

**TOWNSHIP OF PLAINFIELD,
NORTHAMPTON COUNTY, PENNSYLVANIA
ORDINANCE NO. 419**

**AN ORDINANCE OF THE TOWNSHIP OF PLAINFIELD, NORTHAMPTON COUNTY,
PENNSYLVANIA, AMENDING THE CODE OF ORDINANCES OF THE TOWNSHIP
OF PLAINFIELD, CHAPTER 18 (SEWERS AND SEWAGE DISPOSAL), TO CREATE A
NEW ARTICLE 3 ENTITLED SEWAGE SLUDGE, TO REGULATE THE LAND
APPLICATION OF SEWAGE SLUDGE AND TO PROVIDE PENALTIES FOR
VIOLATING THIS ORDINANCE AND WHICH ORDINANCE INCLUDES
SOURCES FOR THE LEGISLATIVE FINDINGS WHICH SOURCES ARE
INCORPORATED HEREIN AND ATTACHED HERETO AS EXHIBIT "A".**

NOW THEREFORE, be it enacted and ordained by the Board of Supervisors of Plainfield Township, Northampton County, Pennsylvania, as follows:

§ 18-301 Title.

The name of this Part shall be the "Plainfield Township Sewage Sludge Land Application Ordinance."

§ 18-302 Authorization.

This Part is authorized by the Pennsylvania Constitution, Article 1, Section 27 and the Second Class Township Code, 53 P.S. § 65101 et seq., which together authorize townships to make and adopt ordinances necessary for the proper management, care, and control of the township; the maintenance of the health and welfare of the township and its citizens; and the conservation and maintenance of the Commonwealth's public natural resources, including its lands, waters, air, and wildlife, for the benefit of all people.

§ 18-303 Statement of Findings.

Environmental Rights, Public Health and Welfare, and the Land Application of Sewage Sludge.

The Board of Supervisors of Plainfield Township finds that:

- A. The Environmental Rights Amendment set out at Article 1, Section 27 of the Pennsylvania Constitution provides that "[t]he people have a right to clean air, pure water, and to the preservation of the natural, scenic, historic and esthetic values of the environment. Pennsylvania's public natural resources are the common property of all the people, including generations yet to come. As trustee of these resources, the Commonwealth shall conserve and maintain them for the benefit of all the people."
- B. The Amendment imposes upon all branches and levels of government a trustee obligation to prevent, remedy, and refrain from permitting or encouraging the degradation, diminution, or depletion of the Commonwealth's public natural resources, including its lands, waters, air, and wildlife.

- C. Pursuant to Article XV, Section 1506 of the Second Class Township Code, the Township of Plainfield may make and adopt any ordinance necessary for the proper management, care, and control of the township and the maintenance of the health and welfare of the township and its citizens.
- D. Pursuant to the Environmental Rights Amendment and the Second Class Township Code, the Township is authorized to make and adopt any ordinance necessary for preventing and remedying the degradation of the Township's natural resources, including its lands, waters, air, and wildlife, and protecting the health and welfare of its citizens.
- E. Under the Environmental Rights Amendment and Second Class Township Code, the Township has the authority to prevent contamination of its drinking water and to protect its residents from the health risks posed by PFAS and other pollutants.
- F. In some circumstances, the land application of sewage sludge within the Township jeopardizes the Township's natural resources and its citizens' health and welfare.

PFAS Threaten Public Health and Welfare.

- G. Per- and polyfluoroalkyl substances (PFAS) are a large class of widely used, long lasting chemicals, which can take thousands of years to break down in the environment.
- H. Because PFAS are long lasting and highly persistent, it is extremely difficult and expensive to control or reverse PFAS contamination once it occurs.
- I. It often takes people and animals a long time to eliminate PFAS from their bodies, meaning that exposures to PFAS can accumulate over time.
- J. Exposure even to low levels of PFAS is associated with significant harmful health effects in humans and animals, including cancer, developmental harm, reproductive harm, immune system toxicity, liver toxicity, thyroid toxicity, kidney toxicity, infant motor impairments, metabolic disorders, and non-alcoholic fatty liver disease.
- K. People are continuously exposed to a range of different PFAS, including mixtures of PFAS, throughout their lifetimes, creating the potential for cumulative harm that worsens the effect on impacted individuals and communities.
- L. Food and drinking water are major sources of human exposure to PFAS.
- M. PFAS also can become airborne, and inhalation is a significant route of human exposure to PFAS.
- N. Livestock, fish, and wildlife, including game species, may become contaminated with PFAS through contact with PFAS-contaminated air, water, soil, and food.

- O. The consumption of PFAS-contaminated food, including livestock, fish, and game, poses a risk to human health, such that multiple states and other authorities have warned people to avoid or limit consumption of potentially contaminated livestock, fish, and game.
- P. PFAS contamination of a drinking water well can render that water unsafe for decades.
- Q. Processes to remove PFAS from drinking water wells can be exorbitantly expensive and take decades.
- R. PFAS contamination in farmland and livestock can prevent farmers from selling their crops and animal products, threatening their livelihoods.
- S. PFAS contamination can decrease property values.

Sewage Sludge Contains PFAS and Other Pollutants that Contaminate Soil, Water, and Air.

- T. PFAS frequently are present in municipal and industrial wastewater, and therefore, PFAS-contaminated wastewater enters wastewater treatment plants (WWTPs).
- U. Conventional treatment methods at WWTPs do not remove or destroy PFAS. Instead, PFAS frequently persist throughout the treatment process and ultimately remain in sewage sludge, including both Class A and Class B biosolids.
- V. Scientific studies have documented the presence of PFAS in soils where sewage sludge has been land applied, and these studies have found certain PFAS in soils at concentrations ranging up to 483,000 parts per trillion (ppt).
- W. Crops take up PFAS from contaminated soil, and PFAS have been detected in crops intended for human and animal consumption.
- X. PFAS can leach from contaminated soil into groundwater, including groundwater used for potable water supply.
- Y. Runoff containing PFAS can reach surface waters such as rivers and streams, exposing humans and animals to PFAS and further threatening drinking water.
- Z. PFAS can become airborne through evaporation and volatilization, as well as by adhering to dust particles that enter the air, exposing humans and animals.
- AA. Sewage sludge contains additional pollutants that pose threats to human health, including microplastics, heavy metals, pesticides, pharmaceuticals, and nutrients such as nitrogen and phosphorus.
- BB. Because sewage sludge contains PFAS and other pollutants, sewage sludge application can cause more harm to the environment and public health and welfare than conventional fertilizer application.

