of Environmental Conservation promulgated solid waste rules that require PFAS testing for biosolids and for soils, groundwater, and crops at land application sites.
- Pennsylvania Department of Environmental Protection revised their Biosolids General Permits to include PFOA and PFOS monitoring requirements (pre-draft issued).

Other methods used by states to increase protection of public health include those used by Michigan and Maine. The Maine state legislature passed a bill – L.D. 1911, An Act to Prevent the Further Contamination of the Soils and Waters of the State with So-Called Forever Chemicals, which completely prohibits the land application of biosolids and the sale of compost or other agricultural products and materials containing sludge and septage in the state of Maine due to PFAS concerns. This bill was passed following at least two farms were significantly impacted by unintentional land application of PFAS-contaminated biosolids or other beneficial use solid wastes.

Since 2018, Michigan has been managing an Industrial Pretreatment Program (IPP) PFAS Initiative with the purpose of finding out if PFOS and/or PFOA were passing through to surface waters and, if found, to reduce and eliminate any sources. The primary mechanism for this effort has been through the state NPDES permit program and by using Michigan PFOS and PFOA water quality values (WQV) as limits for WWTP effluent to surface waters. The Initiative has been extremely successful in reducing PFAS in effluent and in biosolids.

The Michigan EGLE Interim Strategy for reducing PFAS in WWTP biosolids states the following: "While the U.S. Environmental Protection Agency (USEPA) is working to complete a risk-based evaluation of PFAS in biosolids, the Department of Environment, Great Lakes, and Energy (EGLE) will continue a deliberative, disciplined approach which focuses on identifying and reducing significant sources of PFAS entering wastewater treatment systems and preventing industrially impacted biosolids from being land applied." Early in the PFAS Initiative, "EGLE conducted a study of biosolids at 42 municipal WWTPs. The results of this study show the median concentration of PFOS in biosolids from a cross section of WWTPs in Michigan was 11 micrograms per kilogram(μg/kg), and the average concentration was 18 μg/kg for those determined to not be industrially impacted. In addition, review of available literature on PFOS in biosolids suggests that concentrations found in Michigan are consistent with, or lower than, those previously documented in the United States and the world."

As a comparison, the aforementioned Sylvis study of the Tacoma Central WWTP in Washington, found that biosolids had the highest average concentration of PFOS at 15.27 ppb verses the NEBRA average of 21.19 ppb. The Tacoma Central WWTP biosolids results for PFAS are only one data point but indicates that biosolids in Michigan and Washington are comparable.

As part of the Michigan Interim Strategy, EGLE set guidelines for PFAS-containing biosolids land application. These guidelines are not risk-based but are rather based on statewide results of PFAS in biosolids, the soil where land application of

PFAS-impacted biosolids have been applied, surface water from and adjacent to the same fields as well as underlying groundwater. The guidelines require a minimum of one annual representative sample to be analyzed for PFAS by all EPA Majors/All IPPs prior to land application. All other WWTPs that intend to land apply biosolids must collect and analyze a minimum of one sample and analyze for PFAS every 5 years. EGLE requires protective and preventive actions by prohibiting land application of industrially impacted biosolids > 125 ppb PFOS, reduced volumes per acre of biosolids that indicate from 124 ppb to 51 ppb PFOS and typical agronomic rates of biosolids testing < 20 ppb. All WWTPs that have biosolids that test $\geq$ 20 ppb PFOS, must conduct PFAS source investigations. It is anticipated that these guidance levels will be reduced and made regulatory based on the EPA's Office of Water (OW) finalized Biosolids Chemical Risk Assessment and Biosolids Screening Tool (BST).

The notable difference between the Michigan and Washington approaches is that Michigan continues to investigate and react both proactively and when risks to the public are present and Washington has adopted a "wait and see" policy of inaction in respect to investigating analyzing and reacting to protect the public.

9. Why the Biosolids General Permit Does Not Mitigate Risks Imposed by PFAS.

The Washington Ecology ["Ecology"] General Biosolids Permit ["the Permit"] focuses solely on the requirements outlined in Federal Part 503 for management of sludge/biosolids. What the Permit does not address or acknowledge is the significant potential and relevant risk of the presence of what is becoming an increasingly pervasive and dangerous possibility of per- and polyfluoroalkyl substances (PFAS) in wastewater treatment plant sludge/biosolids. Knowledge and control of PFAS in biosolids destined for land application is extremely important to the protection of people and the environment. It is a problem that is well-known and increasingly well recognized across the United States and the fact that Ecology does not even mention

PFAS in a statewide general biosolids permit is of great concern and represents an outdated and obsolete approach to biosolids regulation.

What is even more concerning is that, when faced with data in public comments that indicates PFAS is already present in biosolids and compost in Washington, Ecology still did not include provisions for even monitoring and reporting PFAS in WWTP biosolids. In response to a comment that mentioned the Sierra Club, "Sludge in Garden" report findings that the Tacoma Central WWTP product TAGRO Mix contained PFAS compounds, Ecology stated: "Ecology agrees that the question of PFAS in biosolids warrants investigation. If it becomes apparent that additional regulatory standards are needed to ensure the safety of public health and the environment, for PFAS or any other pollutant, Ecology is prepared to take action. The general permit allows for adjustments like this to be made whenever necessary, not just every 5 years upon issuance." According to Washington Ecology's "PFAS Chemical Action Plan", Revised September 2022, "Biosolids produced in WWTPs where PFAS are present can in turn be contaminated with PFAS. Fundamental PFAS concentration data to characterize Washington biosolids is lacking. Toxicity, concentration, and pathway of exposure determine the risks that PFAS in biosolids pose to human health and the environment." The Action Plan includes recommended key steps to address the current data gaps but the challenged Permit does not implement any action steps. There is an observed lack of urgency in all of Ecology's documents and responses to public comments, and Ecology's lack of monitoring or regulation of PFAS in the challenged Permit is inconsistent with its separate recognition of the presence of PFAS in wastewater and biosolids and associated risks.

Indeed, EPA recognizes the urgency of the potential for PFAS to be present and a risk in WWTP effluent and biosolids. In a December 6, 2022 announcement the U.S. Environmental Protection Agency (EPA) released a memorandum to states that provides direction on how to use the nation's bedrock clean water permitting program to protect against per- and polyfluoroalkyl substances (PFAS). The guidance outlines how states can monitor PFAS discharges and take steps to reduce them where they are detected. The EPA memorandum included a recommendation that all states include a requirement to test for 40 PFAS compounds using Method 1633 in all NPDES permits.

Ecology has already responded they will not follow the new EPA guidance but will wait for an EPA multi-lab validated method for PFAS. Delaying actions to quantify PFAS in Washington biosolids and the lack of regulation to control PFAS at the source is a continued, serious, and significant risk to the health of the people in the State of Washington. The need to address historic and continuing use of biosolids is important and urgent. The Permit essentially allows land application of potentially hazardous biosolids for the next 5 years. Wastewater treatment plant personnel, the farmers that use the biosolids and the animals and people that eat the produce from the farms are likely and unknowingly at risk today. Not even beginning to address the problem in the most important regulatory instrument available to Ecology, the General Biosolids Permit, is wholly inconsistent with the protection of public health and environmental quality, as reflected in widespread science and the practice in other states.

Aside from minimal biosolids information provided for Washington in the Compliance and Enforcement History Online (ECHO) system, Washington does not make biosolids land application detail publicly available. Land application information such as GPS and mapped locations of fields receiving biosolids application and newly proposed fields needs to be publicly available and easily accessible, both via posted signs and online. People that live near these fields have the right to know their potential exposures and risks imposed by the practice of land applying biosolids.

The following is from the March 13, 2023 “Comments on EPA’s National Enforcement and Compliance Initiatives for Fiscal Years 2024-2027, Docket No. EPA-HQ-OECA-2022-0981” from the Southern Environmental Law Center, signed by numerous eNGOs.

"Wastewater plants that refuse to control PFAS pollution from their industrial users are violating the Clean Water Act's pretreatment program and are subject to enforcement under Section 309. Under the pretreatment requirements, municipalities are first required to know what waste they receive from their industrial users. As recently as last December, EPA confirmed that this requirement extends to pollutants that are not conventional or listed as toxic, like PFAS. Municipalities are required to instruct their industries to identify their pollutants in an industrial waste survey and then to apply for a pretreatment permit, by disclosing "effluent data," including on internal waste streams, necessary to evaluate pollution controls. Significant industrial users, or industrial users that contribute influential flow to the wastewater plant, are further required to provide information on "[p]rincipal products and raw materials . . . that affect or contribute to the [significant industrial user's] discharge.

A municipality that runs a wastewater plant is further required to regulate its industries so that industries do not cause "pass through" or "interference," or otherwise violate pretreatment laws."

Continued land application of biosolids that might be impacted by PFAS in Washington is violating the Clean Water Act's pretreatment program and are subject to enforcement under Section 309.

10. Why the Application of Biosolids Under the Biosolids General Permit Causes/Does Not Cause Likely Significant Environmental Impacts.

Continued land application of biosolids without knowing the levels of PFAS in them and the fields where they will be applied, will likely cause significant environmental impacts. This conclusion is based on what is known from testing fields and biosolids in other states. There are numerous studies that have been completed in Michigan and reports posted on the Michigan PFAS Action Response Team (MPART) Land Application Workgroup webpage that provide compiled data, discussions and conclusions, including final environmental and human impacts. In the case of the

Wixom WWTP, the report traces the impact of land application of PFAS-containing biosolids to animal feed and bioaccumulation of PFAS in beef, which ultimately resulted in devastating the farmer that was unaware the biosolids he land applied contained harmful chemicals.

Ecology states in the PFAS Chemical Action Plan that “Ingesting contaminated food and drinking water leads to the greatest portion of chronic exposure to PFAS (specifically to PFOS and PFOA) for the general population.” The hazards of PFAS to people and the environment are cumulative, with exposure to household items such as carpets, food packaging, personal care products and cosmetics, and ski wax, a fairly insignificant part of it. There are documented significant impacts to people from drinking water contaminated with PFAS and Washington is beginning to find contaminated drinking water in more and more communities. Consuming PFAS-containing vegetables, dairy, seafood, and fish are also substantial, cumulative sources.

Land application of PFAS-contaminated biosolids contributes to many routes of exposure. Environmental and human impacts begin at the WWTP where PFAS-impacted biosolids are processed. At the beginning of the treatment process, dewatering and/or drying biosolids can be a cause for exposure to WWTP operators. WWTPs with associated Sewage Sludge Incinerators (SSI) may be a cause for PFAS products of incomplete combustion (PICs) to be deposited to nearby communities (inhalation) and to soil and surface water. Inhalation and dermal contact with biosolids during truck loading and application to fields is an exposure risk to the appliers. The process of land applying biosolids can also be cause for airborne impacted particulate matter that can be inhaled by the nearby community. Surface water runoff from fields where biosolids have been applied can enter field drains, ditches, and swales and increase the risk of exposure to ecosystems and people via dermal contact both locally and in receiving lakes and water, with bioaccumulation in fish a known outcome. Contamination from land application of PFAS-impacted biosolids to soil and surface water can be taken up by plants that people and/or animals consume. Land application

PFAS-impacted biosolids can cause contamination of underlying groundwater. Depending on the use of the impacted aquifer, this can lead to health impacts to animals and humans that drink the water. If Ecology does not require testing for PFAS in WWTP effluent and biosolids, there is no way of knowing if PFAS is present and no way to control land application of highly impacted biosolids or use of these biosolids in commercially available composts and fertilizers.

Conclusion

Available data and research support the conclusion that biosolids land application in Washington under the Washington State Department of Ecology's ["Ecology"] Biosolids General Permit creates significant probable adverse environmental effects due to the presence of per- and polyfluoroalkyl substances (PFAS).

The General Biosolids Permit does not address or acknowledge the significant potential and relevant risk of the presence of what is becoming an increasingly pervasive and dangerous possibility of per- and polyfluoroalkyl substances (PFAS) in wastewater treatment plant sludge/biosolids. Without acknowledgement, testing, and monitoring, there is no mitigation of risk.

There is mounting evidence in Washington of the presence of PFAS in the environment at contaminated sites, in drinking water, surface water and in WWTP biosolids. There are also admitted gaps in this information, especially as it relates to WWTP biosolids. The current General Biosolids Permit is silent on the potential risk of PFAS in WWTP biosolids and does not recommend or require that permittees sample and report PFAS levels in their biosolids or compost products. The only way to fill the gaps is to begin monitoring, tracking and controlling PFAS at the source.

There are multiple sources, pathways and routes of exposure that contribute to adverse risks to the general public from PFAS in the environment and the exposures are often cumulative, particularly in environmental justice areas. It is important to identify all possible sources of exposure to PFAS to the general public. Sampling and analysis of potential sources for PFAS is critical to protecting people and the environment.

The cyclical movement of PFAS to surface and groundwater poses a significant risk to community and individual drinking water systems. Land application of PFAS-impacted biosolids is a known cause for PFAS to enter community and individual drinking water systems. EPA’s proposed Maximum Contaminant Levels (MCLs) and goals, for six PFAS in drinking water, highlights the need to not only control the PFAS supply chain but to also stop literally spreading the cyclical problem.

Expert Report on Microplastics and other Contaminants in Biosolids

Robert C. Hale, Ph.D.

1. Introduction and Summary

Disposal of the massive amounts of sludge generated by wastewater treatment is a growing logistical and environmental problem. Disposal also consumes a sizable portion of wastewater treatment plant operating budgets. Hence there have been an incentive to find more economical means of disposal. Despite substantial unknowns regarding possible environmental and human health consequences, land application is now the major disposal approach in the U.S. It is less expensive than other options (such as incineration and landfilling). It also repurposes the nutrients contained therein to enhance short-term agricultural productivity.

However, sludge also contains pathogens and a plethora of chemical contaminants. Some are concentrated therein. The identities of most of these contaminants are unknown. They can vary in composition and concentration depending on wastewater sources and treatment processes (for wastewater and sludge) applied. A risk assessment was conducted by EPA in the 1990s but that only included a very small subset (<0.1%) of the chemicals likely present in biosolids. This assessment has been used in support of the federal Part 503 regulations governing biosolids land application. These regulations underlie the biosolid application permits issued by the Washington State Department of Ecology.

The first step in successful application of the risk assessment paradigm is knowing the identities of the contaminants being assessed. This essential element was not fulfilled for biosolids. During the original EPA biosolids risk assessment it was believed "only" about 75,000 chemicals were in commerce, but recently that number has ballooned 4-fold to over 350,000. This discrepancy is one clear indication of how limited our knowledge of what contaminants are present in biosolids, let alone their possible human and ecosystem health ramifications.

Recent scientific findings since have identified several classes of chemicals of emerging concern (CECs) including flame retardants (brominated and phosphate-based), plasticizers, pharmaceuticals and personal care products, PFAS, surfactants, antioxidants, and microplastics/fibers). These exhibit appreciable toxicity, persistence, and bioaccumulation potential. Nonetheless, from a chemical contaminant perspective, the Part 503 regulations limit the biosolid concentrations of a mere 9 metals.

Control over what enters wastewater treatment plants and exits via biosolids is limited. Once contaminants are released to soils (and more broadly the environment), toxicological interactions between chemicals are probable, as well as with nonchemical stressors such as pathogens. Persistent chemicals, both organic and inorganic (e.g., metals) build up in soils following repeated applications.

