Landfill Leachate Treatment

Landfill serves several counties in Pennsylvania for disposal of household and construction waste. The landfill produces around 20,000 gals per day of leachate.

The Problem

The facility ran a single basin sequencing batch reactor (SBR) and a filter press to dewater the solids for many years, but found that they first, could not sustain a good biomass and in winter could not nitrify the ammonia as the leachate volume declined. The facility therefore could not reliably sustain the average monthly discharge requirements. The discharge requirements are detailed in the following table:

<table>
<thead>
<tr>
<th>BOD₅</th>
<th>TSS</th>
<th>Ammonia</th>
<th>Phosphorus</th>
<th>Iron</th>
<th>pH</th>
</tr>
</thead>
<tbody>
<tr>
<td>85 mg/L</td>
<td>100 mg/L</td>
<td>17 mg/L</td>
<td>4.4 mg/L</td>
<td>8.7 mg/L</td>
<td>6—9SU</td>
</tr>
</tbody>
</table>

Evaluation

The purpose of the new system is to meet the discharge requirements consistently. Ultrafiltration and Reverse Osmosis technology was selected since it offers the best performance possible in the smallest footprint with the lowest capital cost.

The Process

1. The Leachate is equalized in an equalization basin
2. A conventional filter removes large solids before it enters the UF process
3. The leachate is processed with ultrafiltration to remove solids and oils
4. The UF permeate is treated with Reverse Osmosis to remove dissolved materials
System Design

![Process Flow Drawing](image)

Operation

The system has operated successfully since 2003, allowing the plant to meet its discharge permit on all parameters. The influent and effluent data are provided below.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>$BOD_5$</th>
<th>TSS</th>
<th>Ammonia</th>
<th>Phosphorus</th>
<th>Iron</th>
<th>pH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Influent</td>
<td>2,000 mg/L</td>
<td>200 mg/L</td>
<td>200 mg/l</td>
<td>1.0 mg/L</td>
<td>6.5 mg/L</td>
<td>7.0 SU</td>
</tr>
<tr>
<td>Effluent</td>
<td>&lt;2.0 mg/L</td>
<td>ND</td>
<td>&lt;2.0 mg/l</td>
<td>&lt;0.2 mg/L</td>
<td>&lt;0.009 mg/l</td>
<td>7.0 SU</td>
</tr>
</tbody>
</table>

Influent/Effluent Results

Reverse Osmosis System