Federal Regulators Recognize that PFAS in Sewage Sludge Poses Threats to Public Health and Welfare.

- CC. In September 2020, the U.S. Environmental Protection Agency (EPA) presented research demonstrating that edible portions of crops grown in soil conventionally amended with municipal sewage sludge contained measurable levels of PFAS, including perfluorooctanoic acid (PFOA).
- DD. In November 2020, EPA held a stakeholder meeting concerning PFAS in biosolids at which the agency acknowledged that land application of sewage sludge creates *multiple pathways for human exposure to PFAS, including ingestion of contaminated produce, beef, fish, milk, and drinking water.*
- EE. In October 2021, EPA published a PFAS Strategic Roadmap in which it reiterated that land application of sewage sludge can lead to PFAS contamination in crops and livestock and committed to completing a risk assessment for PFOA and perfluorooctane sulfonic acid (PFOS) in biosolids by Winter 2024.
- FF. In December 2022, EPA recommended that WWTPs monitor influent, effluent, and biosolids for 40 different PFAS at least quarterly.
- GG. In April 2024, EPA finalized a rule that sets forth health-based maximum contaminant level goals for several PFAS in drinking water. The rule establishes “zero” as the level of PFOA and PFOS in drinking water at which there are no known or anticipated negative health effects, allowing for a margin of safety. The rule also establishes 10 ppt as the level of perfluorohexane sulfonate (PFHxS), perfluorononanoic acid (PFNA), and hexafluoropropylene oxide dimer acid (HFPO-DA) *below which no health effects are expected.*
- HH. The federal Safe Drinking Water Act and its implementing regulations, including regulations setting maximum contaminant levels for PFAS in drinking water, regulate only public drinking water systems, not private wells.
- II. Federal regulations governing land application of sewage sludge do not address PFAS contamination and thus do not adequately protect the public from exposure to PFAS in sewage sludge.

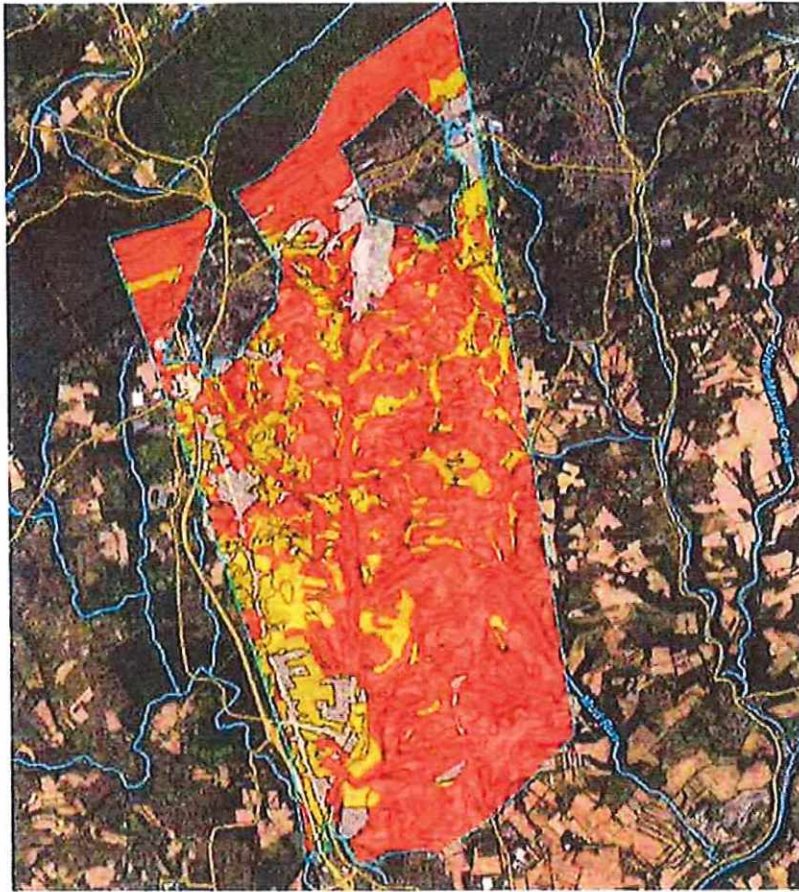
DEP Regulation Relating to PFAS in Sewage Sludge and Sewage Sludge Land Application.

- JJ. The Pennsylvania Department of Environmental Protection (DEP) recognizes that *sewage sludge is one of the primary means of distribution of PFAS throughout the environment.*
- KK. In 25 Pa. Code Chapters 271 and 275, DEP regulations set forth certain requirements governing the land application of sewage sludge in Pennsylvania.
- LL. DEP regulations do not require persons proposing the land application of sewage sludge to test the sewage sludge for PFAS before land application.

- MM. DEP regulations allow land application of sewage sludge irrespective of the level of PFAS in the sludge.
- NN. DEP regulations do not require persons who land apply sewage sludge to monitor for PFAS contamination following land application.
- OO. Despite EPA's December 2022 recommendation that WWTPs monitor influent, effluent, and biosolids for 40 different PFAS at least quarterly, DEP's recent revisions to its National Pollutant Discharge Elimination System Individual Industrial Wastewater permit require quarterly monitoring for only four of the 40 PFAS EPA identified.
- PP. Although DEP recently finalized a rule that sets maximum contaminant level goals for PFOA and PFOS in drinking water, DEP's levels of 8 ppt and 18 ppt, respectively, exceed EPA's maximum contaminant level goal of zero for both contaminants. DEP did not set maximum contaminant level goals for the four other PFAS in EPA's final rule.
- QQ. Technology exists to remove PFAS from wastewater.
- RR. To our knowledge, no technology proven to remove PFAS from wastewater is used at any WWTP in Pennsylvania.