The production and discard of plastic products is increasing at an exponential rate. Plastics often contain percent levels of chemical additives (e.g., flame retardants, plasticizers and even PFAS). Myriad microplastics form when these plastics fragment. A continuous cascade of further fragmentation produces ever smaller and more numerous particles, eventually forming nanoplastics. Additional intentionally made microplastics (e.g., as abrasives) co-mingle with these in sludge. Over 90% of microplastics entering wastewater treatment plants are sequestered in the sludge. These go where the biosolids go. The impact of microplastics in agricultural and environmental scenarios is an emerging area of concern. Once microplastics and chemical pollutants enter soil it is exceedingly difficult, if not impossible, to remediate them. Hence care must be exercised when permitting the contamination of soils with known and unknown complex contaminant mixtures. Nuisance odors, resulting from some biosolids-related chemicals, also often emanate following land application. These malodors can impact nearby properties. Both chemical contaminants and microplastics are subject to offsite movement via surface runoff, aeolian processes and subsurface water movement.

The above issues argue that biosolids land application as regulated by Washington State Department of Ecology (2022) Biosolids General Permit for Biosolids Management is not under control with respect to possible negative environmental or human health impacts. Absence of knowledge does not equate to absence of risk. Thus, the authorization of biosolids land application under the general permit poses the risk of a significant adverse environmental impact under the State Environmental Policy Act (SEPA).

2. Relevant Education and Experience

- Robert C. Hale received his Ph.D in 1983 from William and Mary in Marine Science, focusing on the distribution and fate of organic pollutants in biota of Chesapeake Bay. In 1979 he received a B.S. in Biology and B.A. in Chemistry from Wayne State University (Detroit).

- Dr. Hale has been employed at the Virginia Institute of Marine Science (VIMS), William & Mary in the Ecosystem Health Section (and its predecessors) since 1987, attaining the rank of full Professor in 2002. From 1984-7, he served as a Sr. Environmental Chemist and then Research Chemist at the Mobil Corp. Environmental Health and Sciences Laboratory in Princeton, NJ.

- Professor Hale has ~40 years of post-doctoral experience related to the sources, fate and effects of legacy, emerging and plastic-related pollutants in the aquatic, terrestrial and "built" environments. He has given numerous invited and contributed presentations at major scientific meetings. At VIMS he has served as major professor for 13 Masters and 7 Ph.D. graduates. Dr. Hale has taught university courses in related subjects, including Plastics in Society and the Environment, Environmental Pollution, Water Pollution, Analytical Approaches in Biogeochemical Studies and Introduction to Chemical Oceanography. He received the William & Mary *Plumeri Award for Faculty Excellence* in 2019 and was a *W. Taylor Reveley, III Interdisciplinary Faculty Fellow* (2019-2021).

- Dr. Hale has ~150 peer reviewed publications with over 10,000 citations to date. He has received "excellence in review" awards from *Environmental Science & Technology Letters, J. Environmental Toxicology & Chemistry and Environmental Science & Technology*. Professor Hale has been funded by the U.S. EPA, NOAA, Virginia Dept. of Environmental Quality and others to investigate legacy and emerging contaminants in environmental matrices, including wastewater sludges/biosolids, as well as the influence of treatment processes. He has also investigated the presence of biosolids-related contaminants (including flame retardants) in soils and biota inhabiting agricultural fields receiving biosolids.

- Dr. Hale has served on the journal editorial boards of *J. Residuals Sci. Technol., J. Environ. Toxicol. Chem.* and *Env. Sci. Technol. Lttrs*. He also has been selected for numerous federal and state advisory panels and workshop program committees related to contaminants and associated risks. Those most pertinent to the matter at hand include the EPA/WEF National Biosolids Research Summit (2003); ad hoc member for the EPA Voluntary Children's Chemical Evaluation Panel (2003; PBDEs); reviewer of Washington State Action Plan for PBDEs; Virginia Biosolids Expert Panel (2007-8); reviewer of Exposure and Use Assessment for Five Persistent, Bioaccumulative, and Toxic (PBT) Chemicals and Environmental and Human Health Hazard. U.S. EPA Office of Pollution Prevention and Toxics (2018); Expert Advisory Committee (EAC) member for Save our Seas 2.0 Act Report on Microfiber Pollution (2021-2022).

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4. Wastewater Treatment and the Generation of Biosolids

To understand the complexity of contaminants of biosolids one must recognize the diversity of sources, the processes used to generate wastewater sludge and the techniques applied to stabilize biosolids. Contaminant sources to sludges vary greatly and include all the entities and areas that have access to a sewer. These include diverse industries, businesses, military/governmental, medical facilities, impermeable surfaces and households. While pretreatment regulations exist for select industries, these are not always enforced adequately and do not cover all sources or contaminants of concern. Seasonal or intermittent weather events may significantly alter the volume and composition of both wastewater and resulting biosolids.

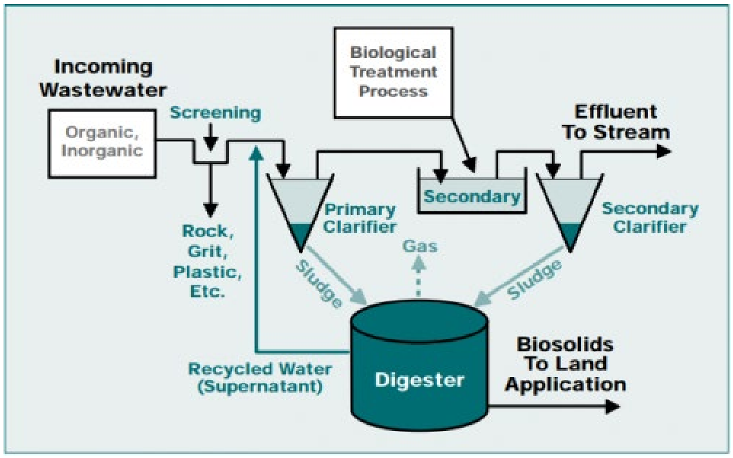
Hence, long intervals between testing of contaminants in biosolids, i.e., monthly or yearly (as stipulated in the Department of Ecology General Permit) may fail to adequately encompass the variability and hence true nature of contaminants in biosolids.

Wastewater treatment consists of several sequential steps. Initially, wastewater enters the facility headworks via a series of sewer lines. Periodically, sewer lines and in-line catchment basins may become blocked by grease or debris and must be cleaned. During this process legacy and recent contaminants trapped therein may be remobilized and enter treatment plants. Remobilization of contaminants may occur decades after their original use or release (e.g., PCBs in Milwaukee, discussed below). In the headworks, large (generally > 5 mm) debris is removed by screens and dense solids (e.g., sand and gravel) sedimented out ("grit"). Both are typically disposed of as solid waste. In-line grinders may be installed to shred solids such as debris, diapers, paper, and plastic products to permit their passage and protect equipment. In the case of plastics, this generates additional microplastics (defined as plastics < 5 mm) in the wastewater.

During "primary" treatment the post-headworks wastewater passes into a quiescent tank to settle additional solids and flocs, generating a semi-solid sludge. Chemical pollutants that are hydrophobic (e.g., BFRs: brominated flame retardants) or those that exhibit a charge (e.g., some pharmaceuticals) may sorb to the solids and then sediment. Floating materials (e.g., floating oil and grease (FOG) and buoyant plastics) are often skimmed from the wastewater surface and combined with the sludge or disposed of in some other manner (Hale et al., 2020). The settled "primary" sludge may then enter the biosolids treatment stream or be otherwise disposed of.

The overlying wastewater then is typically passed into a "secondary" or "activated sludge" stage for biologically mediated degradation of labile organic matter. Here, complex organic matter that would otherwise generate biochemical oxygen demand (BOD) in receiving waters is (commonly partially) degraded by microorganisms. Aeration is provided to support the process. A series of aerobic and anaerobic zones may be created to facilitate denitrification. The treated wastewater next passes into a second quiescent tank and "secondary" sludge settled. A chemical flocculent may be added to facilitate settling. Most microplastics and hydrophobic chemical contaminants (e.g., PCBs) are entrained in the sludges. Some are resistant to biochemically mediated degradation. PFAS, a mixture of chemicals) may also associate with the solids, as a function of their chemical composition (e.g., those with longer alkyl chains). A portion of this microorganism-rich sludge is returned to the aeration tank to "re-seed" the secondary degradation process. The excess "secondary" sludge is removed for biosolids generation.

A third treatment process is increasingly applied to the wastewater to remove other chemicals (often nitrogen and phosphorus) from the wastewater. This step is termed "tertiary" treatment and generate additional solids that may be combined with the other sludges.



Credit: Michigan Dept. of Environmental Quality

The wastewater treatment goal has always been to produce as clean an effluent for discharge as possible. In the process, contaminated sludge residues are created. This sludge was originally viewed as a waste to be discarded as hazardous material. However, costs for sludge disposal are substantial and have grown due to escalating tipping fees, dwindling landfill space near cities, expense of and concerns over incineration, and a prohibition on ocean disposal. Reduced sludge disposal costs and recycling of the abundant residual organic matter and nutrients in sludge led to its promotion as a soil conditioner for agricultural and other lands. However, the wastewater origin of the materials means that many of the chemicals used in society (as a function of their persistence and sorption properties) may ultimately end up in biosolids.

Initial attention regarding biosolid land application focused on odor, vector attraction (e.g., flies), pathogens and persistent chemical pollutants. Persistent pollutants were a particular concern as repeated land applications, as normally done with soil conditioners/fertilizers, would lead to a buildup in soils over time. At some point this accumulation could render the land unusable for agriculture and present possible health risks to workers and nearby human communities and wildlife. Sludges that contained high levels of select metals were deemed unacceptable for land application under the Part 503 regulations.

However, persistent organic pollutants were originally deemed inconsequential, based in part on the assumption that these (focusing on PCBs and organochlorine pesticides) had been banned from commerce in the 1970s, were (at the time) believed to be below levels of concern in sludge and were expected to decrease further over time (EPA, 1995). However, even for organochlorines this assumption was questionable. For example, high PCBs levels were detected in Milwaukee biosolids in 2007. The Milwaukee Metropolitan Sewerage District is still dealing with PCB contaminated sewer lines and sludge in 2023 (Boudreaux, 2023).

To reduce odor, vector attraction and pathogens a series of sludge stabilization techniques have been applied. These include thermal hydrolysis, anaerobic degradation, liming, composting and thermal drying. Following these treatments, sludge is termed “biosolids”. Dewatering of biosolids is commonly done as well to facilitate handling and transport. Depending on the pathogen reduction effectiveness and metals levels, biosolids may be designated as Class A (unrestricted application) or B (suitable for non-human food applications, with a variety of additional restrictions).

Malodors may emanate during and after biosolids applications (Wing et al., 2014). These can cause stress and other impacts in exposed individuals. As stated in National Academies of Sciences report (2002): "Odor perception has been shown to affect mood, in eluding levels of tension, depression, anger, fatigue, and confusion (Schiffman et al. 1995). Mood impairments and stress can potentially lead to physiological and biochemical changes with subsequent health consequences (Shusterman et al. 1991; Cohen and Herbert 1986)."

Malodors also can negatively impact neighboring property resale values (Eyckmans et al., 2013). A commonly reported health symptom for individuals living adjacent to biosolid application sites is respiratory irritation. Off-site transport of biosolids-related aerosols, including the presence of endotoxins derived from gram-negative bacterial cell walls, has been suggested as a cause (Herrmann et al. 2017). Exposure to the above varies greatly depending on the nature of the biosolids applied, application mode, weather, wind, susceptibility of receptors and other factors.

5. Diversity of Organic Contaminants in Biosolids

Many persistent organic pollutants existed in wastewater sludge when the initial EPA biosolids risk assessment was performed and still do today. The EPA risk assessment focused on chlorinated organics due to their persistence, but fluorine and bromine also can impart similar environmentally problematic properties (e.g., lipophilicity, persistence, toxicity) to organic chemicals. Examples include brominated flame retardants (BFRs) and per- and polyfluorinated alkyl substances (PFAS). These two classes were in wide commercial manufacture decades before the EPA risk assessment was performed or the establishment of the Part 503 regulations. However, due to the state of the science at the time, their presence in biosolids was unknown, let alone their attendant environmental and toxicological risks.

Under Part 503, EPA only regulates the biosolid concentrations of nine inorganic elements (arsenic, cadmium, copper, lead, mercury, molybdenum, nickel, selenium and zinc). The above metals were listed due to their toxicity and persistence. It regulates NO organic pollutants. Washington permitting follows the Part 503 regulations. Once land applied, persistent chemicals (whether organic or inorganic) in biosolids will accumulate in soils and may render it unsuitable for agricultural use if levels are sufficient. This unfortunate scenario has recently been demonstrated in Maine for PFAS (Maine Department of Agriculture, Conservation and Forestry, 2023). Repeated applications of biosolids over time, as is customary for soil amendments, exacerbates persistent contaminant buildup.

The US EPA Inspector General criticized EPA for inadequate assessments of (only) 352 pollutants in biosolids (which included a number of organic pollutants) (EPA Office of the Inspector General, 2018). In 2021 EPA listed over twice that many (726) chemical substances present in biosolids (Richman et al., 2022). Until recently, the number of chemicals in commerce was estimated as

75,000 to 90,000. However, this number was recently raised 4-fold, i.e., to >350,000 (Wang et al., 2020). The discrepancy in how many chemicals are in commerce underlines a major problem – i.e., the scientific community and regulatory agencies (including the US EPA and Washington Dept. of Ecology) do not have knowledge of the presence, let alone the toxicological and ecological ramifications of the multitude of pollutants in wastewater and biosolids. Thus, resultant risk assessments are incomplete.

Examples of contaminants assumed "nonproblematic" by the original EPA risk assessment underlying 503 in biosolids include PCBs (due to their banning and presumed low levels), flame retardants and microplastics. Additional emerging classes of pollutants not discussed at length here include pharmaceuticals and personal care products (Garcia-Santiago et al., 2016), plasticizers, antioxidants, surfactants (La Guardia et al., 2001) and pigments/dyes/colorants (Didier de Vasconcelos et al., 2021).

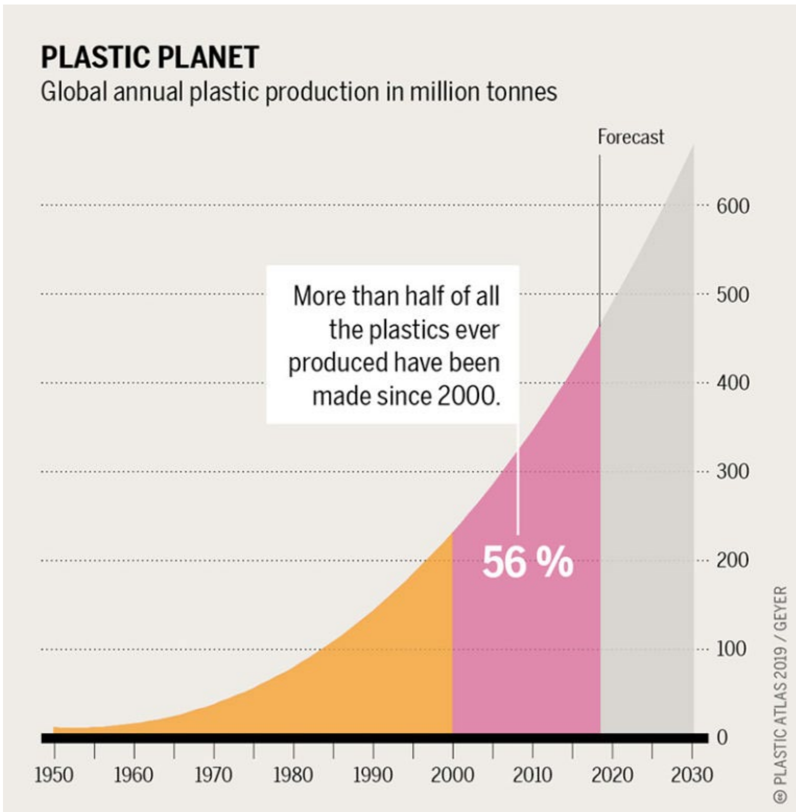
6. Brominated Flame Retardants (BFRs)

The EPA risk assessors did not recognize the existence of BFRs in 1995, although they had been in wide use decades prior. Nor did they recognize a host of additional "chemicals of emerging concern" (CEC). Nonetheless, EPA deemed biosolid application "safe". BFR concerns originally centered on the environmentally persistent and bioaccumulative polybrominated diphenyl ethers (PBDEs). These were first detected at mg/kg levels in biosolids in 2001 (Hale et al, 2001), as well as in wildlife and humans (Hale et al., 2022). PBDEs are endocrine disruptors which can interfere with the early development of the nervous system. Due to these concerns PBDEs were removed from commerce after 2004 (Penta- and Oct-BDE mixtures) and 2013 (Deca-BDE) by "significant new use regulations". However, considerable amounts remain in in-service and discarded polymeric goods (e.g., polyurethane in home furnishings). Hence, PBDEs are still entering wastewaters via migration from and fragmentation (i.e., forming microplastics) of polymer products.

