

## Draft Sewage Sludge Risk Assessment for PFOA and PFOS: Information for Farmers

January 2025

This fact sheet contains information that may be useful to farmers regarding perfluorooctanoic acid (PFOA) and perfluorooctane sulfonic acid (PFOS) contamination in sewage sludge that has been land applied to a farm.

On January 14, 2025, the U.S. Environmental Protection Agency (EPA) released its Draft Sewage Sludge Risk Assessment for Perfluorooctanoic Acid (PFOA) and Perfluorooctane Sulfonic Acid (PFOS). The draft risk assessment indicates that in some scenarios, the EPA's acceptable risk thresholds may be exceeded when sewage sludge containing PFOA and PFOS is land applied for beneficial reuse or surface disposed. The draft risk assessment focuses on people living on or near impacted farms or those that rely primarily on their products. The findings presented in the draft risk assessment are preliminary. The EPA expects to publish a final risk assessment after reviewing public comments and revising the draft risk assessment accordingly. Once finalized, the risk assessment will provide information on risk from use or disposal of sewage sludge and will inform the EPA's potential future regulatory actions under the Clean Water Act (CWA). The EPA is committed to partnering with states, Tribes, territories, and wastewater treatment plants (WWTPs) to reduce risks from PFOA and PFOS that may occur from drinking water or eating food from farms that have applied contaminated sewage sludge.

### What are sewage sludge and biosolids?

When sewage from households and businesses is sent to a WWTP, the liquids are separated from the solids, producing a nutrient-rich product known as "sewage sludge." The EPA typically uses the term "biosolids" to refer to treated sewage sludge that is intended to be applied to land as a soil conditioner or fertilizer. Sometimes biosolids are distributed directly from the WWTP to a farm. While some states, Tribes, or counties may have additional rules around the use of biosolids, federal rules currently allow biosolids to be applied to pastures, feed crops, and crops for direct human consumption. Biosolids can also be applied to forests, tree farms, golf courses, turf farms, and other types of land. Biosolids are different from manure or industrial sludge (like pulp from a paper mill), which are also sometimes used as a soil amendment. The EPA does not regulate the land application of manure or industrial sludges in the same manner it does for biosolids.

### What are PFOA and PFOS?

PFOA and PFOS are two chemicals in a large class of synthetic chemicals called [per- and polyfluoroalkyl substances \(PFAS\)](#). PFOA and PFOS have been widely studied, and they were once high production volume chemicals within the PFAS chemical class. PFOA and PFOS tend to persist in the environment for long periods of time and have been linked to a variety of adverse human health effects (see the EPA's [Final Toxicity Assessment for PFOA](#) and [Final Toxicity Assessment for PFOS](#)). PFAS manufacturers voluntarily phased out domestic manufacturing of PFOA and PFOS and their uses have been restricted by the EPA. Though concentrations of PFOA and PFOS in people's blood have lowered since the voluntary phase out, blood levels can be elevated in communities where there is significant environmental contamination and exposure.

Learn more about [PFAS](#), the [EPA's PFAS Strategic Roadmap](#), and [PFAS exposure in impacted communities](#).

## Why is the EPA concerned about the presence of PFOA and PFOS in sewage sludge?

Although domestic manufacturing of PFOA and PFOS have been phased out and their uses restricted, multiple activities still result in PFOA, PFOS, and their precursors being released to WWTPs.<sup>1</sup> Traditional wastewater treatment technology does not remove or destroy PFOA or PFOS, and these chemicals typically accumulate in the sewage sludge. PFOA and PFOS have strong chemical bonds, which means they do not break down on their own in the environment or in our bodies. The chemicals can move from soils to groundwater or nearby lakes or streams, and be taken up into fish, plants, and livestock. These factors combine to raise questions about whether the presence of PFOA or PFOS in sewage sludge that is used as a fertilizer on agricultural land poses risks.

