

Sequencing Batch Reactor



Proven Technologies to Treat Municipal Solid Waste Landfill Leachate

Project: Navi Mumbai Municipal Leachate Treatment Plant, Turbhe, India

One of the most important issue relating to the long-term management of municipal solid waste generated by cities is the treatment of leachate – the gaseous liquid that seeps from a landfill. Leachate is a growing problem in India and Leachate Treatment Plants (LTP) are now required in every municipal landfill site. Navi Mumbai, one of the largest planned cities in the world, was required by the High Court to build a treatment plant for treating leachate generated from the town's 44,000 m² sanitary landfill in Turbhe.

Challenges

Prior to the construction of the treatment plant, the Navi Mumbai Municipal Corporation (NMMC) stored and hauled leachate away to a nearby Municipal Wastewater Treatment Plant where it was slowly fed and treated to reduce its high concentrations of pollutants. This option was not only expensive, but also dangerous as highly contaminated waste was transported through city streets between the landfill site and the treatment plant several times a year. A solution to treat the leachate on site was thus required.

The quantity and strength of leachate are affected by various factors, most significantly climatic conditions such as rainfall and evaporation. In a wet climate such as India, the LTP would need to be built for a capacity of 60 kiloliters per day (KLD) and designed to handle high amounts of rainfall during monsoons.

Leachate coming from garbage contains heavy metals, high levels of BOD and COD and most notably Ammonia. The Leachate from the Navi Mumbai Landfill was heavily contaminated by organic matter and contained high ammonia concentration, which constituted a potential risk to human health for 100 years or longer.





Solution

Space Kreators Pvt. Ltd. was awarded the contract to build a LTP based on the Ecoprocess™ Sequencing Batch Reactor (SBR) technology from Premier Tech Aqua – an international leader in onsite wastewater treatment with over 25 years of expertise in SBR technology. The High Court appointed the National Environmental Engineering Research Institute (NEERI) as the monitoring agency in the matter. Premier Tech Aqua provided the design, engineering and scope of supply for an energy-efficient and high-performance Ecoprocess™ SBR Treatment Plant.

The solution is composed of an Ecoprocess™ SBR Leachate Treatment that uses activated sludge principal and treats 60 KLD of leachate. The SBR treatment process has been developed as a readily-automated extended aeration system that is particularly well-suited to treat higher organic strength and concentrations of ammoniacal-N in landfill leachate. The larger volume of the main SBR tank makes for efficient aeration, high rates of dilution of incoming leachates, and high resistance to organic load fluctuations.

SBR feed pumps are used to feed the flow into the SBR. Flow is then fed to the reactor in a number of step feeds and monitored using a flow meter. The number of step feeds is decided by the operator based on influent conditions. Having Fill managed independently from the SBR sequence allows the operator to set different SBR sequence combinations such as Anoxic Mix Fill or Aerated Fill depending on process needs. This specific sequence is designed to achieve nitrification and denitrification within the same reactor. After treatment, the SwingCanter™, a PTA-designed and non-mechanical, low-maintenance solid-exclusion floating decanter removes water from the surface of the basin and drains it by gravity into a receiving stream.

The new plant in Turbhe is prepared to meet the requirement of the city as far as waste is concerned and reduce the risk of environmental impact on its groundwater and surface water for the next 30 years.

The dimension of the complete treatment chain, including primary treatment, secondary and sludge is a compact 160 square meters, including the control panel room.

Results

Wastewater characteristics and effluent quality from Ecoprocess™ SBR

Parameters	BOD	TSS	Ammonia nitrogen
Design parameters (influent)	1000 mg/L	500 mg/L	250 mg/L
Outlet requirements	< 20 mg/L	< 30 mg/L	< 10 mg/L
Treatment performances	10 mg/L	10 mg/L	≤ 10 mg/L*

*Total nitrogen

Additional advantages

- Versatile technology ensuring proven performances and low-cost, simple operations.
- Integrated, operator-friendly control/monitoring PLC-based automation program resistant to all plant conditions.
- Experienced team of Process Engineers and local Indian technical advisors from PTA providing exceptional support and expert advice throughout the project – before, during and after the start-up of the treatment plant.

The Ecoprocess™ SBR Leachate Treatment Plant of the the Navi Mumbai Municipal Landfill site in Turbhe was commissioned in 2010 and continually treats up to 60 KLD with high efficiency.



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