Plainfield-Specific Factual Findings.

- SS. According to the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service's Web Soil Survey, which USDA considers its "single authoritative source of soil survey information," 64.6% of land within Plainfield Township has "very limited" suitability for land application of municipal sewage sludge.



Source: USDA Web Soil Survey (demarcating in red land in Plainfield Township with “very limited” suitability for land application of sewage sludge) (last visited April 5, 2024).

- QQ. The species range of the bog turtle (*Glyptemys muhlenbergii*), a Pennsylvania endangered species and a Federal threatened species that depends on wetland for its habitat, spans all of Plainfield Township.
- RR. Plainfield Township contains Exceptional Value Wetlands, a category of wetland that the Pennsylvania General Assembly has determined deserves special protection.
- SS. A survey of Pennsylvania surface waters found PFAS contamination in both of the Northampton County streams tested.
- TT. Many Plainfield Township residents rely on local fish and game for food.
- UU. Many Plainfield Township residents hunt deer whose range includes areas where land application of sewage sludge is proposed or could be proposed in the future.
- VV. Many Plainfield Township residents fish in rivers and streams near areas where land application of sewage sludge is proposed or could be proposed in the future.

The Sources for the legislative findings are incorporated herein and made a part hereof as Exhibit “A”

§ 18-304 Purpose.

It is the purpose of this ordinance to enable persons in the Township to realize their fundamental right to clean air and pure water; to preserve the natural, scenic, historic and esthetic values of the environment; to protect the health and welfare of residents of the Town of Plainfield; and to safeguard the economic wellbeing of the Town of Plainfield and its residents. The ordinance seeks to achieve this purpose by closing gaps in existing state and local laws, regulations, and ordinances governing sewage sludge land application in the Township of Plainfield, taking into account the unique features of the Township, including its soils, wildlife, and waters, and the vulnerabilities of persons who live, work, and recreate in the Township.

§ 18-305 Definitions.

Unless defined herein or the context otherwise requires, the terms and words used in this Ordinance shall have the same meaning as those defined in Title 35, Chapter 29A, Article I, Section 6018.103 of the Pennsylvania Statutes and in Title 25, Part I, Subpart D, Article VIII, Chapter 271, Section 271.1 of the Pennsylvania Code. As used in this Ordinance, these terms and words shall be defined as follows:

County means Northampton County, Pennsylvania.

DEP means the Pennsylvania Department of Environmental Protection.

Other authority means any Pennsylvania law, ordinance, regulation, or legally binding rule of any kind.

Prevailing party means a plaintiff or petitioner in a civil action authorized pursuant to Section 18-309 of this Ordinance in whose favor a final judgment is rendered in whole or in substantial part.

Resident means an individual natural person whose primary residence is in the Township of Plainfield.

Sewage means human excrement, industrial wastewater, storm water, and other types of wastewater piped, trucked, or otherwise conveyed to a wastewater treatment plant.

Sewage Sludge means any liquid or solid sludges and other residues from a municipal sewage collection and treatment system and any liquid or solid sludges and other residues from septic and holding tank pumping from commercial, institutional, or residential establishments. "Sewage sludge" includes materials derived from sewage sludge. "Sewage sludge" shall be considered synonymous with "biosolids."

Township means the Township of Plainfield. Whenever this Ordinance refers to any action which is to be taken or authorized by the "Township," the provisions shall be deemed to refer to the Board of Supervisors of Plainfield Township unless otherwise specified.

Wastewater Treatment Plant means a facility that collects sewage and industrial wastewater and treats the sewage and industrial wastewater to remove certain contaminants.

§ 18-306 Conditions on the Land Application of Sewage Sludge Within the Township of Plainfield.

- A. The land application of sewage sludge shall be prohibited:
1. On any land with soils rated by USDA's Web Soil Survey as having "very limited" suitability for land application of municipal sewage sludge, and
 2. Within 1000 feet of an exceptional value wetland, and
 3. Within 1000 feet of a potable water well, and
 4. In any place within the Township other than those identified in subparagraphs 1, 2, and 3, unless the person proposing the land application of sewage sludge shows:
 - i. That, based a minimum of three sewage sludge samples obtained prior to the proposed application and tested by a DEP-accredited laboratory using EPA Method 1633, the sewage sludge does not exceed the concentrations of pollutants listed in Table 1.

a. Table 1 – Ceiling Concentrations.

<i>Pollutant</i>	<i>Ceiling Concentration</i>
PFOA	0.6 µg/kg
PFOS	1.0 µg/kg
PFNA	0.4 µg/kg
PFHxS	0.5 µg/kg
PFHpA	0.6 µg/kg
PFBS	1.8 µg/kg
HFPO-DA	11.0 µg/kg
Total Organic Fluorine	750 ppb

- ii. The person proposing the land application shall bear the cost of the sampling and testing.
- B. The Township shall review the ceiling concentrations listed in Section 18-306(A)(4)(i)(a) and revise them, as appropriate, when DEP finalizes its own sewage sludge concentrations for any of the pollutants listed.