After recognition of their health and environmental impacts, PBDEs were replaced by alternative brominated chemicals in new product applications. In addition, a host of nonbrominated flame retardants have long been in use (e.g., halogenated and nonhalogenated phosphate esters) and enter waste streams. These have been detected in biosolids at levels exceeding BFRs (Woudneh et al., 2015). Their toxicological consequences remain under investigation. PBDEs themselves were a replacement for structurally similar polybrominated biphenyl (PBB) polymer additives. PBBs were accidentally added to livestock feed in the mid-1970s in Michigan. The subsequent contamination devastated the agricultural sector and exposed people via contaminated food products (Hale et al., 2012). Michigan residents still carry PBB residues in their bodies.

7. Microplastics

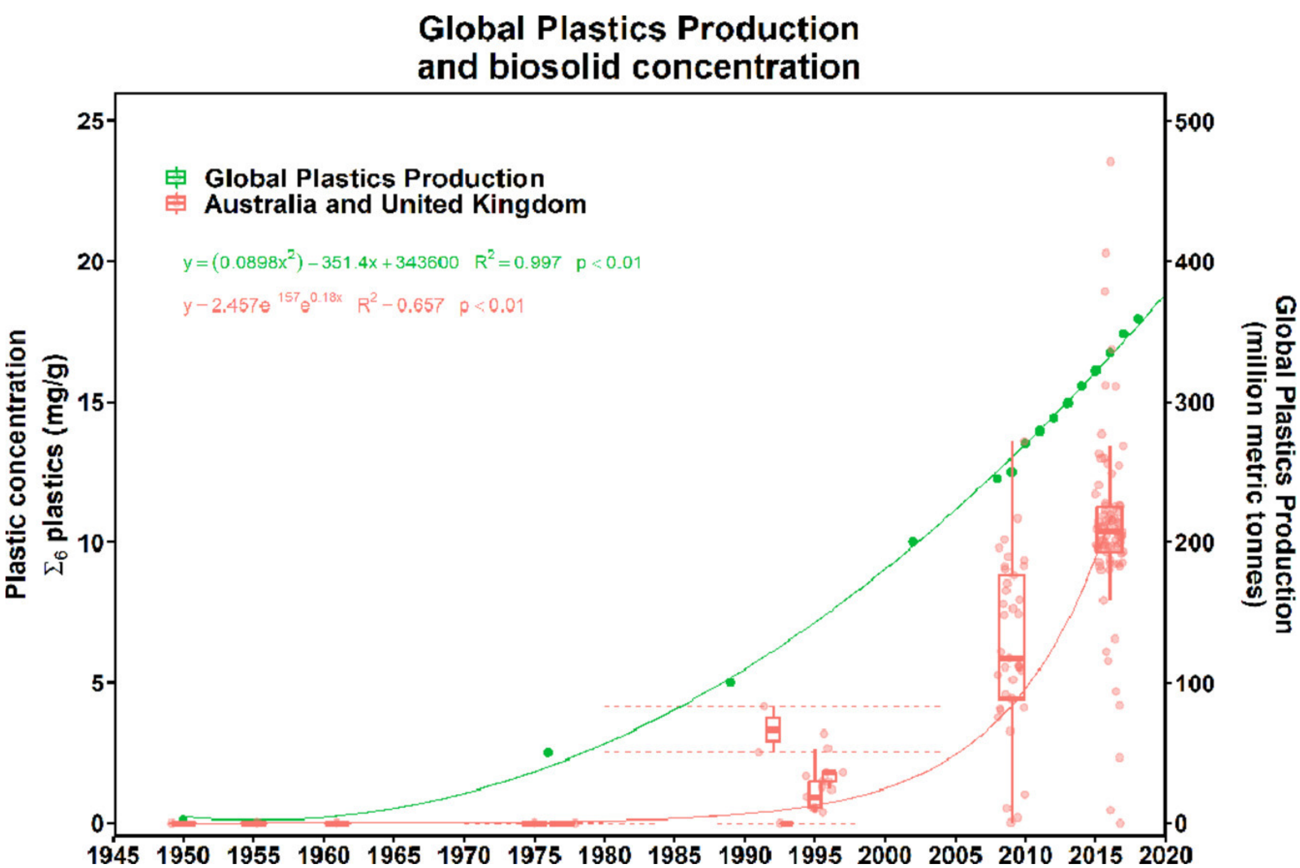
Plastics debris is a growing environmental issue. Production has been increasing exponentially since the 1950s. This increase worsens the problem of micro- and nanoplastics in biosolids. Plastics resist biochemical degradation in soils and may leach additives over time. The olefinic plastics are among the most common and persistent. Fluorinated polymers are also produced and concerns over their safety and possible release of PFAS are outstanding (Lohmann et al., 2020). Polymer additives (including BFRs), as well as fillers and processing aids, exist at substantial levels (percent by weight) in many plastics. These can migrate into water, wastewater and surrounding soils (Barrick et al., 2021). Decreasing plastic debris size increases particle surface areas and decreases the travel distance of additives to the particle surface, facilitating their escape.



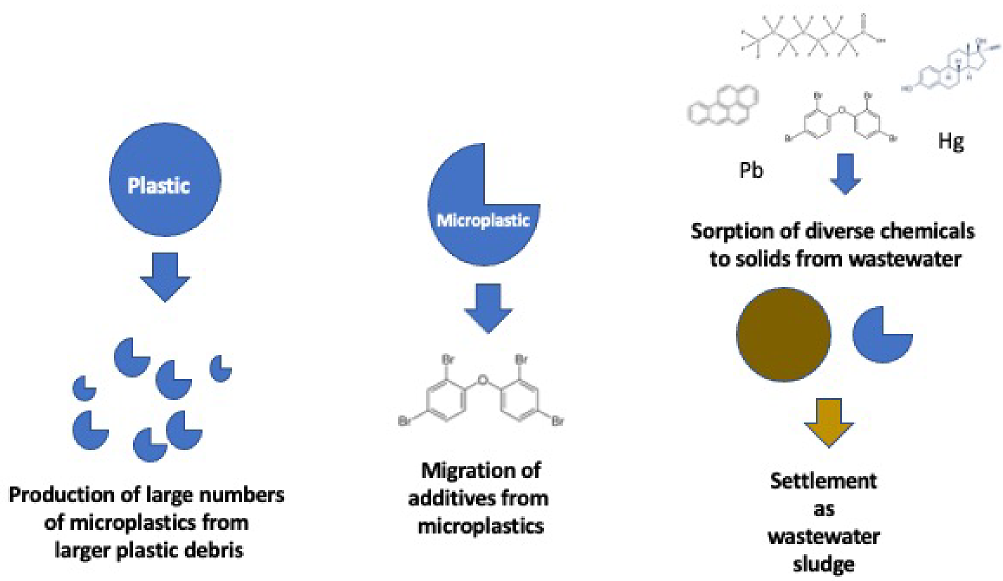
Source: PLASTIC ATLAS | Appenzeller/Hecher/Sack, CC BY 4.0

While plastic debris in the marine environment has garnered the most attention, contamination of soil is likely greater. Over 90% of microplastics entering wastewater treatment plants are typically sequestered in the solids and hence biosolids. Amounts will depend on the treatment residual streams included (primary, secondary sludges, FOG) in biosolids, as described above. Microplastic levels in sludges are expected to track plastic product production trends and are escalating dramatically (Okoffo et al., 2022). Intentionally manufactured microplastics also exist (e.g., as abrasives, in cosmetics), but most are formed by fragmentation of larger plastics. The process is expedited by natural weathering via UV and ozone exposure. Microplastics will continue to fragment in the environment to ever smaller particles and fibers. As they fragment the number of particles increase exponentially and the smaller exhibit greater potentials for penetration into soils and uptake by plants (Azeem et al., 2021). Their small sizes also facilitate offsite transfer via runoff and aeolian processes. This frustrates attempts to remediate these contaminants in soils.

The Department of Ecology General Permit (2022)/WAC 173-308-205 references removal of manufactured inerts. As noted, microplastics are defined as particles 5 mm or less. Removal of small plastics is a function of the screen size and its effectiveness. Plastics are often deformable so this may compromise attempts to eliminate them by mechanical means. Fibers have narrow widths and are not effectively removed by such screening. Biosolids also must contain "less than one percent by volume recognizable manufactured inerts." Okoffo et al. (2020) reported that Australian biosolids ranged from 0.4 mg to 23.5 mg/g (2.35%) dry weight for the sum of six polymer types. A positive correlation between plastic production from 1950 to 2016 and concentrations in archived biosolids from Australia and Great Britain (which have similar per capita plastic consumption as the U.S.) was recently reported (Okoffo et al., 2022). The increase in slope (see figure below) for plastics in biosolids post-1990 indicates accelerating delivery of plastics to treatment plants and biosolids. Note that 10 mg/g is equivalent to 1%.



Chemical stabilizers are added to some plastics to slow degradation, but they later leach and become sludge and soil contaminants. The smaller the microplastic, the more easily it is transported and ingested by biota (Hale et al., 2020). Nanoplastics (< 1 um) can be formed as well. Sludge stabilization processes have been shown to fragment microplastics, increasing their numbers, and mobility (Mahon et al., 2017). Microplastic measurement procedures are time-consuming, and most are incapable of detecting particles < 10 um. Indeed, many studies only identify particles larger than 100 um and only a subset of polymer types. Microfibers are particularly common in biosolids, largely derived from textile washing. Analysis of these is difficult due to their narrow dimensions (Hale et al., 2022). Therefore, most published numbers of microplastics/fibers in biosolids are likely underestimates.



Most microplastics ingested by humans are likely voided via feces and then enter wastewaters. Upon laundering of textiles substantial amounts of flame retardants also enter the sewer system (Schreder and La Guardia, 2014). Land application of biosolids has been estimated to contribute massive amounts of microplastics to the terrestrial environment. Nizzetto et al. (2016) hypothesized that land application of biosolids may deposit up to 300,000 tons of microplastics annually to North American soils. This amount exceeds the cumulative total believed present in all the surface waters of the world ocean.

To date, data on the health impacts of microplastics remains limited. Consequences may result as a function of their physical form (e.g., size and morphology), polymer composition (e.g., polyvinyl chloride (PVC) versus polyethylene (PE)) or chemical additive content. The presence of other stressors may exacerbate microplastic effects. In a recent study pertinent to Washington, Seeley et al. (2023) observed that co-exposure of a salmonid fish species to microplastics and infectious hematopoietic necrosis virus (IHNV), endemic in the Pacific Northwest, resulted in greater mortalities than exposure to either alone. Nylon fibers were particularly potent. Fibers are often the dominant plastic form in sludge (Mahon et al., 2017). Seeley et al. (2020) also demonstrated in controlled experiments that microplastics in coastal marsh sediments altered microbial community composition and processing of nitrogen species.

Research on effects of microplastics on soil organisms remains sparse (de Souza Machado et al., 2018). However, effects on soil ecosystem species are likely to track those observed in aquatic systems. For example, Zhu et al. (2018) observed altered gut microbiomes, growth and reproduction of springtails (important soil ecosystem engineering species) following exposure. Microplastics have also been detected in honey, and it has been suggested that they could interfere with pollination (Shah et al., 2023). Zhu et al. (2022) observed parallel effects in soils and attributed these to the presence of plasticizer additives. Plant uptake, phytotoxicity of micro- and nanoplastics and impacts on alterations of soil structure are areas of expanding investigation (Ng et al., 2018; Zhang et al., 2022). Consumption of micro/nanoplastic-contaminated plants is a possible pathway for human and wildlife exposure. However, data remain limited.

As noted above, plastics often contain chemical additives (at percent levels), including flame retardants, plasticizers, antioxidants, PFAS and precursors, and others. High concentrations of PFAS precursors have recently been reported in some brands of toilet paper - cellulose-based polymeric products themselves (Thompson et al., 2023). As most polymers are hydrophobic, microplastics can sorb pollutants such as PCBs, polycyclic aromatic hydrocarbons (PAHs) and others.

Additives can also be released from plastics and elastomers. Recently, PPD-Q, a degradation product of rubber antioxidant additive PPD (N-(1,3-dimethylbutyl)-N'-phenyl-p-phenylenediamine) common in tires, was found in roadway leachates and to be highly toxic to select salmonid species in Washington (Tian et al., 2020). It and a series of chemical homologs have subsequently been detected in rubber products, indoor dust, soil, roadway runoff and wastewater (Xu et al., 2022). In King County (Washington), some wastewater pipes carry both sewage and stormwater (KingCounty.gov, 2023). This provides an additional route for impermeable surface runoff, associated leachates and tire fragments to reach treatment plants and then biosolids.

8. Why the Biosolids General Permit Does Not Mitigate Risks and Environmental Impacts

The General Permit (Department of Ecology, 2022) is based on the EPA Part 503 regulations, which fail to consider most of chemicals and microplastics likely present, their toxicological effects and interactions. As noted above, chemicals present in biosolids will vary by wastewater source(s) and treatment processes applied. If no analysis of CECs in biosolids is required, then none will be found. Unfortunately, absence of knowledge does not equate to absence of risk. EPA possesses data on the presence in biosolids of less than 1% of the chemicals known to be in commerce (~350,000) and thus likely present in wastewater and biosolids. Many CECs recently detected in biosolids (such as PFAS, brominated and phosphorus-based flame retardants, pharmaceuticals, plasticizers, surfactants and microplastics) have been shown to possess significant toxicity. Some exhibit considerable environmental persistence and bioaccumulation potential.

Plastic production and disposal are increasing exponentially. Fragmentation of such products in use and after disposal will spawn parallel increases in levels of micro- and nanoplastics in biosolids. Okoffo et al. (2021b) recently reported that plastic particles < 25 um were the dominant size fraction in biosolids. The wastewater treatment process is quite effective in sequestering microplastics (>90%) in treatment sludges. But here they persist. Sludges used as biosolids will transfer their chemical and microplastic burdens to soils. Persistent residues will remain for decades or longer. Microplastics are easily transported offsite due to their small size and mass by runoff, aeolian processes and infiltration into soils. As particles decrease in size, they can be ingested by a greater range of organisms and penetrate cell membranes.

Microplastics or associated additives have been shown to alter microbial ecosystem composition in soils and aquatic sediments. Recent published studies indicate that microplastics can interact with the infectious disease agent IHNV, increasing mortalities in salmonid fish. The degradation product PPD-Q, leachable from rubber products and roadway residues, has been found to be toxic to some salmon species at sub ug/L (part per billion) concentrations. Salmonid fishes are financially, ecologically and culturally important in the Pacific Northwest.