## What is a sewage sludge risk assessment?

Risk assessment is a scientific process that is used to understand health risks to people, livestock, or wildlife across the country. The EPA uses sewage sludge risk assessments to help evaluate whether actions, including regulation, are needed to protect those who may experience risks from sewage sludge use or disposal.

In this sewage sludge risk assessment, the EPA estimates potential human exposures and risks in modeled scenarios where biosolids are applied one time and in modeled scenarios where biosolids are applied annually for 40 years. In all models, the biosolids are assumed to contain 1 part per billion (ppb) of PFOA or PFOS (near the currently available detection limit). Using these models, the EPA predicts how the PFOA and PFOS in the contaminated sewage sludge moves from soil to groundwater, surface water, plants, and animals at the modeled application site. For example, this risk assessment estimates how much PFOA and PFOS (1) might build up in a hypothetical farm's soils after biosolids are land applied, (2) are taken up into grass that is eaten by majority pasture-raised dairy cows, and (3) end up in the cows' milk. The modeled concentration in milk is then compared to toxicity values to estimate the potential for health risks in humans. The draft risk assessment includes modeling of agronomic practices that are likely to pose higher risks, like pasture-raising livestock on fields with biosolids application, which are not relevant to all farms. The draft risk assessment focuses on risks to humans because available data indicate that people are much more sensitive to exposures to PFOA or PFOS than livestock or wildlife. Finally, this risk assessment does *not* assess risks to people in the general population, who often have a diversity of sources for their foods.

## What does this draft sewage sludge risk assessment suggest?

The draft risk assessment indicates that, in some modeled scenarios, there could be human health risks exceeding the EPA's acceptable thresholds to those living on or near impacted farms or primarily relying on their products. These risks are associated with multiple individual exposure pathways if the impacted person consumes the modeled amounts of food or water from the biosolids-amended farms (e.g., drinking 32 ounces of milk per day, drinking 1 liter of water per day, eating 1 egg per day, or eating 1-2 servings of fish from the impacted waterbody per week). The biosolids concentration modeled in this draft risk assessment (1 ppb) is near the limit of detection for many laboratories using EPA Method 1633 and at the low end of concentrations in biosolids reported in currently available state data.

---

<sup>1</sup> see the EPA's [Preliminary Effluent Guidelines Program Plan 16](#) and [Multi-Industry Per- and Polyfluoroalkyl Substances \(PFAS\) Study – 2021 Preliminary Report](#)

Not all farms or products from farms where biosolids containing PFOA or PFOS have been applied are expected to pose a risk to human health. The presence and magnitude of risk is expected to vary based on the concentration of PFOA and PFOS in biosolids, number of applications, amount of biosolids land applied, local environmental and geological conditions, type of farming, and human behavioral patterns (*e.g.*, consumption rate of impacted products). For example, human health risks are expected to be lower when biosolids are applied to areas with protected groundwater, sites that are distant from surface waters used for fishing or as a drinking water source, and when applied to certain crops, such as grain, fuel, or fiber crops.

The modeling results also depend on certain assumptions that are not representative of all farms. Currently, data are limited on how many farms have applied biosolids to their land, how often those biosolids were applied, the concentration of PFOA or PFOS in the biosolids, and which types of crops or livestock are raised on biosolids-amended lands. Additionally, there are some data limitations on PFOA and PFOS uptake into specific crops (especially specific fruits and vegetables) and types of livestock (*e.g.*, swine). The majority of food crops grown in the United States do not use biosolids and some states have restricted the land application of sewage sludge to food crops, though this practice is not consistent across all states. The EPA modeled potential impacts to food crops in part because, given the extreme persistence of PFOA and PFOS in soils, a property with previous sewage sludge land application that has been repurposed as a food or feed crop farm could still have multiple relevant human exposure pathways. Finally, every family is different in their consumption of the agricultural products they grow; these home consumption behaviors impact their exposure to PFOA and PFOS from biosolids land application. For example, people living on farms who eat less than a single serving of beef a day from animals raised on impacted pastures would have lower risks than estimated in this assessment.