- C. For all land applications that are granted certification pursuant to Section 18-306(A)(4), the person proposing the application shall:
1. At least 30 days prior to the land application, submit to the Township all information that the person must submit to the Pennsylvania Department of Environmental Protection pursuant to 25 Pa. Code § 271.919 and 25 Pa. Code § 275.222(a)-(c), and
 2. At least 48 hours prior to the land application:
 - i. Notify the Township of the dates and times of the applications, and
 - ii. Submit to the Township the results of the tests conducted pursuant to Section 18-306(A)(4) showing that the sewage sludge does not exceed the concentrations of pollutants listed in Table 1 above, and
 - iii. If the land application will abut a public road, place clearly visible, at least 12-inch by 12-inch, signs written in English and Spanish at intervals at least every 50 feet along the road stating "WARNING" in red, containing notice that sewage sludge has been applied to the land, and prohibiting access to the land, and
 3. At least once each month following the application, for a total of one year, obtain a minimum of five topsoil samples, with one sample coming from the center of the application area and four coming from 30 feet inward from each of the four corners of the area, or, if the area does not have four corners, from 30 feet inward from four different locations along the boundary of the area, and test the samples for the pollutants listed in Table 1 above, using a DEP-accredited laboratory and paid for by the applicator. If pollutant levels in the samples exceed the concentrations in Table 1, the applicator shall:
 - i. Notify the Township, the Pennsylvania Department of Health, and the Pennsylvania Department of Environmental Protection, and
 - ii. Refrain from applying any sewage sludge to the same land until topsoil samples taken in accordance with this subsection do not show pollutant levels above the concentrations in Table 1.
- D. For all land applications that are granted certification pursuant to Section 18-306(A)(4), the Township or its agent may:
1. With at least 72 hours' notice and consent of the landowner:
 - i. Inspect the land on which the application is to take place to assess conditions on the fields and ensure compliance with Pennsylvania Department of Environmental Protection regulations, and

- ii. Obtain a composite soil sample from each field on which the application is to take place and test the sample(s) for the characteristics listed at 25 Pa. Code § 275.222(b)(6) and for the pollutants listed in Table 1 above, and
 - iii. Obtain a water sample from any wells on the land and test the sample for the pollutants listed at 25 Pa. Code § 271.914(b)(1) and for the pollutants listed in Table 1 above.
 - iv. The Township may conduct only one inspection pursuant to this section. The Township shall bear the cost of the inspection, sampling, and testing.
2. During the land application and with consent of the landowner:
- i. Inspect the application operation to ensure compliance with Pennsylvania Department of Environmental Protection regulations, and
 - ii. Obtain samples of the sewage sludge being applied test the sample(s) for the pollutants listed at 25 Pa. Code § 271.914(b)(1) and for the pollutants listed in Table 1 above, and
 - iii. Obtain a water sample from any wells on the land and test the sample for the pollutants listed at 25 Pa. Code § 271.914(b)(1) and for the pollutants listed in Table 1 above.
 - iv. The Township shall bear the cost of the inspection, sampling, and testing.

§ 18-307 Administration.

The provisions of this Ordinance shall be administered by the Board of Supervisors of Plainfield Township or their duly authorized representatives, who shall keep and maintain records of sewage sludge land applications within the Township and make such records available to the public.

§ 18-308 Penalties for Offenses.

- A. Any person who violates any provision of this Ordinance shall be liable for a fine of \$1,000 per offense.
- B. A separate offense shall arise for each instance in which a person violates any provision of Section 18-306 .
- C. A separate offense shall arise for each day in which a violation exists.

- D. In addition to being liable for a fine of \$1,000 per offense, any person who violates any provision of this Ordinance shall be responsible for:
 - 1. Removing any sewage sludge applied in violation of this Ordinance, and
 - 2. Restoring any land on which sewage sludge was applied in violation of the Ordinance to a condition in which the land can provide the level of services available prior to the violation.
- E. Funds raised through the collection of these fines shall be spent first on a filtration system for drinking water contaminated as a result of a person's violation of the Ordinance and on procuring and distributing alternative sources of drinking water until said filtration system is functional, if necessary. If any funds are left over, the Township of Plainfield shall spend the remaining funds to advance the health, safety, and fundamental environmental rights of the Township's residents.

§ 18-309 Enforcement.

- A. Fines provided for by this Ordinance may be recovered in an action by the Township of Plainfield brought before a district justice in the same manner provided for the enforcement of summary offenses under the Pennsylvania Rules of Criminal Procedure.
- B. Equitable remedies provided for by this Ordinance may be recovered in an action by the Township of Plainfield brought in the court of common pleas of Northampton County.
- C. Prior to a court's issuance of a final judgment against the person alleged to be in violation of this Ordinance, the Township of Plainfield may enter into an agreement with said person to waive any fines for said violation.

§ 18-310 Coordination with State Law.

The provisions of this Ordinance shall be interpreted as consistent with state law, including all relevant sections of the Solid Waste Management Act, Title 35, Chapter 29A of the Pennsylvania Statutes.

§ 18-311 Severability.

If any article, section, subsection, sentence, clause, phrase, term, provision, condition, covenant, or portion of this Ordinance is for any reason held to be invalid or unenforceable by any court of competent jurisdiction, or superseded by state or federal legislation, rules, regulations, or decision, the remainder of this Ordinance shall not be affected thereby but shall be deemed as a separate, distinct, and independent provision, and such holding shall not affect the validity of the remaining portions hereof, and each remaining section, subsection, sentence, clause, phrase, provision, condition, covenant, and portion of this chapter shall be valid and enforceable to the fullest extent permitted by law. In the event that federal or state laws, rules, or regulations

preempt a provision or limit the enforceability of a provision of this Ordinance, then the provision shall be read to be preempted only to the extent required by law. In the event such federal or state law, rule, or regulation is subsequently repealed, rescinded, amended, or otherwise changed so that the provision hereof that had been preempted is no longer preempted, such provision shall thereupon return to full force and effect, and shall thereafter be binding, without the requirement of further action on the part of the town.

§ 18-312 Enactment.

This Ordinance shall become effective five days after enactment by the Board of Supervisors of Plainfield Township.