The inability to assess the interactive effects of chemicals in biosolids, or to integrate pathogen and chemical effects was previously identified as a shortcoming of EPA's risk assessment process (National Research Council, 2002). Insufficient progress on these issues has been made since. Inadequate staffing and funding in the EPA office administering biosolids was also identified as a chronic problem by the EPA Inspector General (2018). As the biosolids general permit is based on Part 503, which is based on the EPA biosolids risk assessment, it suffers from the same shortcomings.

9. Conclusions

The 2018 EPA Inspector General report was critical of EPA's approach and actions related to possible chemical risks in biosolids. It stated "The EPA's controls over the land application of sewage sludge (biosolids) were incomplete or had weaknesses and may not fully protect human health and the environment." But even that report only considered about 0.1% of the chemicals that may be present in biosolids. In the Inspector General's report the words "microplastic" and "additive" were absent. The EPA risk assessment that underlies the Part 503 regulations (upon which the General Permit for Biosolids in Washington is based) was inadequate. Since Part 503's promulgation multiple classes of chemicals/wastes have emerged as significant environmental and human health concerns, including BFRs, PFAS, and microplastics. Further, there are limited controls on what enters treatment plants. Even the influent sewer lines themselves (as evidenced by the continuing issue of PCBs in Milwaukee) may release substantial amounts of legacy contaminants such as PCBs that may later contaminate sludges at unexpected times.

It is problematic to permit application of complex mixtures of contaminants on our finite agricultural soils, without sufficient understanding of their composition, let alone their effects - and with no capacity to remediate negative consequences. In soils, and following contact with biological receptors, biosolids-contained pollutants can interact with each other, as well as with other coincident stressors (e.g., pathogens). Thus, the General Permit for Biosolids Management does not adequately protect the environment from risks associated with the chemicals of emerging concern and microplastics.

POLLUTION CONTROL HEARINGS BOARD

STATE OF WASHINGTON

NISQUALLY DELTA ASSOCIATION, a non-profit organization, and ED KENNEY, Appellants, v. STATE OF WASHINGTON DEPARTMENT OF ECOLOGY, Appellee.	PCHB No. 22-057 APPELLANTS' REPLY IN SUPPORT OF MOTION FOR PARTIAL SUMMARY JUDGMENT

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I. INTRODUCTION

Appellants Nisqually Delta Association (NDA) and Ed Kenney (collectively, "Appellant") reply to the State of Washington, Department of Ecology's ("Ecology") Response to Appellants' Motion for Partial Summary Judgment. In response, Ecology does not contest that over a billion pounds of biosolids will be land applied under the General Permit, and that biosolids contain numerous harmful contaminants at detectable levels, including PFAS ("forever chemicals") and microplastics. Ecology also does not contest that these contaminants are dangerous for the environment and human health. According to the unrefuted expert report of Denise Trabbic-Pointer and numerous Ecology actions in other regulatory contexts, PFAS is dangerous in tiny concentrations of parts per trillion. In a recent lawsuit, the State alleged that PFAS are present in biosolids and "PFAS also are harmful to the environment and animal health and can build up in sediments and soils over time, impacting plants, fish, and animals." *See* Exh. M at 4.10, 4.24. According to the unrefuted report of expert Dr. Robert Hale, microplastics comprise a growing percentage of the volume of biosolids and serve to concentrate and deliver other pollutants to waters and the ecosystem. Ecology also does not contest that the General Permit lacks any attempt whatsoever to address PFAS or microplastics—there are no measures to monitor, sample, or regulate PFAS, microplastics, or any other chemical of concern. Ecology also concedes that its SEPA analysis contains no disclosure or evaluation of the impacts of biosolids application. There is no discussion of biosolids volumes, contents, or adverse effects.

Ecology's counterargument in response consists of three main assertions: 1) The General Permit does not authorize land application of biosolids, 2) Ecology cannot include any requirements related to PFAS or microplastics in the General Permit because doing so would constitute unlawful rulemaking, and 3) The General Permit lacks environmental impacts because "the permitting program's effects are all beneficial, not adverse." Ecology Resp. Br. at 13.

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Each of Ecology's counterarguments are wrong and contradict applicable law, agency regulations, and past agency statements. The General Permit "authorizes the application of biosolids to the land or the disposal of sewage sludge in a municipal solid waste landfill." WAC 173-308-080. Ecology's Fact Sheet for the General Permit states "[t]he general permit implements the requirements of Chapter 173-308 WAC, and may (does) contain additional or more stringent requirements beyond those in the rule." *See* Exh. N. Ecology's contention that land applying one billion pounds of biosolids, laden with dangerous contaminants lacks *any* adverse environmental effects is implausible and violates SEPA's procedural requirements.

II. BACKGROUND

NDA generally relies on the background set forth in its motion. However, NDA corrects Ecology's contention that "PBDEs are no longer at issue in this matter." Ecology Resp. Br. at 2. NDA chose to focus its motion on PFAS and microplastics but does not waive any other arguments, and notes that Dr. Hale's report includes discussion on PBDEs. Hale Report at 11.

III. ARGUMENT

A. According to Ecology Regulations and its Fact Sheet, the General Permit Authorizes Storage, Transport, and Land Application of Biosolids.

Ecology argues that:

> …the purpose of the General Permit is to explain how facilities are to comply with WAC 173-308, and to provide a permit template under which individual facility coverage may be granted, to which site specific land application plans, facility spill plans, and site specific requirements can be appended as necessary.
>
> Ecology's issuance of a new general permit was not a decision about whether land application of biosolids should continue as a lawful activity in Washington. That decision was made by enactment of RCW 70A.226…

Ecology Resp. at 12. In essence, Ecology argues that the General Permit has no independent function. Ecology uses this same line of argument throughout its response.

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Ecology's argument is directly contrary to its regulations and previous official statements in the General Permit Fact Sheet. WAC 173-308-080 defines "General Permit" in relevant part as a permit that "**authorizes** the application of biosolids to the land or the disposal of sewage sludge in a municipal solid waste landfill." *Id.* (emphasis added). The General Permit itself states that "Ecology issues this general permit **to implement the rules, including additional or more stringent requirements** that may be necessary to ensure proper management of biosolids in specific circumstances. Ecology uses accepted best management practices from state and federal guidelines and other authoritative sources to determine permit conditions..." Exh. A to NDA Motion for Summary Judgment (hereinafter "MSJ") at 1 (emphasis added).

Ecology's Fact Sheet states that "[a]ll facilities **authorized to operate under the general permit** either (a) produce or treat biosolids generated from the treatment of wastewater in a sewage treatment plant, or (b) treat and/or land apply septage from onsite wastewater (septic) treatment and related systems," and then lists the classes of "**the 375 existing facilities subject to the general permit**." Exh. N at 2 (emphasis added). Under a section titled "Legal Basis for the General Permit," the Fact Sheet states "[t]he purpose of the general permit is to implement the requirements of Chapter 173-308 WAC and additional or more stringent requirements as needed." *Id.* at 10. Under the next section titled "Conditions Set in the General Permit" the Fact Sheet states "[t]he general permit implements the requirements of Chapter 173-308 WAC, and may (does) contain additional or more stringent requirements beyond those in the rule." *Id.*

While NDA recognizes that additional substantive requirements may be imposed in subsequent site-specific approvals, that only confirms Ecology's regulatory authority. Moreover,

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as a practical matter the General Permit is often the only governing permit for biosolids. Facilities with baseline operations are covered under the General Permit only, with no further review. Exh. N at 6. For active biosolids management facilities, a "submitted Notice of Intent secured provisional approval of coverage under the new general permit and allows them to continue operations while Ecology reviews their complete permit application." Exh. N at 7. Ecology admits that "[a]ll facilities with active management programs must apply for coverage, but Ecology is not required to approve coverage in any certain timeframe. Some applications will receive relatively prompt attention, while approval of others will be delayed well into the permit cycle." *Id.* at 6. Thus, as a practical matter, many baseline and active facilities will be covered by only the General Permit for a period of years or more.

In sum, Ecology's regulations, the permit itself, and the fact sheet make clear that the General Permit authorizes biosolids storage, transport, and land application. The General Permit interprets and implements applicable law. For many facilities, the General Permit will be the only source of permit coverage, either permanently or for years prior to site specific review.

B. The Appeal Is Not a Request for Ecology to Conduct Rulemaking.

As in its motion for summary judgment, Ecology contends that NDA is seeking rulemaking through the General Permit, and that "the General Permit cannot be deemed unlawful, or arbitrary and capricious, for having failed to do what it lawfully cannot do." Ecology Resp. Br. at 3. Ecology creates a strawman, which NDA thoroughly addresses in its response to Ecology's motion for summary judgment. NDA further notes that, again, Ecology's past statements contradict its present legal arguments. In response to comments on the General Permit calling for PFAS controls, Ecology stated that the General Permit may be amended at any time to reflect these necessary shortcomings. *See* Exh. D, *Response to Comments on Biosolids*

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Permit, Comment: O-8-6, at 116 ("The general permit allows for adjustments like this to be made whenever necessary, not just every 5 years upon issuance."). Rulemaking is not required for Ecology to uphold its statutory duty to minimize the environmental risk of biosolids.

C. The Absence of any PFAS and Microplastic Measures in the General Permit Violates RCW 70A.226.005(2).

Ecology argues that Appellant's interpretation of RCW 70A.226.005(2) "clearly is not what the legislature intended" as the statute was enacted "contemporaneously with, and adopts as its touchstone, EPA's development of the federal standards for use or disposal of sewage sludge under the Clean Water Act." Ecology Resp. Br. at 4. Ecology's strained argument impermissibly seeks to substitute its idea of legislative intent for the plain text of the statute. "Statutes must be interpreted and construed so that all the language used is given effect, with no portion rendered meaningless or superfluous." *Whatcom County v. City of Bellingham*, 128 Wn.2d 537, 546, 909 P.2d 1303 (1996). "When the plain language is unambiguous, subject to only one reasonable interpretation, our inquiry ends." *Spokane Cnty. v. Dep't of Fish & Wildlife*, 192 Wn.2d 453, 458, 430 P.3d 655, 658 (2018) (internal citation omitted).

RCW 70A.226.005(2) is a state law that must be read according to its own terms. Ecology does not contest that the General Permit is a key aspect of the biosolids program. The unambiguous statutory requirement is therefore that the General Permit "shall, to the maximum extent possible, ensure that municipal sewage sludge is reused as a beneficial commodity and is managed in a manner that minimizes risk to public health and the environment."

In addition to plain language, NDA's reading is supported by Ecology's regulations. The defined purpose of the biosolids regulations is to "is to protect human health and the environment when biosolids are managed." WAC 173-308-010(2). The term "beneficial use of biosolids" is defined as "the application of biosolids to the land for the purposes of improving

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soil characteristics including tilth, fertility, and stability to enhance the growth of vegetation consistent with protecting human health and the environment." WAC 173-308-080. The regulations clearly establish that materials that do not meet this definition are forbidden from land application: "Sewage sludge or septage that fails to meet standards for classification as biosolids is a solid waste, and may not be applied to the land." WAC 173-308-060.

Ecology contends that RCW 70A.226.005(2) has as its "touchstone" CWA Section 405(d), and "CWA Section 405 does not require promulgation of management practices and numerical limitations for all toxic pollutants that may be present at any concentration in sewage sludge." Ecology Resp. Br. at 4. Ecology's argument is irrelevant to the plain language of the State law. Furthermore, legislative history supports NDA's reading of 70A.226.005(2). CWA Section 405 includes provisions for both "pollutants," and "toxic pollutants." 33 U.S.C. § 1645(d)(1), (2). "Pollutants" is defined broadly to include sewage sludge and chemical wastes. 33 USC § 1362(6). Nothing in the statute limits regulation to such specifically identified pollutants, and Section 405 prohibits all pollutants from entering navigable waters.

Importantly, the implementing regulations found in 40 C.F.R. Part 405 direct that "the permitting authority may impose requirements for the use or disposal of sewage sludge in addition to or more stringent than the requirements in this part **when necessary to protect public health and the environment from any adverse effect of a pollutant in the sewage sludge**." 40 C.F.R. § 405(a) (emphasis added). The regulations foresee "imposing requirements for the use or disposal of sewage sludge more stringent than the requirements in this part or from imposing additional requirements for the use or disposal of sewage sludge." *Id.* at § 405(b).

In this context, the Washington Legislature passed RCW 70A.226.005(2). Just as § 405(a) authorizes more stringent requirements "when necessary to protect human health and the

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environment," RCW 70A.226.005(2) requires that the biosolids program "to the maximum extent possible" be "managed in a manner that minimizes risk to public health and the environment." This closely similar language indicates intent to require Washington's biosolids program, in keeping with the direction of 40 C.F.R. § 405(a), to go beyond expressly identified pollutants as necessary to protect human health and the environment.

D. The General Permit Violates WAC 173-308-205.

Ecology argues that "Appellants provide no evidence that nano and microplastics are present in land applied biosolids to a degree that would constitute a violation of WAC 173-308-205 under their interpretation." This is incorrect. Appellants rely upon the declaration of Dr. Robert Hale, which discusses the presence of microplastics in biosolids. Among other qualifications, Dr. Hale is a long-tenured professor with over 150 peer-reviewed publications with over 10,000 citations to date. Dr. Hale has been funded by the U.S. EPA, NOAA, Virginia Dept. of Environmental Quality, and others to investigate legacy and emerging contaminants in environmental matrices, including wastewater sludges/biosolids. In his report, Dr. Hale states:

> Okoffo et al. (2020) reported that Australian biosolids ranged from 0.4 mg to 23.5 mg/g (2.35%) dry weight for the sum of six polymer types. A positive correlation between plastic production from 1950 to 2016 and concentrations in archived biosolids from Australia and Great Britain (which have similar per capita plastic consumption as the U.S.) was recently reported (Okoffo et al., 2022). The increase in slope (see figure below) for plastics in biosolids post-1990 indicates accelerating delivery of plastics to treatment plants and biosolids.

Hale Report at 13. Dr. Hale further explains how the rapidly increasing use of plastics has also likely increased the presence of microplastics in biosolids. *Id.* In comments, Appellants directed Ecology to a study by Ng et al., (2011), which Ecology contests does not apply to biosolids. Ecology is wrong. The Ng study discusses biosolids in detail, including the following quotes that are consistent with Dr. Hale's observations:

> Of the microplastics that pass through wastewater treatment plants, some 95% of the microplastics are estimated to be retained in biosolids (Ziajahromi et al., 2016). As both treated wastewater and biosolids are used in agriculture for irrigation and as fertiliser (Mohapatra et al., 2016; Nizzetto et al., 2016), the microplastic loading on agricultural land is likely to be high…estimates for North America ranged from 44,000 to 300,000 tonnes of microplastics annually.

Ng et al. states that in Australia, which has more stringent requirements than the United States, there is "a likely presence of between 9 and 63 kg of microplastics per tonne of dry biosolids." *Id.* at Box 2. 9 kg/tonne equates to 0.9 percent, while 63 kg/tonne equates to 6.3 percent (by weight). The referenced potential 5 percent by volume of microplastics is well within this range.

Ecology argues that NDA "fail[s] to address the reality that if a permittee were to do so, Ecology would be in a position to exercise its enforcement discretion to issue a penalty to the violator." Ecology Resp. Br. at 11. NDA contends that Ecology's failure to include any provisions to monitor or test biosolids for microplastics fails to ensure the ability to comply with WAC 173-308-205. *See Washington State Dairy Fed'n v. State*, 18 Wash. App. 2d 259, 298, 490 P.3d 290, 312 (2021). Ecology's interpretation that WAC 173-308-205 only applies to microplastics 3/8" or larger is contrary to the plain text of the regulation. These arguments are well-supported in NDA's briefing and not addressed by Ecology.

