El Inga Landfill – Quito, Ecuador

Some breakthroughs in the membrane filtration industry by New Logic have now made it possible for the treatment of some previously difficult separation applications. New "plate and frame" type membrane modules can tolerate very high levels of TSS, organics, and COD due to "open channel flow". Previous conventional spiral membrane modules with tight feed channels and limited crossflow capabilities were not able to effectively handle the high fouling and plugging applications like Landfill Leachate. Now, with more open high turbulence membrane modules that are resistant to fouling and plugging, membranes are becoming a preferred option for treating Landfill Leachate when compared to conventional methods that have been used for many years. VSEP takes this evolution one step further by using a vibrating RO membrane system that combines the benefits of turbulence and shear from vibration. The combination of these two features is unique in VSEP and allows it to take raw wastewater with no pretreatment.

Case Study Background

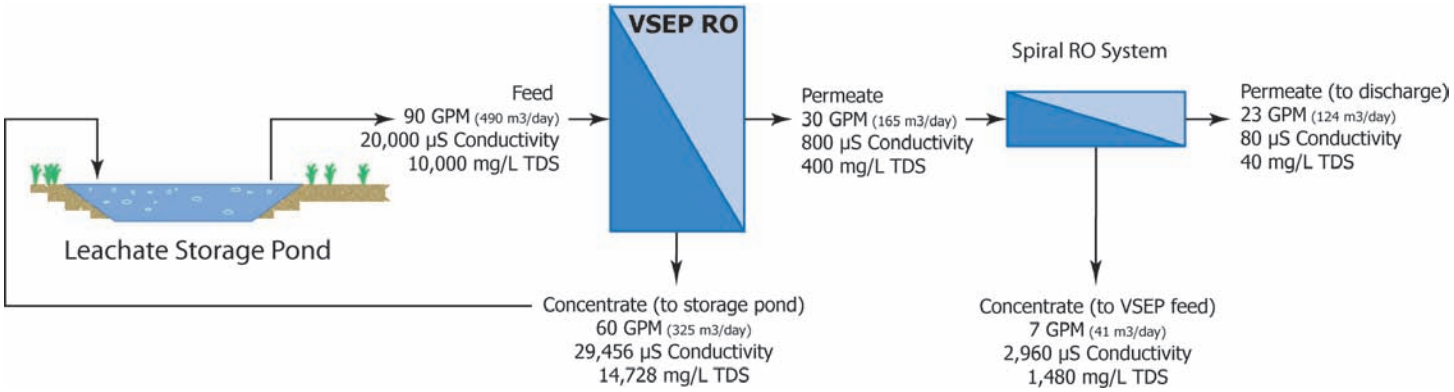
El Inga Landfill serves Quito, the capital city of Ecuador. The landfill has struggled for years with leachate treatment. Previously, a MBR/digester system was installed but was not able to generate treated water that met the requirements for discharge. For years there have been concerns about groundwater contamination from the leachate storage ponds.

The failure of the previous system was a big setback in terms of capital expenditures and the credibility or politicians and managers at the landfill. The risk of drinking water contamination and landfill failure grew with time. Recently the Bogota landfill failed due to hydraulic pressure on the landfill from reinjection. The trash heap liquefied and slid downhill causing significant property damage and injury. This kind of failure is present in the mind of all landfill operators.

Process Description

VSEP's Reverse Osmosis membrane module is capable of treating Landfill Leachate and providing a filtrate, which is free from suspended solids and very low in COD, BOD, and Heavy Metals. The VSEP process does not involve any chemical addition and meets the process engineer's needs for automated PLC controlled production. VSEP membrane modules containing about 1400 Sq Ft of filtration media are modular and can be run in parallel as needed to meet any process flow requirements. Each 84" VSEP module can produce 9-18 gpm of clean water from the leachate pond. Since the units are modular and can be used in parallel or in series, the number of VSEPs needed can be calculated based on the amount of material to be processed, (GPD or GPM). System throughput is a function of the extent to which the feed is concentrated and will vary from site to site. The VSEP module is also uniquely capable of high recovery of filtrate due to its scaling resistance. Recoveries of up to 90% of the landfill leachate as clean filtrate are possible.

New Logic has installed a primary stage of VSEP RO filtration with three 84” VSEP modules followed by a second stage of conventional spiral RO filtration to polish the VSEP filtrate. The two-pass RO filtration creates water suitable for surface water discharge. The VSEP system is fed from existing storage ponds.



Separation Quality

The VSEP system uses a reverse osmosis membrane as a primary treatment step. This step reduces the dissolved solids concentration by about 95%. A secondary RO step reduces TDS by an additional 90%. With each pass, TDS is reduced, so, if the contamination were very high for a landfill, even three or four passes could be implemented. Typically Ammonia and Chemical Oxygen Demand (COD) are the two constituents that would determine how many RO passes are needed.

Summary

After years of struggling, El Inga landfill finally has a treatment process that is working to mitigate the environmental risk in Quito Ecuador. This VSEP system was installed and will be operated by New Logic's South American Partner, Global Fluids. Mr. Juan Bertero is heading up these operations and has been very active in the region showing the VSEP process to a number of landfills in Latin America. With the successful start up of the Quito landfill, now many other community landfills that have been watching are considering installations as well.

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