ATTEST:

PLAINFIELD TOWNSHIP BOARD OF
SUPERVISORS

Paige Stefanelli, Manager

By: _____
Kenneth Field, Chairman

By: _____
Glenn Borger, Vice Chairman

By: _____
Ken Fairchild, Supervisor

By: _____
Nolan Kemmerer, Supervisor

By: _____
Jonathan Itterly, Supervisor

EXHIBIT "A"
TOWNSHIP OF PLAINFIELD,
NORTHAMPTON COUNTY, PENNSYLVANIA
ORDINANCE NO. 419

Sources for Legislative Findings

Environmental Rights, Public Health and Safety, and the Land Application of Sewage Sludge.

PFAS Threaten Public Health and Welfare.

- Agency for Toxic Substances & Disease Registry, *Toxicological Profile for Perfluoroalkyls*, at 7–21 (May 2021), <https://www.atsdr.cdc.gov/toxprofiles/tp200.pdf> (last updated March 2020). Center for Disease Control and Prevention toxicological profile for 12 perfluoroalkyls, characterizing associations between exposure and several health outcomes, including pregnancy-induced hypertension/pre-eclampsia; increases in serum hepatic enzymes; increases in serum lipids, including total cholesterol and low-density lipoprotein cholesterol; decreased antibody response to vaccines; and decreases in birth weight. Additionally, PFOA has been classified as possibly carcinogenic, with increases in testicular and kidney cancer observed in highly exposed humans.
- Antonia M. Calafat et al., *Polyfluoroalkyl Chemicals in the U.S. Population: Data from the National Health and Nutrition Examination Survey (NHANES) 2003–2004 and Comparisons with NHANES 1999–2000*, 115 *Env't Health Persps.* 1596 (2007). Polyfluoroalkyl chemicals were found in over 98% of serum samples collected from over 2,000 people representative of the general U.S. population in 2003.
- Arash Derakhshan et al., *Association of Per- and Polyfluoroalkyl Substances with Thyroid Homeostasis During Pregnancy in the SELMA Study*, 167 *Env't Int'l* 107420 (2022). Exposure to PFAS may interfere with the thyroid system during pregnancy, resulting in changes in serum concentrations of thyroid hormones.
- Blanca Sarzo et al., *Maternal Perfluoroalkyl Substances, Thyroid Hormones, and DIO Genes: A Spanish Cross-sectional Study*, 55 *Env't Sci. Tech.* 11144 (2021). Exposure to PFAS during the first trimester of pregnancy impacts multiple thyroid hormone levels.
- Clare Death et al., *Per- and Polyfluoroalkyl Substances (PFAS) in Livestock and Game Species: A Review*, 774 *Sci. of the Total Env't* 144795 (2021). Livestock and game species may be exposed to PFAS via contaminated water, soil, air, and food. Livestock grazed on pastures where biosolids have been applied may experience long-term exposure to PFAS in the soil and forage.

- Elsie M. Sunderland et al., *A Review of the Pathways of Human Exposure to Poly- and Perfluoroalkyl Substances (PFASs) and Present Understanding of Health Effects*, 29 J. Exposure Sci. & Env't Epidemiology 131 (2019). Multiple studies demonstrate significant associations between PFAS exposure and adverse immune outcomes in children. Dyslipidemia, or dysregulation of bloodstream lipid concentrations, is the strongest metabolic outcome associated with PFAS exposure.
- Guoqi Yu et al., *Shanghai Birth Cohort Study. Environmental Exposure to Perfluoroalkyl Substances in Early Pregnancy, Maternal Glucose Homeostasis and the Risk of Gestational Diabetes: A Prospective Cohort Study*, 156 Env't Int'l 106621 (2021). Environmental exposure to PFAS may affect blood glucose regulation during pregnancy and increase the risk of gestational diabetes mellitus.
- Ian T. Cousins et al., *Why is High Persistence Alone a Major Cause of Concern?*, 21 Env't Sci. Processes & Impacts 781 (2019). High persistence indicates the potential for long-lasting environmental and human exposure to a chemical that is difficult to control and reverse.
- Jianqiu Guo et al., *Umbilical Cord Serum Perfluoroalkyl Substance Mixtures in Relation to Thyroid Function of Newborns: Findings from Sheyang Mini Birth Cohort Study*, 273 Chemosphere 129664 (2021). PFAS exposure impacts thyroid function in newborns. PFAS mixtures *in utero* impact thyroid hormone concentrations in blood.
- Jorid B. Sørli et al., *Per- and Polyfluoroalkyl Substances (PFASs) Modify Lung Surfactant Function and Pro-Inflammatory Responses in Human Bronchial Epithelial Cells*, 62 Toxicol in Vitro 104656 (2020). PFAS may increase the risk of acute lung toxicity and airway infections, as evidenced by the inhibition of lung surfactant function, a pro-inflammatory response, and the suppression of chemokines in two in vitro models.
- Nalin Singh & Ching Yi Jennifer Hsieh, *Exploring Potential Carcinogenic Activity of Per- and Polyfluorinated Alkyl Substances Utilizing High-Throughput Toxicity Screening Data*, 40 Int'l J. Toxicology 355 (2021). Twenty-three PFAS were screened for potential carcinogenic activity. PFAS were found to induce several diverse biological perturbations in molecular pathways implicated in carcinogenicity.
- Patricia A. Fair et al., *Perfluoroalkyl Substances (PFASs) in Edible Fish Species from Charleston Harbor and Tributaries, South Carolina, United States: Exposure and Risk Assessment*, 171 Env't Rsch. 266 (2019). PFAS were found in six species of fish collected in South Carolina. The PFOS concentrations in fillets exceeded human screening values for cancer risk in some cases. Additionally, PFOS levels exceeded thresholds set to protect mammals in 83% of whole fish samples, representing a potential risk to wildlife that consume the fish.