E. Ecology's Perfunctory Effects Analysis Plainly Violates SEPA.

SEPA is a required and appropriate mechanism for Ecology to confront the difficult environmental impacts, policy considerations, and alternatives for biosolids management. NDA has a simple SEPA argument that Ecology distorts and fails to address. The General Permit is a programmatic decision authorizing storage, transport, and land application of one billion or more pounds of biosolids over its five-year term. Under black letter SEPA law, Ecology was required to consider the direct, indirect, and cumulative impacts of the decision. *King County v. Boundary Review Board,* 122 Wn.2d 648, 663-64, 860 P.2d 1024 (1993); RCW

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43.21C.030(2)(b). Consideration of impacts must occur at the "earliest possible time." WAC 197-11-055. Ecology's requirements to fully analyze effects applies whether or not Ecology has authority to regulate those effects, and SEPA acts as a "supplement to or an overlay of other governmental authorization." *Polygon Corp. v. City of Seattle*, 90 Wash.2d 59, 66, 578 P.2d 1309 (1978). Ecology's determination "must indicate that the agency has taken a searching, realistic look at the potential hazards and, with reasoned thought and analysis, candidly and methodically addressed those concerns." *Wenatchee Sportsmen Ass 'n v. Chelan County*, 141 Wn.2d 169, 176 (2000). The fact that a decision may have some beneficial impacts does not alter the requirement to evaluate the adverse effects. WAC 197-11-330(5).

Ecology wholly failed to comply with its obligations under SEPA. To prevail on summary judgment, NDA only must demonstrate that Ecology has violated the SEPA statute or regulations, or made an otherwise clearly erroneous determination. NDA does not have to prove via undisputed facts the exact extent or nature of the impacts—NDA must only show that Ecology clearly erred in its omissions and lack of analysis. Identifying a class of impacts that Ecology failed to analyze is sufficient to prevail on summary judgment. *Quinault Indian Nation, et al.* v. *City of Hoquiam*, SHB No. 13-012c (Order on Summary Judgment) (Dec. 9, 2013). NDA easily meets that burden. Ecology promulgated a mere one-paragraph, conclusory analysis that biosolids "do not pose a significant risk to human health or the environment when used in accordance with applicable rules, guidelines, and permit requirements." Ecology's DNS. Ecology's checklist and DNS demonstrates that it did not rely on adequate information and did not take the requisite "hard look" at the direct, indirect, and cumulative impacts of PFAS and microplastics found in biosolids. The expert reports of Denise Trabbic-Pointer and Dr. Robert C. Hale further demonstrate the serious direct, indirect, and cumulative human health and

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environmental impacts that are probable because of the General Permit. Ecology impermissibly deferred the SEPA analysis, that must be conducted at the earliest possible time, and impermissibly balanced the asserted benefits against the adverse effects. Therefore, Ecology's determination of non-significance is clearly erroneous. Furthermore, an EIS is required.

F. Appellants Rely on the Reports of Highly Credentialed Experts.

Ecology argues that NDA's expert reports "are not sworn testimony, are not accompanied by any kind of authentication, and contain no copies of the materials relied upon or cited therein." Ecology Resp. Br. at 14. The reports provide full citations, and no affidavit is required. Nonetheless, NDA provides declarations for each report attached hereto. *See* Exhs. O and P.

IV. CONCLUSION

For all the reasons stated herein, summary judgment should be granted as follows:

Issue 1. RCW 70A.226.005(2) requires that Ecology ensure that the General Permit "to the maximum extent possible… minimizes risk to public health and the environment." Ecology violated that requirement by failing to address known harmful pollutants, including PFAS and microplastics.

Issue 4. Approval of the General Permit is arbitrary and capricious because the General Permit ignores known harmful pollutants, including PFAS and microplastics.

Issue 5. WAC 173-308-205(1) regulates microplastics. WAC 173-308-205(4) establishes a volume standard that applies to microplastics. The General Permit violates WAC 173-308-205 by: a) failing to include any measures to ensure compliance, and b) authorizing biosolids application that exceeds one percent by volume of microplastics.

Issue 8. Ecology's determination of non-significance is clearly erroneous and violates SEPA.

Issue 9. The General Permit has probable significant adverse environmental effects and Ecology must make a determination of significance and prepare an EIS.

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Dated this 12th day of June, 2023.

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CERTIFICATE OF SERVICE

I certify that on June 12, 2023, I served a copy of the foregoing upon the parties as indicated below:

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EXHIBIT N

Fact Sheet: 2021 General Permit for Biosolids Management

Introduction

The Department of Ecology is proposing to issue a General Permit for Biosolids Management (general permit). The previous general permit expired on September 4, 2020. The permit is the primary regulatory mechanism for approving the final use or disposal of biosolids in Washington. The expired permit remains in effect until the effective date of the new permit.

How to Submit Comments on the Draft General Permit

Ecology will accept comments on the draft general permit beginning on May 5, 2021. The comment period will close at 11:59 PM on July 1, 2021. After the close of the comment period, Ecology will evaluate and prepare a response to comments before making a decision on issuance of the permit. Anyone may express their comments, concerns, or recommendations regarding the draft permit by submitting written comments online[1]or testifying at a public hearing. For tips on how to submit effective comments, visit our commenting tips page.[2] There will be two online public meetings, followed by hearings to accept oral comments: June 22, 2021 beginning at 10 AM, and June 24, 2021 beginning at 7 PM. Due to the Covid pandemic, hearings will be online only. Subject to review of comments, Ecology anticipates issuing the permit on August 4, 2021, and it would become effective on September 3, 2021.

Facilities and Activities Subject to the Permit

The general permit applies to public and private facilities that meet the definition of treatment works treating domestic sewage[3] (TWTDS). All TWTDS eventually produce biosolids[4] (some daily, some after a period of years). State laws direct Ecology to maximize the beneficial use of biosolids, consistent with protecting public health and the environment. The permit regulates the production, storage, use, and disposal of biosolids including septage.

[1] https://swm.ecology.commentinput.com/?id=SpmPs
[2] https://ecology.wa.gov/About-us/Get-involved/Public-input-events/Commenting-tips
[3] https://apps.leg.wa.gov/wac/default.aspx?cite=173-308&full=true#173-308-080
[4] https://apps.leg.wa.gov/wac/default.aspx?cite=173-308&full=true#173-308-080

Regulated activities include biosolids applied to the land, sold or given away in a bag or other container, in storage, transferred from one facility to another, and disposed in a municipal solid waste landfill or incinerator.

The term treatment works treating domestic sewage comes from federal rules. It includes:

- All publicly owned wastewater treatment works,
- Privately owned treatment works that treat only domestic sewage (separate from industrial flows), and
- Facilities that treat biosolids as a feedstock, such as facilities that compost biosolids with other materials.

State rules expand the federal definition of a TWTDS, to include:

- Beneficial use facilities[5] (BUF) - provide land application services to biosolids generators, but do not actually treat biosolids.
- Septage management facilities[6] (SMF) - accept and treat or land apply septage from household septic tanks and similar systems.

Three hundred seventy-five (375) facilities in the State of Washington manage biosolids as described above and are subject to the general permit. The list of facilities is available online[7] and at the end of this fact sheet

Research Exemptions

Facilities performing approved research may be exempt from the permit requirements if they meet the criteria established in WAC 173-308-192[8]. Research projects are typically small in scope, and the proponent must have Ecology's written approval. Some examples of research include determining agronomic rates for particular crops and nitrogen mineralization rates for specific types or sources of biosolids.

Characteristics of Facilities Authorized Under the General Permit

All facilities authorized to operate under the general permit either (a) produce or treat biosolids generated from the treatment of wastewater in a sewage treatment plant, or (b) treat and/or land apply septage from onsite wastewater (septic) treatment and related systems. This permit does not apply to sludge generated by the treatment of industrial wastewater.

Of the 375 existing facilities subject to the general permit:

- 330 are sewage treatment plants also operating under National Pollutant Discharge Elimination System (NPDES) or State Waste Discharge Permits.
- 152 sewage treatment plants have Active Biosolids Management programs. The remainder only hold biosolids in a surface impoundment or send biosolids to another facility for further treatment.
- 29 are septage management facilities. Septage is a form of biosolids. These facilities treat and or land apply septage from onsite wastewater treatment systems and similar devices. The permit does not apply to onsite system service providers that only pump or provide other maintenance services.
- 2 are separate compost facilities that combine biosolids with other feedstocks. Composting is a method of treatment. Some wastewater treatment plants also compost.
- 8 are beneficial use facilities. Beneficial use facilities typically do not treat biosolids. They provide land application services for sewage treatment plants that generate biosolids. Some treatment works land apply biosolids to sites they permit for individual use.
- 6 are facilities that receive and treat a combination of biosolids generated from wastewater treatment plants and septage. They combine the two forms of biosolids, so they must meet higher standards for biosolids generated at a wastewater treatment plant.

[5] https://apps.leg.wa.gov/wac/default.aspx?cite=173-308&full=true#173-308-080
[6] https://apps.leg.wa.gov/wac/default.aspx?cite=173-308&full=true#173-308-080
[7] https://ecology.wa.gov/Biosolids-permit-actions
[8] https://apps.leg.wa.gov/wac/default.aspx?cite=173-308-192

In 2019, about 109,000 dry tons of biosolids were available for beneficial use or disposal in Washington. Generators beneficially used more than 80% of biosolids. Less than 20% were incinerated or disposed of in municipal solid waste landfills. Treatment plants and septage management facilities received, treated, or applied approximately 165,000,000 gallons (14,000 dry tons) of septage.

Conditions, Standards, and Limitations Imposed by the General Permit

Additional or more stringent permit requirements

The permit implements the standards and requirements of the rules in chapter 173-308 WAC. Washington's general permit is a hybrid model that combines the advantages of a general permit, with the ability to impose additional or more stringent requirements as a condition of final approval of coverage. This allows Ecology to take into consideration site characteristics where biosolids are applied to the land and develop permit conditions appropriate for each location. Some examples of additional or more stringent requirements include:

- Increased buffers to features such as surface water.
- Limits on seasonal timing of land application.
- Buffers to property boundaries.
- Checking for the presence of shallow groundwater.

Ecology uses accepted best management practices from state and federal guidelines and other authoritative sources to determine permit conditions and to establish additional or more stringent requirements for individual sites and facilities. Input from the public may also inform the agency and lead to additional or more stringent requirements for a specific facility or land application site. Examples of commonly used state guidance include Ecology's *Biosolids Management Guidelines* - WDOE 93-80[9], and *Managing Nitrogen from Biosolids* – WDOE 99-508[10]. The U.S. Environmental Protection Agency's (EPA) *Control of Pathogens and Vector Attraction Reduction in Sewage Sludge*[11] is an important federal guidance document. Other authoritative sources include, but are not limited, to University Cooperative Extension publications on crop nutrient needs and soil sampling.

Land application standards

The state rules in Chapter 173-308 WAC[12] meet or exceed federal requirements in 40 CFR Part 503. Biosolids and associated facilities managed under the general permit can achieve compliance with standards in a combination of ways depending on the biosolids end use and management practices.

There are three primary measures of biosolids quality: *pathogen reduction*, *vector attraction reduct*ion, and *pollutant concentration*. The qualitative standards for septage are somewhat less stringent, but the site management and access restrictions are more restrictive than for biosolids generated from wastewater treatment plants. Septage cannot be applied to public contact sites such as home gardens, lawns, and golf courses. Biosolids destined for public contact sites must meet higher standards than biosolids applied to areas where site management and access are restricted.

Pathogen reduction

Pathogen reduction uses defined treatment processes and/or measurement of concentrations of pathogens or indicator organisms to determine compliance.

Class B: Class B pathogen reduction can be determined by documenting adherence to certain operational criteria described in the regulations, or by measuring the concentration of fecal coliform bacteria directly. EPA established the Class B standard based on a two-log (99 percent) reduction of pathogens or indicator organisms. Additional site management and access restrictions are required when applying Class B biosolids to the land. Those

[9] https://apps.ecology.wa.gov/publications/SummaryPages/9380.html
[10] https://apps.ecology.wa.gov/publications/SummaryPages/99508.html
[11] https://www.epa.gov/biosolids/control-pathogens-and-vector-attraction-sewage-sludge
[12] https://apps.leg.wa.gov/wac/default.aspx?cite=173-308

management restrictions protect public health and the environment while natural conditions complete the process of eliminating pathogens. Biosolids must meet standards for Class B pathogen reduction at a minimum.

Class A: All Class A pathogen reduction options require documentation of a defined treatment process and measurement of pathogen or indicator organism concentrations. Class A pathogen reduction reduces pathogens to below detectable limits.

Vector attraction reduction

Vector attraction reduction is akin to odor control and can be thought of as stabilization. Requirements for vector attraction reduction in state rules are the same as federal rules. Vector attraction reduction is accomplished by treatment such as lime stabilization or reduction in volatile solids content, or in the field by tilling or injecting biosolids into the soil.

Pollutant limits

The permit relies on pollutant limits in WAC 173-308-160[13]. Table 1 of the regulation lists the *ceiling concentration limit*, which is the maximum amount of a regulated pollutant that is allowable in biosolids. Table 3 lists lower values referred to as the *pollutant concentration limit*. Biosolids with amounts of pollutants above the Table 3 value are subject to cumulative loading limits on specific land application sites. Biosolids in Washington rarely exceed, and more typically are far below the Table 3 values.

Exceptional quality biosolids

The state program recognizes exceptional quality (EQ) biosolids consistent with federal program standards. Exceptional quality biosolids meet the lowest threshold for regulated pollutants (Table 3, WAC 173-308-160). Generators also treat exceptional quality biosolids to reduce attraction to vectors, and to reduce pathogens to below detectable limits (Class A). The state program does not regulate subsequent uses of EQ biosolids, except to require a label or information sheet for exceptional quality products produced from the treatment of biosolids that do not first meet exceptional quality standards.

Exceptional Quality biosolids are suitable for unregulated uses. If facilities produce or plan to produce exceptional quality biosolids, they must ensure that their product is suitable for unregulated use when released from their control. Based on a recent regulatory interpretation by EPA, Ecology will no longer regulate second generation EQ products derived from other EQ products. For example, if a treatment works first produces an EQ biosolids compost, Ecology would regulate the compost, but would not regulate a topsoil product manufactured using that compost, even though it may remain in control of the generator.

Septage standards

About a third of the state's population depends on septic (onsite wastewater treatment) systems. Septage is much more concentrated than typical sewage that enters a treatment plant. Septic systems require periodic pumping, yet many wastewater treatment plants in Washington cannot accept septage for further treatment. That makes land application of septage a critical part of the state biosolids program, although septage makes up only about five percent of the biosolids applied to the land in Washington. Septage land application is limited to an amount calculated according to an equation developed by EPA. The equation considers the nitrogen requirement of the crop and incorporates a factor to address expected concentrations of pollutants in septage. Septage applied to the land must be stabilized with the addition of lime, or tilled, or injected into the soil. Site access and management restrictions are equal to or more stringent than those for Class B biosolids.

Crop harvest limitations

The permit invokes limits on livestock use and crop harvest from WAC 173-308-210[14] for biosolids and WAC 173-308-270[15] for septage. Waiting periods (when applicable) range from thirty days to thirty-eight months after the

[13] https://app.leg.wa.gov/wac/default.aspx?cite=173-308-160

[14] https://apps.leg.wa.gov/wac/default.aspx?cite=173-308-210

[15] https://apps.leg.wa.gov/wac/default.aspx?cite=173-308-270

last application of biosolids. The degree of pathogen reduction, the method of vector attraction reduction, and the type of crop and use determine the length of the restriction.

