



U.S. Waste Industries, Inc.



PFAS DISPOSAL:

Challenges and
Solutions



Introduction to PFAS

Also called “forever chemicals,” PFAS (per- and polyfluoroalkyl substances) are highly persistent, stable chemicals used in many consumer and industrial products. These chemicals are linked to numerous health and environmental problems. Because current disposal methods can be ineffective, disposed PFAS can return to the environment and be found in drinking water. In the United States, there are thousands of PFAS derivatives, with more than 600 compounds currently used for commercial applications.

The most common types of PFAS compounds include:

- ✔ **PFOA:** Perfluorooctanoic acid
- ✔ **PFOA:** Perfluorooctanoic acid
- ✔ **PFHxS:** Perfluorohexane-1-sulfonic acid
- ✔ **HFPO-DA:** GenX hexafluoropropylene oxide dimer acid

Industrial materials such as aerospace, medical, and automotive products and aqueous film-forming firefighting foam are typically manufactured using PFAS. The following water- and stain-resistant consumer products also frequently contain PFAS:



Cleaning chemicals



Packaging materials



Carpeting



Clothing



Personal care items



Food wares



Textiles

Why Proper Disposal Is Needed

Many of these consumer products end up in incinerators, wastewater treatment plants, and landfills or are directly discarded into the environment. Industrial PFAS air emissions and discharges of PFAS into waterways pose a constant significant threat to oceans, rivers, and wildlife.



Challenges in PFAS Disposal

Technical Challenges

PFAS compounds do not readily break down because of the chemical stability of fluorinated compounds and the fluorine's electronegativity. In landfills and wastewater treatment processes, the PFAS precursors in fluorotelomer-based coatings for clothing, food wrappers, and carpets can undergo biological alterations to become smaller, more mobile PFAS compounds.

In the United States, waste containing PFAS has not been classified as hazardous material and can enter the waste cycle without consideration for the toxicity, persistence, and mobility of this family of chemicals. All of these challenges illustrate the difficulty of effective PFAS disposal.

Prior to 2024, there were no federal regulations governing PFAS disposal in the United States, except for military applications. On April 10, 2024, the Environmental Protection Agency (EPA) implemented the National Primary Drinking Water Regulation (NPDWR) for six PFAS compounds.

The EPA now regulates the following five PFAS:

1. PFOA
2. PFOS
3. PFNA
4. PFHxS
5. HFPO-DA

The EPA also regulates the following four PFAS as a mixture:

1. PFHxS
2. PFNA
3. HFPO-DA
4. PFBS



Public water systems must complete the initial regulatory requirements within three years. They will be obligated to inform the public of the level of PFAS in drinking water while implementing solutions to reduce the amount of PFAS in the water supply within five years. This change should effectively bring the drinking water to appropriate levels of PFAS below the recommended limits.

Health and Safety Risks

The incomplete destruction of PFAS compounds can result in products of incomplete combustion (PICs) or smaller PFAS products, which themselves may be potential chemicals of concern. Exposure to these PICs and regular PFAS can negatively impact human health.

The most researched PFAS exhibit the key characteristics of carcinogens, such as:

- ✔ Alterations in hormonal receptor-mediated signaling
- ✔ Epigenetic alterations
- ✔ Immunosuppressive effects
- ✔ Increased cell proliferation
- ✔ Induction of oxidative stress

Complex PFAS mixtures commonly occur in air, soil, and water and can accumulate in all living organisms, including humans. Animal and human studies have identified an increased risk of cancer due to PFAS exposure. In epidemiological studies, exposure to PFAS—especially PFOA and PFOS—is associated with the following medical conditions in humans:

- ✔ Changes in thyroid function and hormonal balance
- ✔ Harm to a developing fetus
- ✔ Increased cholesterol
- ✔ Weakened immune response



U.S. Waste Industries Solutions

U.S. Waste Industries offers the following solutions for effective contaminated waste disposal, taking into consideration the unique challenges of PFAS disposal.

Incineration

Incineration has become a preferred method of destroying polychlorinated biphenyls (PCBs), ozone-depleting substances (ODSs), and other halogenated organic chemicals. High residence times and sufficiently high temperatures break the carbon-halogen bond, allowing the halogen to get scrubbed from the flue gas as an alkali-halogen.

The incineration process includes the following steps:

1. The waste gets loaded into a sealed incineration chamber, which contains all the generated heat, emissions, and materials.
2. The chamber maintains a temperature between 1800 °F and 2200 °F.
3. All emissions are closely treated, filtered, and contained to reduce the release of total emissions into the atmosphere.
4. During the combustion process, heat energy is captured for heating buildings or generating electricity.
5. The remaining solids, metal, or ash are now more inert and compact, ready for proper disposal.



Deep Well Injection Landfill

Disposal of PFAS can be problematic, especially when contamination occurs in large quantities. Deep well injection provides an effective solution for reducing the amount of PFAS-contaminated waste. The injection process usually involves solidifying or mixing the waste with compatible fluids to facilitate its injection into the well. Depending on the specific waste composition, the process can help to reduce or manage the overall volume of waste

Injecting the waste deep underground allows for storage in stable geological formations, offering the following benefits:

- 🔄 Prevent surface liabilities
- 🔄 Prevent contamination from spreading to surface water or groundwater sources
- 🔄 Maintain community and environmental health in the surrounding area



Landfills

Municipal solid waste (MSW) or hazardous waste landfills are acceptable disposal options for PFAS and PFAS-containing materials. Permitted hazardous waste landfills implement the most extensive record-keeping practices and strictest environmental controls, which include double-liner systems with leak detection and leachate/gas collection. These measures successfully minimize PFAS migration into the environment.



U.S. Waste Industries Solutions

U.S. Waste Industries is a full-service environmental company with consultants on call 24 hours a day, available for emergency response. We offer environmental consulting for hazardous waste disposal services and remediation services for demolition projects, lagoon cleaning, tank cleaning, and contaminated soil. Whether you need to dispose of radioactive waste, remove an underground storage tank, or replace the clay liner on your pond, our experienced team can help.

As a national leader in complete turnkey waste stream management, U.S. Waste Industries offers comprehensive services for the proper disposal and transportation of PFAS, non-hazardous waste, and hazardous waste products. We utilize a broad range of disposal methods to ensure all waste is handled responsibly.

[Contact us](#) to learn more about our capabilities, or [request a quote](#) to see how U.S. Waste Industries can handle your next project.





U.S. Waste Industries, Inc.



ABOUT US

U.S. Waste Industries (U.S. Waste) is a full-service environmental company. We have a group of consultants offering environmental consulting which consists of Hazardous Waste Disposal Services, remediation services such as tank cleaning, contaminated soil, lagoon cleanings, and demolition projects. U.S. Waste can manage your next lagoon cleaning, lagoon closure. We offer on-site solidification or stabilization, sludge disposal and dredging services.

Contact Us



4420 Jefferies Highway,
Walterboro, SC 29488

www.uswonline.com
info@uswonline.com