

Virginia Landfill, USA



New Logic developed the VSEP vibratory membrane system to be able to handle difficult wastewater streams that exceed the limits of conventional Spiral RO membrane modules. By doing this, membranes can be considered for applications thought previously to not be possible. The open channel flow and the vibratory shear created by the resonant frequency allows for filtration of wastewater high in suspended solids, biological materials, and solutions near saturation that would scale a spiral membrane module. One of the best uses of VSEP is to filter the reject from other membrane systems. So, VSEP can pick up where other membrane systems leave off.

Landfill leachate is an application where people have struggled with the use of membranes for a long time. New Logic has now perfected a process for efficiently filtering landfill leachate leaving a small volume of reject compared to other membrane systems. Because of this reject disposal is more easily done using thermal evaporation or other methods. If allowed, the small volume of reject can be sent back and re-injected into the landfill. In cases where methane

gas is extracted from the landfill, the VSEP reject is actually nutrition for the bugs that do the work in methane conversion. The volume of liquid going back is small and so the hydraulic loading is minimal.

Case Study Background

New Logic began working with a landfill in the Commonwealth of Virginia. This customer had a permit for sewer discharge, but was facing surcharges for elevated levels of Biological Oxygen Demand (BOD), Ammonia, and Arsenic. The client had tried a dissolved air floatation unit (DAF) to pretreat the leachate prior to adsorptive media. However, this system was not able to achieve the reduction in the surcharged elements and so, the client pilot tested and evaluated the VSEP technology.

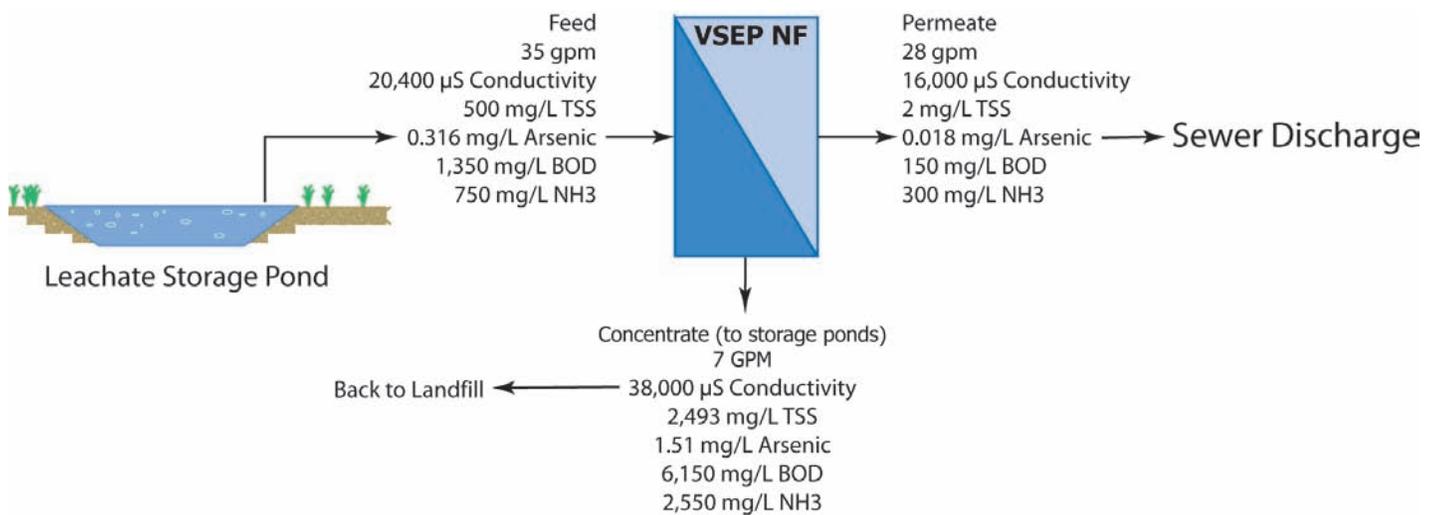
Since the treated water did not need to be very clean, Nanofiltration (NF) was tested to see if it was sufficient to reduce the BOD, Arsenic, and Ammonia to levels below the surcharge limit. Pilot testing indicated that NF would do the job and produced a clear filtrate with significant reductions in BOD and Arsenic to well below the limits. Ammonia was reduced enough to also meet the limit.



Process Description

A full-scale VSEP system was installed at this site in 2007 using one 84" VSEP module. The leachate is collected from several sources at the landfill and sent to a tank to feed the VSEP system. The VSEP operates at about 80% recovery meaning that 80% is filtered and sent to the sewer and 20% is left as concentrate. The concentrate stream is returned to the landfill. Periodic chemical cleaning is done automatically using an acidic cleaner followed by an alkaline surfactant cleaner.

This landfill has leachate that varies depending on the amount of rainfall. When there is a lot of rainwater that saturates the landfill, the leachate is much more dilute. During these times, the leachate is able to meet the discharge requirements without any treatment. So, the VSEP is not operated during these times. However, during long dry periods, the leachate can become more concentrated and this is the leachate that feeds the VSEP system for treatment. So, VSEP is run intermittently when needed. VSEP does provide good insurance in the event of changes in the sewer discharge permit. The VSEP system with the NF membrane is designed to process 50,000 gallons per day (190 m³/day) of leachate. NF was chosen because it generally fluxes higher than the tighter RO membrane. However, the NF filtrate will not be as good as RO.



Separation Quality

NF can reject multi-valent ions, suspended solids, biological materials, hardness, bacteria, and other larger species. However, monovalent salts and Ammonia only have limited rejection. RO is capable of removing all types of dissolved solids. This client has the option to switch to RO at any point should that be needed since the same system can accommodate either NF or RO.

The VSEP system in this case was able to reject about 95% of the Arsenic and 89% of the BOD. It was not measured, but NF will also remove most of the Iron, Lead, Zinc, Mercury, Copper, and other heavy metals.



Summary

It is common in the United States for landfills to have permits to discharge wastewater to the municipal sewer. This has worked pretty well for a long time. However, many city sewer systems are operating near maximum capacity and face discharge violation risks of their own. Much needed upgrades and expansions have not been done and this infrastructure is aging and out of date. Local municipalities have had strained budgets and have not been spending money on infrastructure development. Instead, they have been shifting the burden and the cost to users of the sewer system. More and more, cities are tightening up on permits for discharge and are forcing POTW users to install their own wastewater treatment plants. The city sewer systems are becoming more and more just a conduit for the water to pass with not much treatment. The burden of treatment is shifting to industry and agriculture.

Regulations will be changing and landfills will be facing tighter standards when it comes to sewer discharge. There are treatment options available for leachate, but none that can provide a complete solution such as VSEP with an RO membrane.



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