

BRINE SOLUTIONS

Using salt-loving microbes to increase evaporation!

Over 1,300 halophilic (salt-loving) micro-organisms have been isolated and are strategically selected based on brine characteristics to greatly increase evaporation. The specifics of the proprietary process are confidential, but the 'activity' of these specialized microbes results in changes to brine on both a micro and macro level, which in turn significantly increases the rate of evaporation compared to that of untreated brine.

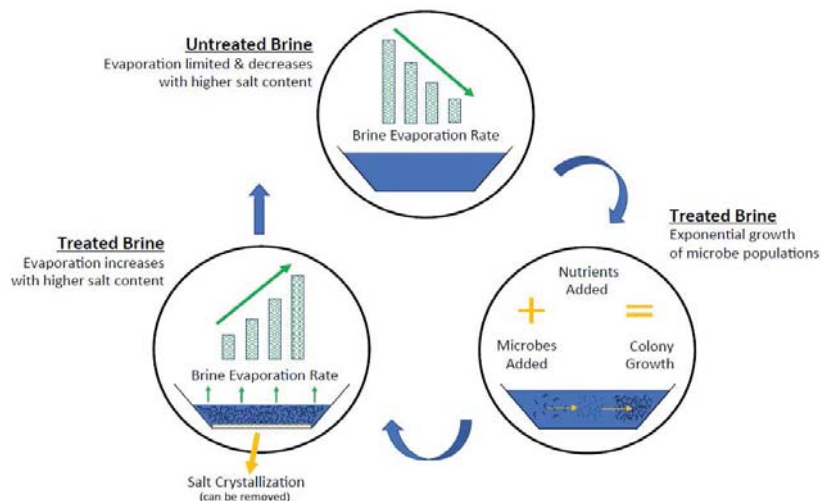
A counter-intuitive characteristic of this technology is that **the higher the salt content, the more effective it is**. In other words, where all other technologies struggle or fail, this approach is most successful, thereby 'closing the loop' for numerous processes that produce highly saline brine. The technology is even effective when salt is super concentrated at 10% (100,000 mg/L) to 30% (300,000 mg/L) and higher.

This proprietary, science-backed technique of enhanced brine evaporation was developed over a 35+ year career by one of the world's most distinguished, halophilic microbiologists, and is now offered by Clear Creek through a distributorship. The approach truly fits the definition of a "Natural System" which is a core component of Clear Creek Environmental offerings.



- No fuel
- No electricity
- No spray
- No equipment
- No plumbing
- No odors
- No pretreatment required
- No additional infrastructure or buildings
- No control systems
- Zero liquid discharge (ZLD) potential
- Reduces carbon footprint
- Degrades and mineralizes organic compounds

Factor	Standard Evaporation	Microbes
Evaporation Rates	Decrease as salts increase	Increase as salts increase
Organics	Remain	Destroyed
Acceleration	Mechanical	Natural
By-Products	Over sprays	None
Post-Treatment Leftovers	Concentrated Brine	Clean crystals
Electrical/Fuel Needed	Yes	No
New Infrastructure	Yes	No
Obvious to Neighbors	Yes	No

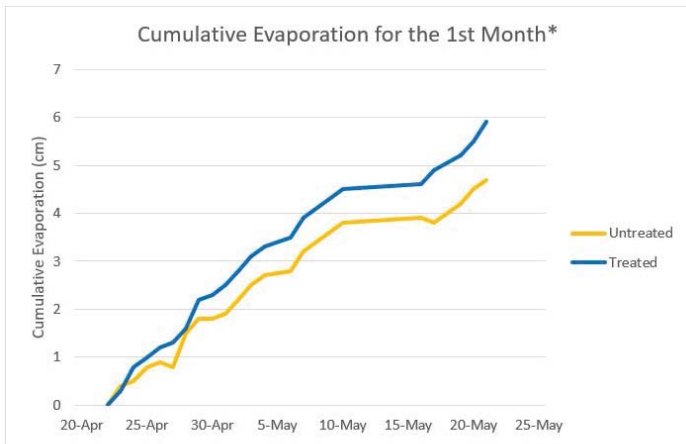


Untreated brine evaporation decreases as the salt content increases. Once the special blend of salt-loving microbes and nutrients are added to the pond, the colonies grow exponentially and increase evaporation rates.

Comparative evaporation rates and gallons evaporated per acre with and without microbes*

Annual Evaporation Rate (inches)	Untreated Brine Evaporation (inches/day)	Microbe Brine Evaporation (inches/day)	Gallons per Acre per Day without Microbes	Gallons per Acre per Day with Microbes	Days to Evaporate 1 Acre ft. without Microbes	Days to Evaporate 1 acre ft. with Microbes	Yearly Additional Evaporation per Acre with Microbes (gal)
40	0.03	0.10	813	2,170	400	120	495,305
50	0.046	0.14	998	3,038	261	86	744,600
60	0.05	0.16	1,085	3,472	240	75	871,255
70	0.06	0.19	1,302	4,123	200	63	1,029,665
80	0.07	0.22	1,519	4,774	171	54	1,188,075
90	0.08	0.25	1,736	5,425	150	48	1,346,485
100	0.09	0.27	1,953	5,859	133	44	1,425,690

* Based on a salt content from 20% to 32% (NaCl w/v)



* Evaporation increased >25% over the first month alone and the benefit versus untreated brine will continue to significantly increase over time as the process matures.

With the variety and bio-diversity of microbes in our ‘library,’ we can successfully apply the process in many different environments including, but not limited to: acidic or alkaline conditions, hot or cold climates, salt only or multiple compounds of concern, many different brines from multiple industries. We can evaluate your brine and create a blend of microbe cultures paired with just the right nutrient mixture that will be customized for your lagoon.

Contact us today to see how we can help you! We’ll walk you through our **Easy, 3-Step Process** to full implementation.

Step 1 – Viability Testing. We ensure that there are no major bio-inhibitors and that we can efficiently grow cultures in your brine.

Step 2 – Customization. We determine what combination of microbes and nutrient mix works best with your brine.

Step 3 – Implementation. We grow cultures and mix nutrients which are shipped to your site for pouring into your brine pond.



Clear Creek Environmental Solutions is a consulting and engineering firm dedicated to finding the most effective and innovative solutions for industrial wastewater management. Visit our website and contact us today to see how we can improve your facility operations.