



This case study showcases the effectiveness of the SynaPure™ wastewater treatment systems in resolving leachate management challenges at landfills. The system can provide a sustainable solution by eliminating transportation costs, reducing environmental impact and achieving PFAS removal to non-detectable levels. By adopting this innovative technology, landfills can achieve significant financial and environmental benefits, demonstrating a responsible approach to waste management and environmental protection.

THE PREMIER SUSTAINABLE SOLUTIONS PROVIDER IN NORTH AMERICA

Synagro delivers environmentally beneficial products, services and circular innovation by reimagining product design, material use and resource efficiency.

INTRODUCTION

Landfills face significant challenges associated with managing their leachate. Trucking the leachate for off-site treatment and disposal is expensive, environmentally unsustainable and poses logistical hurdles. Additionally, the leachate contains per- and polyfluoroalkyl substances (PFAS), a class of "forever chemicals" known for their environmental persistence and potential health risks.

CHALLENGE

Landfills generate large volumes of leachate with high concentrations of organic matter, ammonia and PFAS. This contaminated water requires specific treatment before discharge or disposal. Trucking the leachate to distant treatment facilities can be costly, generates greenhouse gas emissions and poses potential risks from spills or accidents. Additionally, there is always the risk that with upcoming stringent regulations, with the leachate often presenting a bulk of the contaminant load to the local wastewater treatment plants, these facilities could decide to stop accepting the leachate, leading to increased trucking distances and thereby increasing the disposal costs astronomically.

SOLUTION

Landfills seeking a sustainable and cost-effective solution can implement the SynaPure™ membrane-based wastewater treatment system. This innovative system, combining ultrafiltration (UF)/nanofiltration (NF) and reverse osmosis (RO) membranes, treats the leachate onsite, eliminating the need for off-site transportation.

PROCESS TREATMENT TRAIN

- 1. Leachate Collection** – Leachate is collected from the landfill and pumped to a storage tank.
- 2. Ultrafiltration/Nanofiltration** – The leachate passes through UF/NF membranes, removing suspended solids, colloids and some organic matter.
- 3. Reverse Osmosis** – UF/NF-treated water then enters RO membranes, which remove dissolved pollutants like ammonia, remaining organic matter and PFAS.
- 4. Treated Water Discharge** – The highly purified water from the system meets all surface discharge regulations and can be safely released into the environment or reused onsite for dust control, truck washing, etc.

SUCCESS

Implementing the SynaPure system can yield remarkable results including:

- **Elimination of Trucking and Disposal** – On-site treatment removes the need for leachate transport, significantly reducing costs and environmental impact.
- **Reduced Operational Expenses** – The system's efficiency and minimal maintenance further lowers operational costs compared to traditional methods.
- **PFAS Removal** – The specialized PFAS treatment process successfully removes these "forever chemicals" to nondetectable levels, protecting human health and the environment.

- **Improved Water Quality** – The treated water meets all regulatory standards for surface discharge, ensuring environmental sustainability and safeguarding surrounding water resources.

ADDITIONAL BENEFITS

- **Reduced Carbon Footprint** – Eliminating leachate trucking significantly lowers greenhouse gas emissions, contributing to climate change mitigation.
- **Enhanced Safety** – On-site treatment minimizes the risk of spills or accidents associated with transporting hazardous waste.
- **Flexibility and Scalability** – The modular design of the system enables easy future expansion if the landfill's leachate volume increases.

ABOUT THE SYNAPURE WASTEWATER TREATMENT SYSTEM

The SynaPure wastewater treatment system is a flexible, single-pass process capable of treating a wide variety of influent wastewater types to produce direct discharge or reuse quality effluent. Provided on a skid or built into a shipping container, the system can be rapidly deployed to virtually any site.

The technology behind the SynaPure system removes contaminants including inorganic and organic pollutants, total suspended solids, total dissolved solids, PFAS, heavy metals and pathogens that can create challenges and disposal issues for our current and future customers.¹

¹https://www.epa.gov/system/files/documents/2021-09/multi-industry-pfas-study_preliminary-2021-report_508_2021.09.08.pdf

Climate Change

We've baselined our Scope 1, 2 and 3 CHG emissions and calculated our beneficial handprint.



Product Stewardship

In 2023, we processed 16 million tons of biosolids, organics and residuals of which 80% was reused for a beneficial purpose.



Technology and Circular Innovation

We are collaborating with CharTech Solutions to pilot an industry-first process to treat biosolids.



To learn more about our sustainability efforts and how we plan to grow our business sustainably, visit www.synagro.com/sustainability.



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