- Preliminary Regulatory Determination and Proposed Rule, PFAS National Primary Drinking Water Regulation Rulemaking, 88 Fed. Reg. 18,638, 18,647 (Mar. 29, 2023).
- Qian Yao et al., *Prenatal Exposure to Per- and Polyfluoroalkyl Substances, Fetal Thyroid Hormones, and Infant Neurodevelopment*, 206 Env't Rsch. 112561 (2022). Prenatal PFAS exposures are negatively associated with early neurodevelopment, with particularly adverse impacts to gross motor development.
- Richard Christian Jensen et al., *Higher Free Thyroxine Associated with PFAS Exposure in First Trimester. The Odense Child Cohort*, 212 Env't Rsch. 113492 (2022). Exposure to PFOS, PFOA, and PFNA is associated with higher maternal thyroid hormone concentrations in women during early pregnancy.
- Vishal Midya et al., *Association of Prenatal Exposure to Endocrine-Disrupting Chemicals with Liver Injury in Children*, 5 JAMA Network Open e2220176 (2022). Prenatal exposures to PFAS increase risk of liver injury in children.

Sewage Sludge Contains PFAS and Other Pollutants that Contaminate Soil, Water, and Air.

- Alfredo C. Alder & Juergen van der Voet, *Occurrence and Point Source Characterization of Perfluoroalkyl Acids in Sewage Sludge*, 129 Chemosphere 62–73 (Jun. 2015), <https://doi.org/10.1016/j.chemosphere.2014.07.045>. PFAS pollution from a variety of industrial emitters can end up in sewage sludge and wastewater, and this wastewater may cause elevated PFAS concentrations in receiving waters, even after dilution by the receiving waters.
- Ali Behnami et al., *Biosolids, an Important Route for Transporting Poly- and Perfluoroalkyl Substances from Wastewater Treatment Plants into the Environment: A Systematic Review*, 925 Sci. Total Env't 171559 (May 15, 2024), <https://doi.org/10.1016/j.scitotenv.2024.171559>. Wastewater treatment plants are a significant source of PFAS contamination in the environment, and several factors impact retention of PFAS in sewage sludge, such as PFAS carbon chain length.
- Andrew B. Lindstrom et al., *Application of WWTP Biosolids and Resulting Perfluorinated Compound Contamination of Surface and Well Water in Decatur, Alabama, USA*, 45 Env't Sci. & Tech. 8015–21 (Apr. 22, 2011), <https://doi.org/10.1021/es1039425>. Soils in Decatur, Alabama amended with biosolids had elevated PFC concentrations as did adjacent surface and well water sources. Sampled surface and well water sources were generally within 500 meters of the nearest biosolid application site.

- Annessh Borthakur et al., *Inhalation Risks of Wind-Blown Dust from Biosolid-Applied Agricultural Lands: Are They Enriched with Microplastics and PFAS?*, 25 *Current Opinion Env't. Sci. & Health* 100309 (Feb. 2022), <https://doi.org/10.1016/j.coesh.2021.100309>. Land-applied biosolids can increase PFAS concentrations, and PFAS associated with dust or microplastics in the soil can then become airborne.
- Ansley J. Levine et al., *Leaching of Select Per-/Poly-Fluoroalkyl Substances, Pharmaceuticals, and Hormones Through Soils Amended with Composted Biosolids*, 343 *J. Env't Mgmt.* 118185 (Oct. 1, 2023), <https://doi.org/10.1016/j.jenvman.2023.118185>. Composted biosolids are a source of PFAS contamination in soil, particularly PFHxA, and the composting process does not effectively reduce PFAS concentrations.
- Applied Ecology, Inc., Brevard County, *Brevard County Sampling Report for the Land Application of Biosolids on Deer Park Ranch and Other Potential Impacts to Lake Washington Water Quality* (Mar. 11, 2020), https://appliedecologyinc.com/wp-content/uploads/2020/03/BrevardCounty_BiosolidsReport_03112020.pdf. Samples taken from 11 sites adjacent to and within Lake Washington in Florida all had detectable levels of PFAS, but no samples exceeded the EPA Lifetime Drinking Water Health Advisory limits, including samples taken at two sites that had land-applied Class B biosolids.
- Arjun K. Venkatesan & Rolf U. Halden, *National Inventory of Perfluoroalkyl Substances in Archived U.S. Biosolids from the 2001 EPA National Sewage Sludge Survey*, 252–253 *J. Hazardous Materials* 413–18 (May 15, 2013), <https://doi.org/10.1016/j.jhazmat.2013.03.016>. Of 13 inventoried PFAS compounds, PFOS is present in the highest concentrations in biosolids. The mean load of PFAS in land-applied biosolids was estimated to be 1375–2070 kg/year.
- Bei Wen et al., *Field study on the uptake and translocation of perfluoroalkyl acids (PFAAs) by wheat (Triticum aestivum L.) grown in biosolids-amended soils*, *Env't Pollution* 184 (2014). Biosolid application to soil results in increasing levels of perfluoroalkyl acids, and application to soil results in subsequent uptake of perfluoroalkyl acids by wheat crops.
- Bethany A. Parker et al., *In Vitro Modeling of the Post-Ingestion Bioaccessibility of Per- and Polyfluoroalkyl Substances Sorbed to Soil and House Dust*, 197 *Toxicological Sci.* 95–103 (Jan. 2024), <https://doi.org/10.1093/toxsci/kfad098>. PFAS structure is the primary variable that accounts for the bioaccessibility of PFAS in soils and dust. PFAS have greater bioaccessibility in soils compared to dust.
- Charles E. Schaefer et al., *Release of Poly- and Perfluoroalkyl Substances from Finished Biosolids in Soil Mesocosms*, 217 *Water Rsch.* 118405 (June 15, 2022), <https://doi.org/10.1016/j.watres.2022.118405>. During an outdoor experiment measuring

PFAS in a column of soil after the application of biosolids, PFAS leached through the soil column for the six-month duration of the experiment. PFAA precursors contributed to elevated rates of PFAA leaching.