### **If you are concerned about PFOA and PFOS in biosolids applied to your farm, the EPA recommends you:**

- Consider contacting your state environmental agency or county government to learn about its efforts to address PFOA and PFOS, including in wastewater and biosolids. Many wastewater systems have not yet collected sewage sludge monitoring data for PFOA and PFOS, so these other resources may have more information.
  - State and regional biosolids contacts: <https://www.epa.gov/biosolids/epa-regional-and-state-contacts-biosolids>
  - General PFAS resources from your state: <https://www.epa.gov/pfas/us-state-resources-about-pfas>
- Consider contacting your local agriculture extension program or your closest USDA Service Center.
  - <https://extension.org/find-cooperative-extension-in-your-state/>
  - <https://www.farmers.gov/working-with-us/service-center-locator>
- Consider testing your home drinking water well for PFOA and PFOS.
  - There is more information about testing private drinking water wells for PFAS in the EPA's factsheet for small and rural communities under the section "Information for Communities and Households Served by Privately-Owned Wells": [https://www.epa.gov/system/files/documents/2024-04/pfas-npdwr\\_fact-sheet\\_monitoring\\_4.8.24.pdf](https://www.epa.gov/system/files/documents/2024-04/pfas-npdwr_fact-sheet_monitoring_4.8.24.pdf)
- Consider an alternative source of fertilizer from biosolids moving forward, especially if your farm might be vulnerable to PFAS impacts (examples include dairy farms where the pastures or fields used to grow feed have biosolids application, farms with pasture-raised hens or cattle in fields with biosolids application, farms growing leafy greens like lettuce or spinach, farms with a home drinking water well and sensitive groundwater, like those in regions with karst geology).
- Learn more about agriculture extension education related to PFAS on farms in Maine. Maine is one state that has been addressing PFAS contamination in farmland and has compiled resources for farmers. Some of these resources may also be applicable to farmers in other states:

<https://www.maine.gov/dacf/ag/pfas/pfas-response.shtml>

- Review the EPA's Meaningful and Achievable Steps You Can Take to Reduce Your Risk: <https://www.epa.gov/pfas/meaningful-and-achievable-steps-you-can-take-reduce-your-risk>
- Review the USDA's PFAS Frequently Asked Questions: <https://www.farmers.gov/protection-recovery/pfas/faq>
- Learn more about the National Academies of Science and Medicine's Guidance on PFAS Exposure, Testing, and Clinical Follow-up: <https://nap.nationalacademies.org/resource/26156/interactive/>

## What is the EPA doing to reduce exposure to PFOA and PFOS in sewage sludge?

The draft risk assessment is not a regulation and does not compel any actions. After the public comment period has closed, the EPA will consider the comments received, revise the draft risk assessment as appropriate, and prepare a final risk assessment. If the final risk assessment indicates that there are risks above acceptable thresholds when using or disposing of sewage sludge, the EPA expects to propose a regulation to manage PFOA and/or PFOS in sewage sludge to protect public health and the environment. In the meanwhile, the EPA is continuing to recommend that states monitor biosolids for PFAS contamination, identify likely industrial discharges and other sources of PFAS, and implement industrial pretreatment programs where appropriate. Doing so will help reduce downstream PFAS contamination and lower the concentration of PFAS in biosolids as described in Section C of the EPA's December 2022 memorandum entitled, "[Addressing PFAS Discharges in NPDES Permits and Through the Pretreatment Program and Monitoring Programs](#)." Current science indicates that **lower levels of PFAS exposure present less risk**, so these efforts to identify and reduce PFOA and PFOS in sewage sludge help protect public health.

Learn more about the EPA's recent actions to address [PFAS in sewage sludge](#).

Learn more about the [EPA's Draft Sewage Sludge Risk Assessment for PFOA and PFOS](#).