Geographical Area Covered Under the General Permit

This permit is applicable to all TWTDS operating within the jurisdiction of the State of Washington. Facilities on federal lands and Washington Tribal lands that manage biosolids wholly within their jurisdiction are not subject to this permit. Facilities on federal and Washington Tribal lands and those located in other states or countries that transport biosolids into the jurisdiction of the State of Washington are subject to state program requirements, but may not require coverage under the permit, depending on the reason for exporting biosolids. Facilities that export biosolids to areas outside the jurisdiction of the State of Washington must have approval before doing so. Facilities that export biosolids to Washington for further treatment or disposal, or to a permitted beneficial use facility, must have an approved spill response plan and pay a permit fee. Facilities that export biosolids into state jurisdiction may apply for coverage to have and manage their own land application site.

Changes to the General Permit

There are significant changes in the structure of this general permit as compared with previous general permits. Ecology separated this general permit into three main sections (Baseline, Active Septage Management, and Active Biosolids Management) based on facility operations. All facilities are required to comply with the *Baseline* section of the permit. The other sections apply only to facilities with active management programs.

Permit application requirements differ depending upon the coverage required. Some existing facilities (those without active management programs) will have automatic final coverage on the effective date of the permit. Other facilities are subject to further review, and potentially additional or more stringent requirements following evaluation of a complete permit application. All facilities that started operations after September 4, 2020, are required to submit a complete permit application.

Benefits of Changes to Permit Structure

Ecology made the decision to revise the general permit structure after evaluating the burden imposed by, and benefit gained from, the application process. We concluded that many facilities do not have active management programs – that is, they do not sell, give away, or directly apply their biosolids to the land, and are unlikely to do so during the life of the permit. For these existing facilities, in particular, we determined that we could both reduce the burden of applying for coverage under the general permit and speed the process of granting approval of coverage. We will accomplish this under the new permit by:

- Addressing all requirements for facilities without Active Biosolids Management programs in one section of the permit called the Baseline.
- Clarifying the limited activities of Baseline facilities, apart from those with Active Biosolids Management programs. Ecology will use information collected from the Notice of Intent process (conducted in 2020 before expiration of the previous general permit), understanding of facility operations from our biosolids regional coordinators, and our facilities database to assist in verifying appropriate permit coverage.

A permit application is not required for existing facilities without Active Biosolids or Septage Management programs. They have already submitted a Notice of Intent to be covered under the permit and will have final approval of coverage when the permit goes into effect. The public and small businesses served by these facilities – many located in small communities with limited resources – will benefit from the reduction in burden placed on staff at their treatment works.

Facilities approved only under the Baseline section of the permit are subject to modification of coverage or corrective actions if they are not operating in compliance with previous submittals and approved practices. Changes to management practices, such as the method of treatment utilized, addition of a land application site, or shifting to an active management program, are permit modifications subject to review and approval by Ecology.

Facilities with active management programs will benefit by having their most critical operational requirements aggregated in specific sections of the permit. The improved process will allow Ecology staff to better prioritize permit applications, which will enable them to focus on permit reviews that will bring the best return on effort. Overall, this will also benefit citizens served by these facilities, by making better use of local resources.

There are other changes in the permit. There is an emphasis on improved communication. Facilities are required to maintain updated contact information and have at least one person subscribed to Ecology's biosolids ListServ. Three changes in operational requirements are of most note:

- Facilities not covered by an NPDES or State Waste Discharge Permit must protect above ground storage tanks with bollards or similar devices.
- All facilities are required to sample for pollutants accumulated in surface impoundments in the first two years of the permit, if they have not done so since September 2019.
- Lastly, following a recent rule interpretation by EPA, Ecology will no longer regulate second-generation Exceptional Quality Biosolids products (those derived from biosolids already meeting Exceptional Quality standards).

Applicable facilities should review the entire permit and accompanying Small Business Economic Impact Analysis to determine how these and other changes may affect them.

Criteria for Providing Coverage Under the General Permit

The general permit will remain in effect for five years. Although the new permit structure will improve overall efficiency of the permit program, staff must still prioritize review of applications. All facilities with active management programs must apply for coverage, but Ecology is not required to approve coverage in any certain timeframe. Some applications will receive relatively prompt attention, while approval of others will be delayed well into the permit cycle.

State rules incorporate a concept called *provisional approval*. Provisional approval allows facilities to continue operations under the general permit while Ecology reviews their permit application, including taking into consideration any comments received following public notice. Facilities under provisional approval are subject to all applicable program rules and permit requirements.

Ecology has identified which of the three permit sections: *Baseline, Active Septage Management*, and *Active Biosolids Management* are applicable to facilities, based on the previous general permit (see facility list at the end of this Fact Sheet). Existing facilities are responsible for consulting the facility list and confirming their placement in the permitting system. New facilities that begin operations after the issuance of the general permit are required to submit a complete application to Ecology, regardless of their intended operations.

Facilities will obtain coverage under the general permit as follows:

Baseline

The Baseline section (section 2 of the general permit) applies to all facilities subject to the general permit. Sections 3 and 4 of the general permit apply only to facilities with Active Septage and Biosolids Management programs, respectively. Facilities without an active beneficial use program are subject *only* to requirements of the Baseline section (2).

Ecology has identified existing facilities that do not have active management programs, and thus ONLY require coverage under the Baseline section of the permit (see *facility list*[7] at the end of the fact sheet). These facilities:

- Operate lagoons where biosolids accumulate, without expectation of removal during the term of the permit.
- Only send their biosolids to another permitted facility for further treatment.
- Are authorized to incinerate biosolids or dispose of biosolids in a municipal solid waste landfill.

For these facilities, a Notice of Intent submitted in advance of permit issuance suffices, and a permit application is not required. Coverage under the general permit will be final for these facilities on its effective date. Facilities approved only under the Baseline section of the permit are subject to modification of coverage or corrective actions if they are not operating in compliance with previous submittals and approved practices, or wish to change their operations, including the addition of an active management program.

For new facilities, a complete permit application is required 180 days before beginning operations.

Active Management Facilities (Septage and Biosolids)

Sections 3 and 4 of the general permit apply to facilities that are actively managing septage and/or biosolids. These facilities include but are not limited to:

- Beneficial use facilities (BUF)
- Septage Management Facilities (SMF)
- Compost facilities
- Facilities that land apply biosolids and/or septage
- Lagoons that are near capacity and require cleaning out during the life of the permit

For these facilities, a complete permit application is due within 90 days of issuance of the general permit. Their previously submitted Notice of Intent secured provisional approval of coverage under the new general permit and allows them to continue operations while Ecology reviews their complete permit application. As a condition of final approval of coverage, Ecology may impose additional or more stringent requirements as necessary to their individual circumstances.

For new facilities, a complete permit application is required 180 days before beginning operations.

Information Required in a Complete Permit Application

A complete application includes basic information including address and contact information, as well as details about facility operations including treatment processes, goals for treatment, and anticipated end use of material. Ecology also expects facilities to confirm their placement in the permitting system as identified in the *facility list* at the end of this fact sheet. That will ensure they correctly apply for, and obtain, coverage under the appropriate sections of the permit.

Contents of a complete permit application depend on the nature of a facility's management practices. In addition to the Application for Coverage, a complete permit application package may include all or some of the following:

- A vicinity map of the facility.
- A vicinity map of any associated treatment or storage facilities.
- A treatment facility schematic.
- Land application plans.
- Monitoring data.
- A biosolids sampling and analysis plan.
- A contingency plan for facilities producing exceptional quality biosolids.
- A spill prevention and response plan, if transporting biosolids.
- Planned public notice or confirmation of compliance with public notice requirements.
- Confirmation of compliance with SEPA requirements.

Public Notice Requirements

All new treatment works are required to conduct public notice that includes newspaper publication and notice to interested parties, at a minimum. Existing facilities with active management programs must conduct public notice in accordance with the requirements of WAC 173-308-310[16]. Public notice occurs when the draft and final statewide general permit is issued. That may be the only notice for facilities without active management programs. Notices for facilities with active management programs may be partially addressed by the notice that accompanies issuance of the general permit. Additional notice will be required if a facility changes its management practices. Changes can include but are not limited to different methods of treatment implemented, addition of a land application site, or shifting to an active management program. Notice may be coordinated with requirements of the State Environmental Policy Act. Ecology works with facilities so their notice can be timely for review of their

[16] https://apps.leg.wa.gov/wac/default.aspx?cite=173-308-310

application and actual changes to management activities. Existing facilities that do not actively manage biosolids or septage, and only operate within the parameters of the Baseline section of the permit are not required to conduct additional public notice. Existing Baseline facilities that propose significant changes to their operations or intend to conduct land application of biosolids or septage are subject to additional public notice requirements.

All new facilities

All new facilities that began operations after September 4, 2020 are subject to the following public notice requirements:

- Issue notice in a newspaper of general circulation in any counties where they prepare biosolids or septage.
- Issue notice in a newspaper of general circulation in any counties where they land apply biosolids or septage.
- Issue notice in a newspaper of general circulation in any counties where they land apply non-exceptional quality biosolids except where this notice has been conducted by a permitted beneficial use facility.
- Post notices at sites where they plan to land apply non-exceptional quality biosolids except where this has been conducted by a permitted beneficial use facility. The signs must remain posted during the entire public comment period referenced below.
- Provide a thirty-day public comment period following the issuance of newspaper notice and posting signs.

State Environmental Policy Act (SEPA) Rules[17]

The SEPA process is often parallel to but separate from the biosolids permit process. Each SEPA process may differ, depending on the nature of the application or proposal, SEPA history, and local rules that may guide the SEPA Lead Agency. Ecology has a helpful SEPA webpage[18] that may assist facilities in their SEPA checklist preparation.

As part of public notice for this permit, Ecology identified facilities that do not have Active Biosolids or Septage Management programs. Those facilities will have final coverage on the effective date of the permit. Facilities that do have active management programs may require further review under SEPA as part of their permit application process. All applicants should review existing SEPA documentation to ensure it is consistent with current activities.

When an application requires further review under SEPA, facilities should begin by verifying the SEPA Lead Agency and the SEPA staff with whom they will work. If a local government entity such as a publicly owned treatment works is making a proposal, the SEPA Lead Agency is generally a local government body. For privately owned operations, the SEPA Lead Agency will be either a local government body or Ecology.

The SEPA Responsible Official makes a threshold determination regarding environmental impacts of a project, based on information provided in a SEPA checklist and supporting documents. It is helpful to consult with the SEPA Lead Agency before submitting an application.

The application package and SEPA Checklist work hand-in-hand. If another agency is the SEPA Lead Agency, Ecology will expect the application packet to include the SEPA Threshold Determination, associated SEPA Checklist, and if required, proof of public notice often referred to as an Affidavit of Publication." Ecology cannot accept a verbal assurance about the determination of the SEPA Responsible Official. If Ecology is the SEPA Lead Agency, we will expect a complete application package, including a SEPA checklist, before making our threshold determination.

If SEPA and biosolids permit processes are running in parallel, it is possible to issue a combined public notice. The combined public notice includes opportunity for public review and comment on both the SEPA threshold determination and the biosolids permit. That may extend the SEPA review period from fourteen days to the minimum thirty days required under the biosolids general permit. If a facility posts a combined public notice, they must include contact information for the SEPA Lead Agency as well as Ecology. Alternatively, they may complete the public review process for SEPA process before proceeding with public notice on their permit application.

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[17] https://app.leg.wa.gov/wac/default.aspx?cite=197-11&full=true

[18] https://ecology.wa.gov/regulations-permits/SEPA-environmental-review

Commitment to Environmental Justice

The EPA defines "environmental justice" as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies[19].

Fair Treatment means that no group of people should bear a disproportionate burden of environmental harms and risks, including those resulting from the negative environmental consequences of industrial, governmental, and commercial operations or programs and policies[198].

Meaningful Involvement means that:

- Potentially affected populations have an appropriate opportunity to participate in decisions about a proposed activity that will affect their environment and/or health;
- The public's contribution can influence the regulatory Agency's decision;
- The concerns of all participants involved will be considered in the decision-making process; and
- The rule-writers and decision-makers seek out and facilitate the involvement of those potentially affected.[198]

Ecology is committed to considering how agency activities, including permitting, may adversely affect the environment, and health of people, and communities of our state. This includes making sure that no population bears a disproportionate burden of environmental harms and risks, and that potentially affected populations have the opportunity to participate in decisions that affect their environment and/or health. During the life of this general permit, we will develop environmental justice criteria to help guide how we approach and evaluate relevant environmental, health, and social factors. Steps we will take during the life of the 2021-2026 general biosolids permit include:

- Convene a workgroup and/or solicit opinions of stakeholders as to how biosolids permitting can address environmental justice.
- Identify environmental justice considerations that most closely connect with biosolids management.
- Outline an approach to incorporate environmental justice into our permit program.
- Identify positive outcomes, not necessarily limiting the use of biosolids, but overall designed to increase understanding of, or reduce the burdens on, peoples and communities where the beneficial use of biosolids is proposed and environmental justice issues are present.

Ecology will work with one or more proponents in pilot projects to implement recommendations, evaluate, and improve the process. Ecology plans to incorporate the outcome of this in the next iteration of the biosolids general permit.

Small Business Economic Impact Analysis

In accordance with the requirements in WAC 173-308-90005(4)[20], Ecology prepared a Small Business Economic Impact Analysis) to assess whether the draft general permit is thought to have a disproportionate economic impact on small businesses relative to large businesses. Ecology found that the draft general permit does have a disproportionate impact on small businesses. The economic analysis[7] may be obtained online or by requesting from the contacts listed in this fact sheet.

Of the estimated 375 facilities subject to the permit, 70 are privately owned. We were able to find employment data on 49 of those. Eighty-four percent are considered small businesses and average seven employees, while the largest ten percent are seven businesses with an average of 425 employees.

The SBEIA identified three elements of the general permit that would impose costs above the baseline requirements of the rule. Estimated costs are for the five-year life of the permit.

[19] Source: Guidance on Considering Environmental Justice During the Development of Regulatory Actions. U.S. EPA, May 2015. https://www.epa.gov/environmentaljustice/guidance-considering-environmental-justice-during-development-action

[20] https://apps.leg.wa.gov/wac/default.aspx?cite=173-308-90004

Required posting of public notice: The public notice requirements of the permit are somewhat more than those of the rule, and would cost $42 to $87 for applicable facilities. This requirement does not represent a significant change from the previous permit, just an additional cost above the baseline of the rule.

Protective devices for tanks: Facilities not operating under NPDES or State Waste Discharge Permits will be required to place bollards or similar devices to protect tanks. The estimated cost is from $350 to $750 for two bollards.

Sampling and analysis costs for facilities with surface impoundments. The permit will require facilities with surface impoundments to sample once for pollutants during the first two years of the permit, if they have not sampled since September 4, 2019. The estimated cost is from $1,247 to $1,688 dollars. The cost includes the acquisition of a small boat, sludge sampler, and staff time to perform the work. This cost also includes the staff time to provide an annual estimate of remaining capacity.

Legal Basis for the General Permit

Washington's biosolids program is authorized by state laws in Chapter 70A.226 RCW[21]. The law establishes biosolids as a valuable commodity and directs Ecology to maximize beneficial use while protecting human health and the environment. Ecology developed rules for the state biosolids program in Chapter 173-308 WAC Biosolids Management based on federal rules in 40 CFR 503. The rules apply to biosolids treated, stored, transferred, applied to the land, or disposed of in the state. The purpose of the general permit is to implement the requirements of Chapter 173-308 WAC and additional or more stringent requirements as needed. Ecology uses accepted best management practices from state guidelines and other authoritative sources in establishing additional or more stringent requirements for individual facilities.

