



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)

SaltMaker: Low Temperature Evaporator-Crystallizer



Raw Leachate (left) and Freshwater Produced (right)

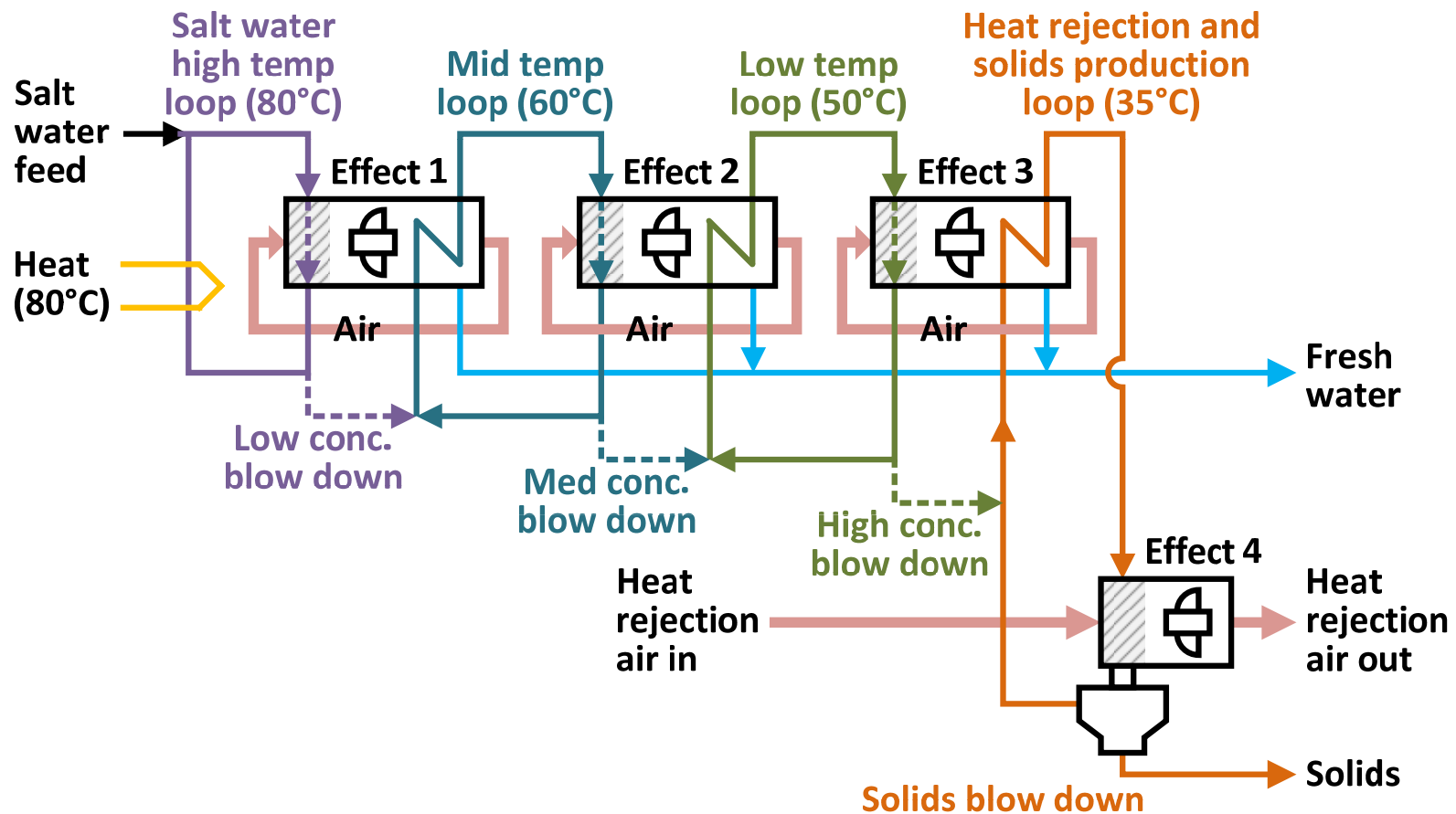


Leachate Solids Produced

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 $\frac{1}{4}$ 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



SaltMaker Evaporator Crystallizer: Leachate Treatment

Parameter (mg/L)	Raw Landfill Leachate	SaltMaker Brine	SaltMaker Condensed Water
Total Dissolved Solids (TDS)	12,000 to 90,500	541,000	135
Total Suspended Solids (TSS)	100 to 2,000	94,000	<1
Total Solids (TDS + TSS)	12,000 to 92,500	635,000	135
Total Hardness (as CaCO ₃)	500 to 14,000	113,000	5

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!

**Brine Concentrated to
as high as 63% Solids**



**High Quality Freshwater
135 mg/L TDS**



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- Desktop studies (free), pilots, full scale plants: we deliver them all

