



This case study showcases the effectiveness of the SynaPure™ wastewater treatment systems in resolving leachate management challenges at landfills. The system provided a sustainable solution by eliminating transportation costs, reducing environmental impact and achieving PFAS removal to nondetectable levels. The Minnesota landfill, by adopting this innovative technology, achieved 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

A landfill in Western Minnesota faced significant challenges associated with managing their leachate. Trucking the leachate for off-site treatment and disposal was expensive, environmentally unsustainable and posed logistical hurdles. Additionally, the leachate contained per- and polyfluoroalkyl substances (PFAS), a class of "forever chemicals" known for their environmental persistence and potential health risks.

CHALLENGE

The landfill generated large volumes of leachate with high concentrations of organic matter, ammonia and PFAS. This contaminated water required specific treatment before discharge or disposal. Trucking the leachate to a distant treatment facility was costly, generated greenhouse gas emissions and posed potential risks from spills or accidents. Additionally, with upcoming stringent regulations and the leachate presenting a bulk of the contaminant load to the local wastewater treatment facility, the facility decided to stop accepting the leachate, increasing the trucking distances and hence the costs astronomically.

SOLUTION

Seeking a sustainable and cost-effective solution, the landfill implemented the SynaPure™ membrane-based wastewater treatment system. This innovative system, combining nanofiltration (NF) and reverse osmosis (RO) membranes, treated the leachate on-site eliminating the need for off-site transportation.

PROCESS TREATMENT TRAIN

- 1. Leachate Collection** – Leachate was collected from the landfill and pumped to a storage tank.
- 2. Nanofiltration** – The leachate passed through NF membranes, removing suspended solids, colloids and some organic matter.
- 3. Reverse Osmosis** – NF-treated water then entered RO membranes, which removed dissolved pollutants like ammonia, remaining organic matter and PFAS.
- 4. Treated Water Discharge** – The highly purified water from the system met all surface discharge regulations and was safely released into the environment.

SUCCESS

Implementing the SynaPure system yielded remarkable results including:

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

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

ADDITIONAL BENEFITS

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

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 2022, we processed 6.5 million tons of biosolids, 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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