- Elham Tavasoli et al., *Distribution and Fate of Per- and Polyfluoroalkyl Substances (PFAS) in Wastewater Treatment Facilities*, 23 *Env't Sci.: Processes & Impacts* 903–913 (May 12, 2021), <https://doi.org/10.1039/D1EM00032B>. PFAS were detected in influent, effluent, and sludge from a wastewater treatment plant. Short-chain PFAS predominated in influent and effluent, whereas long-chain PFAS predominated in sludge.
- Garrett W. Link et al., *Per- and Polyfluoroalkyl Substances (PFAS) in Final Treated Solids (Biosolids) from 190 Michigan Wastewater Treatment Plants*, 463 *J. Hazardous Materials* 132734 (Feb. 5, 2024), <https://doi.org/10.1016/j.jhazmat.2023.132734>. Concentrations vary widely between different PFAS compounds, with an average total PFAS concentration of 108 ± 277 ng/g dry weight.
- Grace Longendyke et al., *PFAS Fate and Destruction Mechanisms During Thermal Treatment: A Comprehensive Review*, 2 *Env't Sci.: Processes & Impacts* (2022). Due to the diversity of chemical structures across PFAS types, variability in field conditions, and the potential for incomplete combustion byproducts, complete thermal destruction of PFAS compounds in waste products proves challenging.
- Gwynn R. Johnson, *PFAS in Soil and Groundwater Following Historical Land Application of Biosolids*, 211 *Water Rsch.* 118035 (2022). In fields treated with biosolids, twelve PFAS were detected in all near-surface soil samples and in many deeper soil samples and groundwater samples at a depth of approximately 17 meters. PFAS soil levels were significantly correlated with biosolid application rates but were independent of the time since last application, indicating long-term bioaccumulation within soil.
- Ian Pepper et al., *Is PFAS from Land Applied Municipal Biosolids a Significant Source of Human Exposure via Groundwater?*, 864 *Sci. of the Total Env't* 161154 (2023). Land application of biosolids to coarse-textured soils with shallow depth to groundwater and high rates of rainfall or irrigation carries the greatest risk of PFAS contamination to groundwater. The Northeast U.S. is particularly susceptible to PFAS contamination of groundwater due to the generally shallow depth of the water table.
- Jake T. Thompson, et al., *Underestimation of Per- and Polyfluoroalkyl Substances in Biosolids: Precursor Transformation During Conventional Treatment*, 57 *Env't Sci. & Tech.* 9 (2023). Quantification of 92 PFAS in biosolids before and after composting, heat treatment, lime treatment, and anaerobic digestion revealed increases in percent of PFAA precursors, which were likely underrepresented in previous studies that failed to quantify these compounds.

- James O'Connor et al., *Distribution, Transformation and Remediation of Poly- and Per-Fluoroalkyl Substances (PFAS) in Wastewater Sources*, 164 *Process Safety & Env't Prot.* 91–108 (Aug. 2022), <https://doi.org/10.1016/j.psep.2022.06.002>. Biosolids and wastewater are primary sources of PFAS in agriculture, and the wastewater treatment process can transform PFAS precursors into harmful PFAS compounds.
- Jeff A. K. Silva et al., *Simulated Leaching of PFAS from Land-Applied Municipal Biosolids at Agricultural Sites*, 251 *J. Contaminant Hydrology* 104089 (2022). Site-specific soil properties regulate PFAS retention in soils amended with biosolids, and the EPA preliminary remediation goal for groundwater contaminated by PFAS can be exceeded with a biosolids loading rate of 50 Mg/ha.
- Jennifer Sepulvado et al., *Occurrence and Fate of Perfluorochemicals in Soil Following the Land Application of Municipal Biosolids*, 45 *Env't Sci. Tech.* 19 (2011). Concentrations of perfluorochemicals in soil increase based on biosolid application rates, and trace levels are detected at depths of up to 120 cm.
- Juliane B. Brown et al., *Assessing Human Health Risks from Per- and Polyfluoroalkyl Substance (PFAS)-Impacted Vegetable Consumption: A Tiered Modeling Approach*, 54 *Env't Sci. & Tech.* 15202–14 (Nov. 17, 2020), <https://doi.org/10.1021/acs.est.0c03411>. PFAS-contaminated crops are an important exposure pathway, and crops irrigated with PFAS-contaminated water can become contaminated.
- Justin Caniglia et al., *Extraction, Analysis, and Occurrence of Per- and Polyfluoroalkyl Substances (PFAS) in Wastewater and After Municipal Biosolids Land Application to Determine Agricultural Loading*, 4 *Frontiers in Water* (Oct. 26, 2022), <https://doi.org/10.3389/frwa.2022.892451>. PFAS in municipal biosolids applied to soils measured 22.9 ng g⁻¹ dry weight, and measurements of PFAS levels in biosolids-amended soils and runoff from those soils suggest that biosolids can be a source of PFAS contamination.
- Maria Christina Schilling Costello & Linda Lee, *Sources, Fate, and Plant Uptake in Agricultural Systems of Per- and Polyfluoroalkyl Substances*, *Current Pollution Rep.* (Dec. 15, 2020), <https://doi.org/10.1007/s40726-020-00168-y>. Biosolids are a source of PFAS contamination in agriculture, particularly PFAS compounds with long perfluoroalkyl chains. These PFAS can be taken up by crops and bioaccumulated in livestock that consume PFAS-contaminated feed.
- Mark L. Brusseau, R. Hunter Anderson & Bo Guo, *PFAS Concentrations in Soils: Background Levels Versus Contaminated Sites*, 740 *Sci. Total Env't* 140017 (Oct. 20, 2020), <https://doi.org/10.1016/j.scitotenv.2020.140017>. PFAS are detectable across the majority of soil samples, including samples from soils in remote regions. PFAS are

retained in the unsaturated zone above the groundwater table for decades while simultaneously leaching into groundwater.