Conditions Set in the General Permit

The general permit implements the requirements of Chapter 173-308 WAC, and may (does) contain additional or more stringent requirements beyond those in the rule. After review of a complete application, Ecology may impose additional or more stringent requirements for an individual facility as a condition of final approval of coverage. This allows Ecology to consider site-specific variables such as topography, climate, and surrounding lands in the permitting process.

Compliance Schedule

Ecology may establish compliance schedules for individual facilities in accordance with WAC 173-308-310(16) except mandatory requirements under the Clean Water Act or state statutes.

More information

https://ecology.wa.gov/Biosolids-permit-actions

Contact information

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360-789-6592
Emily.Kijowski@ecy.wa.gov

Kyle Dorsey
State Biosolids Coordinator
360-407-6559
Kyle.Dorsey@ecy.wa.gov

ADA Accessibility

To request an ADA accommodation, contact Ecology by phone at 360-407-6900 or SWMpublications@ecy.wa.gov, or visit https://ecology.wa.gov/accessibility. For Relay Service or TTY call 711 or 877-833-6341

[21] https://app.leg.wa.gov/RCW/default.aspx?cite=70A.226

Facility List

Find your facility name below to confirm what sections of the permit your facility is subject to. Contact your regional coordinator with questions.

Permit	Facility Name	Permit Section(s)
BT8054	33575 PARK LAKE LAG (LAURENTS SUN VILLAGE RESORT LAG)	Baseline
BA0037192	ABERDEEN WWTP	Baseline, Active Biosolids
BT0501	ACE ACME SEPTIC	Baseline, Active Biosolids
BT1203	AIRWAY HEIGHTS WRP	Baseline
BA0022608	ALBION WWTP	Baseline
BA0002950	ALCOA INTALCO WORKS	Baseline
BA0000680	ALCOA WENATCHEE WORKS	Baseline, Active Biosolids
BT6035	ALDER LAKE PARK WWTP	Baseline
BA0037753	ALDERBROOK RESORT	Baseline
BA0020826	ALDERWOOD PICNIC POINT WWTF	Baseline, Active Biosolids
BT5295	ALMIRA WWTP	Baseline
BA0020257	ANACORTES WWTP	Baseline
BA0022560	ARLINGTON WWTP	Baseline, Active Biosolids
BA0020818	ASOTIN WWTF	Baseline
BT0516	B AND B SEPTIC SMF	Baseline, Active Septage
BT0511	BACK LAND TEE PEE SEPTIC SERVICES SMF	Baseline, Active Septage
BA0020907	BAINBRIDGE ISLAND WINSLOW WWTP	Baseline
BT1006	BARR-TECH COMPOSTING FACILITY	Baseline, Active Biosolids
BA0023744	BELLINGHAM POST POINT WWTP	Baseline
BA0051349	BENTON CITY WWTP	Baseline
BA0022373	BINGEN WHITE SALMON WWTP	Baseline, Active Biosolids
BT9901	BIORECYCLING LSP CENTRALIA	Baseline, Active Biosolids
BT9908	BIORECYCLING LSP NORTH RANCH	Baseline, Active Biosolids
BA0029556	BIRCH BAY WS DIST	Baseline
BT9907	BISHOP SANITATION SMF	Baseline, Active Septage
BT1007	BLAINE LIGHTHOUSE POINT WRF	Baseline
BT0518	BOULDER PARK BUF	Baseline, Active Biosolids
BA0029289	BREMERTON WESTSIDE WWTP	Baseline, Active Biosolids
BA0021008	BREWSTER WWTP	Baseline, Active Biosolids
BA0024066	BRIDGEPORT WWTP	Baseline, Active Biosolids
BT0514	BS PUMPERS SMF	Baseline, Active Septage
BA0023361	BUCKLEY WWTP	Baseline, Active Biosolids
BA0020150	BURLINGTON WWTP	Baseline, Active Biosolids
BA0020249	CAMAS WWTP	Baseline, Active Biosolids
BA0020834	CARBONADO WWTP	Baseline, Active Biosolids
BA0037915	CARLYON BEACH WWTP	Baseline
BT5139	Carnation Farms WWTP	Baseline
BA0023183	CASHMERE WWTP	Baseline, Active Biosolids
BA0022683	CASTLE ROCK WWTP	Baseline, Active Biosolids

Permit	Facility Name	Permit Section(s)
BA0022667	CATHLAMET WWTP	Baseline, Active Biosolids
BA0020982	CENTRALIA WWTP	Baseline, Active Biosolids
BA0021105	CHEHALIS REG WRF	Baseline, Active Biosolids
BA0052175	CHELAN CO PESHASTIN WWTP	Baseline, Active Biosolids
BA0052094	CHELAN CO PUD NO 1 LAKE WENATCHEE WWTP	Baseline
BA0020605	CHELAN WWTP	Baseline, Active Biosolids
BT1004	CHENEY SEPTIC SERVICES SMF	Baseline, Active Septage
BA0020842	CHENEY WWTP	Baseline, Active Biosolids
BA0037079	CHERRYWOOD MOBILE HOME MANOR	Baseline
BA0023604	CHEWELAH WWTP	Baseline, Active Biosolids
BT9206	CHEYNE LANDFILL SEPTAGE LAG	Baseline, Active Septage
BA0024431	CLALLAM BAY POTW	Baseline
BA0023639	CLARK CO SALMON CREEK WWTP	Baseline, Active Biosolids
BA0021113	CLARKSTON WWTP	Baseline
BT5392	CLAYTON SEWER SYSTEM WWTP	Baseline
BA0021938	CLE ELUM UPPER KITTITAS CO REG WWTP	Baseline
BT0506	CLEARWATER TECH SMF	Baseline, Active Septage
BA0020613	COLFAX WWTP	Baseline
BA0020656	COLLEGE PLACE WWTP	Baseline, Active Biosolids
BA0023175	COLTON WWTF	Baseline
BA0022616	COLVILLE WWTP	Baseline
BT5529	COMMUNITY WS DIST WWTP	Baseline
BT5528	CONCONULLY WWTP	Baseline
BA0020851	CONCRETE WWTP	Baseline
BT5342	CONNELL WWTP	Baseline
BA0020711	COULEE CITY WWTF	Baseline
BT0905	COULEE DAM WWTP	Baseline, Active Biosolids
BA0029378	COUPEVILLE WWTP	Baseline
BA0052396	COWICHE REG WWTP	Baseline, Active Biosolids
BA0038695	COWLITZ CO RYDERWOOD WWTP	Baseline, Active Biosolids
BA0037770	COWLITZ CO TOUTLE WWTP	Baseline, Active Biosolids
BA0023975	COWLITZ CO WOODBROOK WWTP	Baseline
BT1105	COWLITZ INDIAN TRIBAL HOUSING	Baseline
BT0117	COWLITZ TRIBE WRP	Baseline, Active Septage
BT5277	CRESCENT BAR ISLAND WWTF	Baseline, Active Biosolids
BT8021	CRESTON WWTP	Baseline
BT5073	CRYSTAL MOUNTAIN WWTP	Baseline
BT5396	CURLEW JOB CORPS WWTP	Baseline
BT8025	CUSICK WWTP	Baseline
BA0045578	DAVENPORT WWTP	Baseline
BA0020729	DAYTON WWTP	Baseline, Active Biosolids
BT8016	DEER PARK WWTP	Baseline

Permit	Facility Name	Permit Section(s)
BA0020958	DES MOINES CREEK WWTP	Baseline, Active Biosolids
BT8029	DIAMOND LAKE WS WWTP	Baseline
BA0020621	DOUGLAS CO SD NO 1 WWTP	Baseline, Active Biosolids
BA0029513	DUVALL WWTP	Baseline, Active Biosolids
BA0030571	EASTSOUND SW DIST WWTP	Baseline
BA0037231	EATONVILLE WWTP	Baseline
BA0024058	EDMONDS WWTP	Baseline
BA0024341	ELLENSBURG WWTP	Baseline, Active Biosolids
BA0023132	ELMA STP	Baseline, Active Biosolids
BT0903	ELYSIAN FIELDS BUF	Baseline, Active Biosolids
BA0023981	ENDICOTT WWTP	Baseline
BA0051276	ENTIAT WWTP	Baseline, Active Biosolids
BA0020575	ENUMCLAW WWTP	Baseline, Active Biosolids
BT8031	EPHRATA WRP	Baseline, Active Biosolids
BA0024490	EVERETT WPCF	Baseline, Active Biosolids
BA0020435	EVERSON WWTP	Baseline
BT0806	EXPRESS SEPTIC SMF	Baseline, Active Septage
BA0045489	FAIRFIELD WWTP	Baseline, Active Biosolids
BT5344	FARMINGTON WWTP	Baseline
BA0022454	FERNDALE WWTP	Baseline, Active Biosolids
BT9902	FIRE MOUNTAIN FARMS BUF	Baseline, Active Biosolids
BA0030589	FISHERMAN BAY SD WWTP	Baseline
BT6031	FORKS WWTP	Baseline, Active Biosolids
BA0045403	FREEMAN SCHOOL DIST NO 358 WWTP	Baseline
BA0023582	FRIDAY HARBOR WWTF	Baseline
BA0044822	GARFIELD WWTP	Baseline
BT8062	GEORGE WWTP	Baseline
BA0023957	GIG HARBOR WWTP	Baseline
BA0021121	GOLDENDALE WWTP	Baseline
BA0044857	GRAND COULEE ELECTRIC CITY WWTP	Baseline, Active Biosolids
BA0052205	GRANDVIEW WWTP	Baseline, Active Biosolids
BA0022691	GRANGER WWTP	Baseline, Active Biosolids
BA0021130	GRANITE FALLS WWTP	Baseline, Active Biosolids
BA0037095	GRAYS HARBOR CO PACIFIC BEACH WWTP	Baseline
BT9903	GROCO COMPOST FACILITY	Baseline, Active Biosolids
BA0045462	HARRINGTON WWTP	Baseline
BA0038377	HARTSTENE POINTE WWTP	Baseline
BT0907	HAYDEN AREA REG SEWER BOARD WWTP	Baseline, Active Biosolids
BT0405	HERRIMAN SPEEDY TANK SERVICE SMF	Baseline, Active Septage
BT9912	HOLDEN VILLAGE SMF	Baseline, Active Septage
BT7373	HOLMES HARBOR SD WWTP	Baseline
BA0020915	HOQUIAM WWTP	Baseline, Active Biosolids

Permit	Facility Name	Permit Section(s)
BA0023159	ILWACO WWTF	Baseline, Active Biosolids
BA0045373	IONE WWTP	Baseline
BT9905	ISLAND CO WWTP	Baseline, Active Biosolids
BT1003	J AND J FARMING SMF	Baseline, Active Septage
BT0206	JA WRIGHT CONSTRUCTION SMF	Baseline, Active Septage
BA0021954	JBLM SOLO POINT WWTP	Baseline, Active Biosolids
BT0006	JIMS PUMPING SERVICES SMF	Baseline, Active Septage
BT0505	JOHNSON SEPTIC SMF	Baseline, Active Septage
BA0020320	KALAMA WWTP	Baseline
BA0044784	KENNEWICK WWTP	Baseline, Active Biosolids
BT5297	KETTLE FALLS WWTP	Baseline
BT1106	KING CO BRIGHTWATER WWTP	Baseline, Active Biosolids
BT0804	KING CO CARNATION WWTP	Baseline
BA0029581	KING CO SOUTH WWTP	Baseline, Active Biosolids
BA0022527	KING CO VASHON WWTP	Baseline
BA0029181	KING CO WEST POINT WWTP	Baseline, Active Biosolids
BA0030520	KITSAP CO CENTRAL KITSAP WWTP	Baseline, Active Biosolids
BA0032077	KITSAP CO KINGSTON WWTP	Baseline
BA0023701	KITSAP CO MANCHESTER WWTP	Baseline
BA0030317	KITSAP CO SD NO 7 FORT WARD WWTP	Baseline, Active Biosolids
BT9208	KITTITAS CO RYEGRASS LAG SMF	Baseline, Active Septage
BA0050474	KITTITAS CO WD NO 6 VANTAGE WWTP	Baseline, Active Biosolids
BA0021253	KITTITAS WWTP	Baseline
BT9226	KLICKITAT CO DALLESPORT WWTP	Baseline, Active Biosolids
BT9064	KLICKITAT CO GLENWOOD WWTP	Baseline
BA0023698	KLICKITAT CO KLICKITAT WWTP	Baseline, Active Septage
BA0050482	KLICKITAT CO LYLE WWTP	Baseline
BT0205	KLICKITAT CO ROOSEVELT WWTP	Baseline
BA0051292	KLICKITAT CO WISHRAM WWTP	Baseline, Active Biosolids
BA0023230	LA CENTER WWTP	Baseline, Active Biosolids
BA0022446	LA CONNER WWTP	Baseline, Active Biosolids
BT5345	LACROSSE WWTP	Baseline
BA0020893	LAKE STEVENS SD WWTP	Baseline, Active Biosolids
BA0022624	LAKEHAVEN LAKOTA WWTP	Baseline, Active Biosolids
BA0023451	LAKEHAVEN REDONDO WWTP	Baseline, Active Biosolids
BA0020702	LANGLEY WWTP	Baseline, Active Biosolids
BA0020974	LEAVENWORTH WWTP	Baseline, Active Biosolids
BA0024546	LEWIS CO WD NO 2 ONALASKA WWTP	Baseline
BA0037141	LEWIS CO WD NO 6 MOSSYROCK WWTP	Baseline
BA0045144	LIBERTY LAKE WRF	Baseline, Active Biosolids
BT5397	LIBERTY SCHOOL DIST NO 362 WWTP	Baseline
BT0531	LIL JOHN SANITARY SERVICE SMF	Baseline, Active Septage

Permit	Facility Name	Permit Section(s)
BA0021237	LIND WWTP	Baseline
BA0022489	LONG BEACH WWTP	Baseline, Active Biosolids
BT8019	LOON LAKE SD NO 4 WWTP	Baseline
BA0037061	LOTT CLEAN WATER ALLIANCE BUDD INLET WWTP	Baseline, Active Biosolids
BA0022578	LYNDEN WWTP	Baseline, Active Biosolids
BA0024031	LYNNWOOD WWTP	Baseline
BA0020648	MABTON WWTP	Baseline, Active Biosolids
BT9109	MANSFIELD WWTP	Baseline
BA0022497	MARYSVILLE WWTP	Baseline, Active Biosolids
BT6224	MASON CO BELFAIR WRF	Baseline
BT6039	MASON CO NORTH BAY CASE INLET WWTP	Baseline
BA0038075	MASON CO RUSTLEWOOD WWTP	Baseline
BT8066	MATTAWA WWTP	Baseline
BA0024040	MCCLEARY WWTF	Baseline, Active Biosolids
BA0021148	MEDICAL LAKE WWTP	Baseline
BT5337	MESA WWTP	Baseline
BA0023469	MESSENGER HOUSE WWTP	Baseline
BA0021156	METALINE FALLS WWTP	Baseline
BA0020699	METALINE WWTP	Baseline
BT0204	METHOW VALLEY SEPTIC SMF	Baseline, Active Septage
BA0020486	MONROE WWTP	Baseline, Active Biosolids
BA0024660	MONTESANO WWTP	Baseline
BT0906	MORGAN AND SON SMF	Baseline, Active Septage
BA0022659	MORTON WWTP	Baseline, Active Biosolids
BT8012	MOSES LAKE DUNES WWTP	Baseline, Active Biosolids
BT8024	MOSES LAKE LARSON WWTP	Baseline, Active Biosolids
BA0021024	MOSSYROCK WWTP	Baseline, Active Biosolids
BA0024074	MOUNT VERNON WWTP	Baseline, Active Biosolids
BT9916	MT RAINIER NP LONGMIRE WWTP	Baseline
BT9915	MT RAINIER NP OHANAPECOSH WWTP	Baseline
BT9917	MT RAINIER NP PARADISE WWTP	Baseline
BT9918	MT RAINIER NP TAHOMA WOODS WWTP	Baseline
BA0023396	MULKITEO BIG GULCH WWTF	Baseline, Active Biosolids
BT8041	MULLEN HILLS TERRACE MHP WWTP	Baseline
BT9139	N CASCADES NP STEHEKIN DIST WWTP	Baseline
BA0022586	NACHES WWTP	Baseline, Active Biosolids
BT9904	NATURAL SELECTION FARMS BUF	Baseline, Active Biosolids
BA0029670	NEWHALEM WWTP	Baseline
BA0022322	NEWPORT WWTP	Baseline
BA0029351	NORTH BEND WWTP	Baseline
BA0023388	NORTH BONNEVILLE WWTP	Baseline, Active Biosolids
BT0504	NORTHWEST CASCADE PACIFIC FACILITY SMF	Baseline, Active Septage

