SaltMaker Evaporator
Crystallizer Treatment of
Landfill Leachate

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Landfill Leachate Treatment & Technology

The Project:

➢ Reduce landfill leachate volumes at brine concentrations in excess of 30% solids by mass (outside reverse osmosis range)
➢ SaltMaker evaporator crystallizer pilot projects completed with four top US solid waste management companies
➢ Produce freshwater to meet regulatory requirements
➢ Generate highly concentrated brine or solids for return to landfill

The SaltMaker Evaporator Crystallizer Technology:

➢ Built for reliability and extreme brine concentrations
➢ Multiple effect for energy efficiency (burn ¼ the gas vs. conventional leachate evaporators without the emissions)
➢ Modular / portable & easy to operate (no steam tickets)

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SaltMaker: Low Temperature Evaporator-Crystallizer

120 m³/day [32K GPD] leachate removed SaltMaker evaporator crystallizer containerized and modular plant
SaltMaker Evaporator Crystallizer: Process

- Four effects to recycle heat of evaporation: burn \( \frac{1}{2} \) the gas. Landfill gas fired packages available.
- Effects 1-3 closed to atmosphere (no leachate air emissions) and effect 4 used for cooling as a “cooling tower” (effect 4 can be closed for zero leachate air emissions)
SaltMaker Evaporator Crystallizer Attributes

• No membranes, no pre-treatment
• Solves conventional evaporator-crystallizer reliability problems:
  – Scaling: no evaporation on hot tubes, no boiling induced scale
  – Non-stick / non-corrode: gel coated fiberglass construction
  – Plugging & organics: high circulation rate, low temperature, self cleaning
• Maintainability: built-in automated cleaning cycles, no pressure vessels, no confined spaces, modules remove readily, spares parts stocked in Canada
• Automation: intelligent self start/stop/clean
SaltMaker Evaporator Crystallizer: Modular Building Blocks

- ISO shipping container dimensions
- Standard transportation vehicles and construction machinery
- Easy assembly / disassembly
- Modular plant expansion
SaltMaker Evaporator Crystallizer: Commercial Production and Services

SaltMaker Evaporator Crystallizer Module Production – Mass Produced

Quality Assurance  Customer Training Center  24/7 Remote Customer Support
SaltMaker Evaporator Crystallizer: Balance of Plant

Control Room

Thermal Source
SaltMaker Evaporator Crystallizer: Pilot & Modular Full-Scale

Pilot SaltMaker Evaporator Crystallizer

Modular Full-Scale SaltMaker Evaporator Crystallizer
(S100: up 120 m³/day or 32K GPD)
Multiple Landfill Leachate Pilots Successfully Completed

- SaltMaker evaporator crystallizer pilot produced freshwater, meeting discharge limits, and solids or concentrated brine with 45-60% total solids.
- 100% reliability, 24-7 remote operations, 90 day continuous run.
Post treatment of high ammonia waters may be required: ammonia is volatile and can be suppressed (pH) or post treated. We offer a standard post treatment package, contact us!

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Raw Landfill Leachate</th>
<th>SaltMaker Brine</th>
<th>SaltMaker Condensed Water</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Dissolved Solids (TDS)</td>
<td>12,000 to 90,500</td>
<td>541,000</td>
<td>135</td>
</tr>
<tr>
<td>Total Suspended Solids (TSS)</td>
<td>100 to 2,000</td>
<td>94,000</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Total Solids (TDS + TSS)</td>
<td>12,000 to 92,500</td>
<td>635,000</td>
<td>135</td>
</tr>
<tr>
<td>Total Hardness (as CaCO3)</td>
<td>500 to 14,000</td>
<td>113,000</td>
<td>5</td>
</tr>
</tbody>
</table>

Brine Concentrated to as high as 63% Solids

High Quality Freshwater 135 mg/L TDS
YOUR PROJECT?

• Contact us with your project needs: projects@saltworkstech.com
• Desktop studies (free), pilots, full scale plants: we deliver them all