- Matěj Hušek et al., *Removal of Per- and Polyfluoroalkyl Substances and Organic Fluorine from Sewage Sludge and Sea Sand by Pyrolysis*, 6 Biochar 1 (2024). Pyrolysis at temperatures below 400 °C is ineffective for removing PFAS from sand and sludge.
- Md Shahin Alam et al., *Assessing the Potential Impacts of Biosolids Applications on the Presence of PFAS Compounds in Nearby Groundwater Wells: A Citizen Science-Based Study in Pennsylvania*, ASABE Annual International Meeting (2022), <https://10.13031/aim.202200110>. Approximately 70 residents living near biosolids application sites in Pennsylvania tested their drinking water wells, and results showed that 72% of households had wells with PFAS levels above the 2022 EPA interim health advisory levels. The wells ranged from 10.7 to 274 meters in depth and were on average 10.8 km away from the nearest biosolid application site.
- Michael Holly, et al., *Evaluation of Per- and Polyfluoroalkyl Substances Leaching from Biosolids and Mitigation Potential of Biochar through Undisturbed Soil Column*, 4 ES&T Water 2 (2024). Even one application of biosolids to soil can result in groundwater contamination. PFAS may remain in soil for years, resulting in prolonged risk to human health from prior biosolid application.
- Mohammad Nazmul Ehsan et al., *PFAS Contamination in Soil and Sediment: Contribution of Sources and Environmental Impacts on Soil Biota*, 9 Case Stud. in Chem. & Env't Eng'g 100643 (2024). PFAS remains in sludge even after extensive wastewater treatment, and incineration of sludge can release hazardous air pollutants.
- Nanthi Bolan et al., *Distribution, Behaviour, Bioavailability and Remediation of Poly- and Per-Fluoroalkyl Substances (PFAS) in Solid Biowastes and Biowaste-Treated Soil*, 155 Env't Int'l 106600 (Oct. 2021), <https://doi.org/10.1016/j.envint.2021.106600>. Biosolids are a significant source of PFAS in the environment, and while several remediation strategies exist, many have drawbacks or have not yet been successfully implemented at a field scale.
- Nanthi Bolan et al., *Remediation of Poly- and Perfluoroalkyl Substances (PFAS) Contaminated Soils – To Mobilize or to Immobilize or to Degrade?*, 401 J. of Hazardous Materials 123892 (2021). Remediation of soils contaminated with PFAS is extremely challenging due to the high stability of PFAS, frequent occurrence of complex mixtures of PFAS compounds in tandem, unique physicochemical properties of PFAS compounds, and limited or no biodegradation of PFAS compounds.
- Olivia Mroczko et al., *Spatiotemporal Patterns of PFAS in Water and Crop Tissue at a Beneficial Wastewater Reuse Site in Central Pennsylvania*, 51 J. Env't Quality 1282–97 (Sept. 7, 2022), <https://doi.org/10.1002/jeq2.20408>. At a site in Pennsylvania irrigated

with treated wastewater, crops had detectable levels of PFAS, and livestock fed the contaminated crops would consume an estimated 2.46–7.67 mg per animal annually.

- Privilege Masinga et al., *Emerging Organic Contaminants in the Soil–Plant-Receptor Continuum: Transport, Fate, Health Risks, and Removal Mechanisms*, 196 *Env't Monitoring & Assessments* 367 (2024). Even at low concentrations, PFAS can disrupt soil structure and microbial processes. PFAS have the potential to migrate within soil profiles and be taken up by plants.
- Swadhina Priyadarshini Lenka, Melanie Kah & Lokesh P. Padhye, *A Review of the Occurrence, Transformation, and Removal of Poly- and Perfluoroalkyl Substances (PFAS) in Wastewater Treatment Plants*, 199 *Water Rsch.* 117187 (July 1, 2021), <https://doi.org/10.1016/j.watres.2021.117187>. PFAS are present in influents and effluents of wastewater treatment plants, and wastewater processing techniques at these plants are ineffective at removing PFAS. Studies have identified some processes that are more effective at reducing PFAS concentrations but implementing them presents challenges.

Federal Regulators Recognize that PFAS in Sewage Sludge Poses Threats to Public Health and Welfare.

- EPA, *EPA Biosolids PFOA & PFOS Problem Formulation Meeting Summary* (Nov. 2020), <https://www.epa.gov/sites/default/files/2021-02/documents/biosolids-pfoa-pfos-meeting-summary-nov-2020.pdf>.
- EPA, *PFAS Strategic Roadmap: EPA's Commitments to Action 2021–2024* (Oct. 18, 2021), https://www.epa.gov/system/files/documents/2021-10/pfas-roadmap_final-508.pdf.
- Marc Mills, EPA, *Session 6: PFAS Treatment in Biosolids – State of the Science* (Sept. 23, 2020), https://www.epa.gov/sites/default/files/2020-10/documents/r1-pfas_webinar_day_2_session_6_mills_final.pdf.

DEP Regulation Relating to PFAS in Sewage Sludge and Sewage Sludge Land Application.

- DEP, PFAS MCL Rule, <https://www.dep.pa.gov/Business/Water/BureauSafeDrinkingWater/DrinkingWaterMgmt/Regulations/Pages/PFAS-MCL-Rule.aspx> (last visited July 30, 2024).

Plainfield-Specific Factual Findings.

- ECOS Env't Conservation Online Sys., U.S. Fish & Wildlife Serv., Bog Turtle (*Glyptemys mühlenbergii*), <https://ecos.fws.gov/ecp/species/6962> (last visited July 30, 2024).

- Sara E. Breitmeyer et al., *Per- and Polyfluorinated Alkyl Substances (PFAS) in Pennsylvania Surface Waters: A Statewide Assessment, Associated Sources, and Land-Use Relations*, 888 Sci. Total Env't 164161 (Aug. 25, 2023), <https://doi.org/10.1016/j.scitotenv.2023.164161>. PFAS contamination was found in both of the Northampton County streams tested.
- U.S. Dep't Agric., Nat. Res. Conservation Serv., Web Soil Survey, <https://websoilsurvey.nres.usda.gov/app/WebSoilSurvey.aspx> (last visited July 30, 2024).