Permit	Facility Name	Permit Section(s)
BA0020567	OAK HARBOR WWTP	Baseline, Active Biosolids
BA0044792	OAKESDALE WWTP	Baseline
BA0023817	OCEAN SHORES WWTP	Baseline, Active Biosolids
BA0045560	ODESSA WWTP	Baseline
BA0022365	OKANOGAN WWTP	Baseline, Active Biosolids
BT1801	OLYMPIC AG BUF	Baseline, Active Biosolids
BT9920	OLYMPIC NP BARNES POINT WWTP	Baseline
BT0410	OLYMPIC NP KALALOCH WWTP	Baseline
BT9919	OLYMPIC NP LOG CABIN WWTP	Baseline
BA0021202	OLYMPIC WS PORT LUDLOW WWTP	Baseline, Active Biosolids
BA00209040	OMAK WWTP	Baseline, Active Biosolids
BA0030911	ORCAS VILLAGE SD STP	Baseline
BA0022390	OROVILLE WWTP	Baseline, Active Biosolids
BA0020303	ORTING WWTP	Baseline, Active Biosolids
BA0022357	OTHELLO WWTP	Baseline
BT0003	OVERLOOK FARMS SMF	Baseline, Active Septage
BA0044806	PALOUSE WWTP	Baseline, Active Biosolids
BA0044962	PASCO WWTP	Baseline, Active Biosolids
BA0020559	PATEROS WWTP	Baseline, Active Biosolids
BA0020192	PE ELL WWTP	Baseline, Active Biosolids
BA0029386	PENN COVE WS DIST WWTP	Baseline
BT0508	PEONE PINES WWTP	Baseline
BA0039624	PIERCE CO CHAMBERS CREEK REG WWTP	Baseline, Active Biosolids
BT6215	PIERCE CO TEHALEH CASCADIA WWTP	Baseline
BA0021164	POMEROY WWTP	Baseline
BT1104	PONDORAY SHORES WS DIST	Baseline
BA0023973	PORT ANGELES WWTP	Baseline
BA0022292	PORT GAMBLE RESOURCE RECOVERY FACILITY	Baseline
BA0040843	PORT OF KALAMA WWTP	Baseline
BA0000922	PORT TOWNSEND PAPER CORP WWTP	Baseline
BA0037052	PORT TOWNSEND WWTP	Baseline
BT1005	POST FALLS WRF	Baseline
BA0020800	PROSSER WWTP	Baseline, Active Biosolids
BA0044652	PULLMAN WWTP	Baseline, Active Biosolids
BA0037168	PUYALLUP WPCP	Baseline, Active Biosolids
BT5278	QUINCY WWTP	Baseline, Active Biosolids
BA0045306	REARDAN WWTP	Baseline
BT8020	REPUBLIC WWTP	Baseline
BA0020419	RICHLAND WWTP	Baseline, Active Biosolids
BA0023272	RIDGEFIELD WWTP	Baseline
BT5395	RIMROCK COVE WWTP	Baseline
BT8028	RITZVILLE STP	Baseline

Permit	Facility Name	Permit Section(s)
BA0021822	ROCHE HARBOR WWTP	Baseline, Active Biosolids
BA0501487	ROCK ISLAND WWTP	Baseline, Active Biosolids
BA0044831	ROCKFORD WWTP	Baseline
BA0044687	ROSALIA WWTP	Baseline
BA0029891	ROSARIO WWTP	Baseline
BT5294	ROYAL CITY WRF	Baseline, Active Biosolids
BT0501294	SACHEEN LAKE LID NO 3 WWTP	Baseline
BT5046	SATSOP BUSINESS PARK WWTP	Baseline
BT0502	SCOTT SEPTIC AND RENTALS SMF	Baseline, Active Septage
BA0037273	SEASHORE VILLA WWTP	Baseline
BA0041131	SEDRON SERVICES SUMNER SMF	Baseline, Active Biosolids
BA0023752	SEDRO-WOOLLEY WWTP	Baseline, Active Biosolids
BA0024449	SEKIU SD POTW	Baseline
BA0021032	SELAH WWTP	Baseline, Active Biosolids
BA0044938	SELKIRK WWTP	Baseline
BA0022349	SEQUIM WRF	Baseline, Active Biosolids
BT5373	SEVEN BAYS ESTATES WWTP	Baseline
BT0201	SHAGGYPLUM SMF	Baseline, Active Septage
BT0805	SHANNON TJOELKER BUF	Baseline, Active Biosolids
BT1102	SHELTON SATELLITE WRF	Baseline
BA0023345	SHELTON WWTP	Baseline, Active Biosolids
BT0519	SHORT SEPTIC SERVICE SMF	Baseline, Active Septage
BA0030597	SKAGIT CO SD NO 2 BIG LAKE WWTP	Baseline
BA0029548	SNOHOMISH WWTP	Baseline
BT9005	SNOQUALMIE PASS UD WWTP	Baseline
BA0022403	SNOQUALMIE WWTP AND WRF	Baseline, Active Biosolids
BT8039	SNOWBLAZE CONDOS WWTP	Baseline
BT5282	SOAP LAKE WWTP	Baseline, Active Biosolids
BA0020346	SOUTH KITSAP WRF	Baseline, Active Biosolids
BA0040479	SOUTH PRAIRIE WATER POLN CONTROL PLANT	Baseline
BA0045471	SPANGLE WWTP	Baseline
BT8045	SPOKANE CO LATAH CREEK WWTP	Baseline
BT1103	SPOKANE CO REG WRF	Baseline
BA0024473	SPOKANE RIVERSIDE PARK WRF	Baseline, Active Biosolids
BT5383	SPRAGUE WWTP	Baseline
BT5385	SPRINGDALE WWTP	Baseline
BA0021229	ST JOHN WWTP	Baseline
BA0020290	STANWOOD WWTP	Baseline, Active Biosolids
BA0039152	STELLA WWTP	Baseline
BT5394	STEPTOE SD NO 1 WWTP	Baseline
BT8084	STEVENS CO ADDY BLUE CREEK WWTP	Baseline
BT8056	STEVENS CO WAITTS LAKE VALLEY STP SMF	Baseline, Active Septage

Permit	Facility Name	Permit Section(s)
BA0029521	STEVENS PASS SD WWTP	Baseline
BA0020672	STEVENSON WWTP	Baseline
BA0023302	SULTAN WWTP	Baseline, Active Biosolids
BA0023353	SUMNER WWTP	Baseline, Active Biosolids
BT6003	SUNLAND WD WRF	Baseline
BA0020991	SUNNYSIDE WWTF	Baseline, Active Biosolids
BT1201	SUNSET MOBILE HOME COURT WWTP	Baseline
BA0023256	SUQUAMISH WWTP	Baseline
BA0022764	SW SUBURBAN MILLER CREEK WWTP	Baseline, Active Biosolids
BA0022772	SW SUBURBAN SD SALMON CREEK WWTP	Baseline, Active Biosolids
BA0024422	SWINOMISH TRIBAL SHELTER BAY	Baseline
BA0037087	TACOMA CENTRAL WWTP NO 1	Baseline, Active Biosolids
BA0037214	TACOMA NORTHEND PWTP NO 3	Baseline
BT1301	TAKESA VILLAGE HOMEOWNERS COOP WWTP	Baseline
BA0037656	TAYLOR BAY BEACH CLUB WWTP	Baseline
BA0023141	TEKOA WWTP	Baseline
BT0526	TENELCO BUF	Baseline, Active Biosolids
BT0101	TENELCO SMF	Baseline, Active Septage
BT1001	TENINO WRF	Baseline, Active Biosolids
BT0705	THE SHEEP CAMP SMF	Baseline, Active Septage
BA0037799	THREE RIVERS REG WWTP	Baseline, Active Biosolids
BA0040291	THURSTON CO BOSTON HARBOR WWTF	Baseline
BA0042099	THURSTON CO GRAND MOUND WWTF	Baseline, Active Biosolids
BA0037290	THURSTON CO TAMOSHAN WWTP	Baseline
BT9911	TJOELKER ENTERPRISES BUF	Baseline, Active Biosolids
BA0036986	TOLEDO WWTP	Baseline, Active Biosolids
BT9104	TONASKET WWTP	Baseline
BT0521	TOPPENISH WWTP	Baseline, Active Biosolids
BT0803	TRIBECA TRANSPORT BUF	Baseline, Active Biosolids
BA0023370	TWISP WWTP	Baseline, Active Biosolids
BT0005	UFO CORP NW WW PUMPING SERVICE SMF	Baseline, Active Septage
BT5371	UNIONTOWN WWTF	Baseline
BT8034	UPPER COLUMBIA ACADEMY WWTP	Baseline
BA0021083	VADER WWTF	Baseline, Active Biosolids
BA0024368	VANCOUVER MARINE PARK WWTP	Baseline
BA0024350	VANCOUVER WESTSIDE WWTF	Baseline
BA0023728	WA DCYF NASELLE YOUTH CAMP WWTP	Baseline
BA0037737	WA DOC CEDAR CREEK WWTP	Baseline, Active Biosolids
BA0039845	WA DOC CLALLAM BAY WWTP	Baseline
BA0038687	WA DOC LARCH WWTP	Baseline, Active Biosolids
BA0040002	WA DOC MCNEIL ISLAND WWTP	Baseline, Active Biosolids
BA0030066	WA DOC MONROE HONOR FARM WWTP	Baseline

Permit	Facility Name	Permit Section(s)
BT0517	WA DOC MONROE WWTP	Baseline, Active Biosolids
BA0038938	WA DOC OLYMPIC WWTP	Baseline, Active Biosolids
BA0414	WA SP BROOKS MEMORIAL WWTP	Baseline
BT6251	WA SP DOSEWALLIPS WWTP	Baseline
BA0038709	WA SP FORT COLUMBIA WWTP	Baseline
BA0037282	WA SP FORT FLAGLER WWTP	Baseline, Active Biosolids
BA0023787	WA SP LARRABEE WWTP	Baseline, Active Biosolids
BA0413	WA SP LINCOLN ROCK WWTP	Baseline
BT6160	WA SP MILLERSYLVANIA WWTP	Baseline
BT9255	WA SP PEARRYGIN LAKE LAG	Baseline
BA0412	WA SP POTHOLES WWTP	Baseline
BA0411	WA SP STEAMBOAT ROCK WWTP	Baseline
BA0410	WA SP SUN LAKES WWTP	Baseline
BA0045551	WAITSBURG WWTP	Baseline, Active Biosolids
BT0513	WALKER SEPTIC SERVICE SMF	Baseline, Active Septage
BT8040	WALLA WALLA WD NO 2 WWTP	Baseline
BA0024627	WALLA WALLA WWTP	Baseline, Active Biosolids
BA0050229	WAPATO WWTP	Baseline, Active Biosolids
BT0045509	WARDEN HUTTERIAN BRETHREN WWTP	Baseline
BT5380	WARDEN WRF	Baseline, Active Biosolids
BA0029904	WARM BEACH CAMPGROUND WWTP	Baseline
BA0037427	WASHOUGAL WWTP	Baseline, Active Biosolids
BT5361	WASHTUCNA WWTP	Baseline
BT9000	WATERVILLE WWTP	Baseline
BA0023949	WENATCHEE WWTP	Baseline, Active Biosolids
BT1802	WEST LINCOLN PROJECT BUF	Baseline, Active Biosolids
BA0051063	WEST RICHLAND NORTH WWTP	Baseline
BA0020923	WESTPORT WWTP	Baseline, Active Biosolids
BT7367	WHATCOM CO WD NO 13 WWTP	Baseline, Active Biosolids
BA0044920	WILBUR WWTP	Baseline
BA0023281	WILKESON WWTP	Baseline
BA0041041	WILLAPA REG WWTF	Baseline, Active Biosolids
BT0532	WILLIAMS LAKE SD NO 2	Baseline
BA0021199	WINLOCK WWTP	Baseline, Active Biosolids
BA0020885	WINTHROP WWTP	Baseline
BA0020401	WOODLAND WWTP	Baseline, Active Biosolids
No permit # yet	WSP FIRE TRAINING ACADEMY WWTP	Baseline
BA0052132	YAKIMA CO BUENA WWTP	Baseline, Active Biosolids
BA0024023	YAKIMA REG WWTF	Baseline, Active Biosolids
BA0021962	YAKIMA TRAINING CENTER WWTP	Baseline
BA0040762	YELM WRF	Baseline
BA0020168	ZILLAH WWTP	Baseline, Active Biosolids

EXHIBIT O

POLLUTION CONTROL HEARINGS BOARD

STATE OF WASHINGTON

NISQUALLY DELTA ASSOCIATION, a non-profit organization, and ED KENNEY, Appellants, v. STATE OF WASHINGTON DEPARTMENT OF ECOLOGY, Appellee.	PCHB No. 22-057 DECLARATION OF DENISE TRABBIC-POINTER

Denise Trabbic-Pointer hereby declares as follows:

1. I make this declaration based on personal knowledge.

2. My report filed in this matter on May 12, 2023, is true and correct to the best of my knowledge.

I declare under penalty of perjury under the laws of the State of Washington that the foregoing is correct.

Signed at East China, Michigan, this 12th day of June, 2023.

Denise Trabbic-Pointer

ZIONTZ CHESTNUT
2101 FOURTH AVENUE, SUITE 1230
SEATTLE, WASHINGTON 98121
TEL. (206) 448-1230; FAX (206) 448-1230

CERTIFICATE OF SERVICE

I certify that on June 12, 2023, I served a copy of the foregoing Declaration of Denise Trabbic-Pointer upon the parties as indicated below:

Jonathan C. Thompson
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Via Email

Dylan Stonecipher
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Via Email

Dated this 12th day of June, 2023.

/s/Laura Bartholet
Paralegal/Legal Assistant

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EXHIBIT P

POLLUTION CONTROL HEARINGS BOARD

STATE OF WASHINGTON

NISQUALLY DELTA ASSOCIATION, a non-profit organization, and ED KENNEY, Appellants, v. STATE OF WASHINGTON DEPARTMENT OF ECOLOGY, Appellee.	PCHB No. 22-057 DECLARATION OF ROBERT C. HALE

Robert C. Hale hereby declares as follows:

1. I make this declaration based on personal knowledge.

2. My report filed in this matter on May 12, 2023, is true and correct to the best of my knowledge.

I declare under penalty of perjury under the laws of the State of Washington that the foregoing is correct.

Signed at ___Barhamsville_____, Virginia, this 12th day of June, 2023.

Robert C. Hale

Robert C. Hale

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CERTIFICATE OF SERVICE

I certify that on June 12, 2023, I served a copy of the foregoing Declaration of Robert C. Hale upon the parties as indicated below:

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Via Email

Dated this 12th day of June, 2023.

/s/ Laura Bartholet
Paralegal/Legal Assistant

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