Supporting Evidence & Methodology

1. Introduction

This document supplements the Salt Silo Savings Calculator by providing a detailed explanation of the assumptions, formulas, and the scientific rationale behind reduced regeneration cycles with high-purity brine. It includes citations and extracts from industry research to support the calculator's predictions.

2. Why Brine Purity Matters in Water Softening

Water softeners regenerate resin beds using a brine solution. The effectiveness of this process is directly related to the salt's purity.

Low-purity salt (<98.9%) contains filler materials that:

- Leave residue in brine tanks
- Decrease regeneration efficiency
- Cause more frequent backwashing
- Shorten equipment lifespan

Hydrosoft's 99.9% purity eliminates these issues, improving system performance and reducing

costs.

3. Regeneration Reduction Estimate Table

Salt Purity (%)	Regeneration Reduction (%)
99.9	0%

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99.8	5%
99.7	6%
99.6	7%
99.5	8%
99.4	10%
99.3	12%
99.2	14%
99.1	16%
99.0	18%
98.9	20%
98.8	22%
98.7	24%
98.6	26%
98.5	28%
98.4	29%
98.3	30%
98.2	31%
98.1	32%
98.0	33%
97.9	34%

Chart: Regeneration Reduction vs Salt Purity

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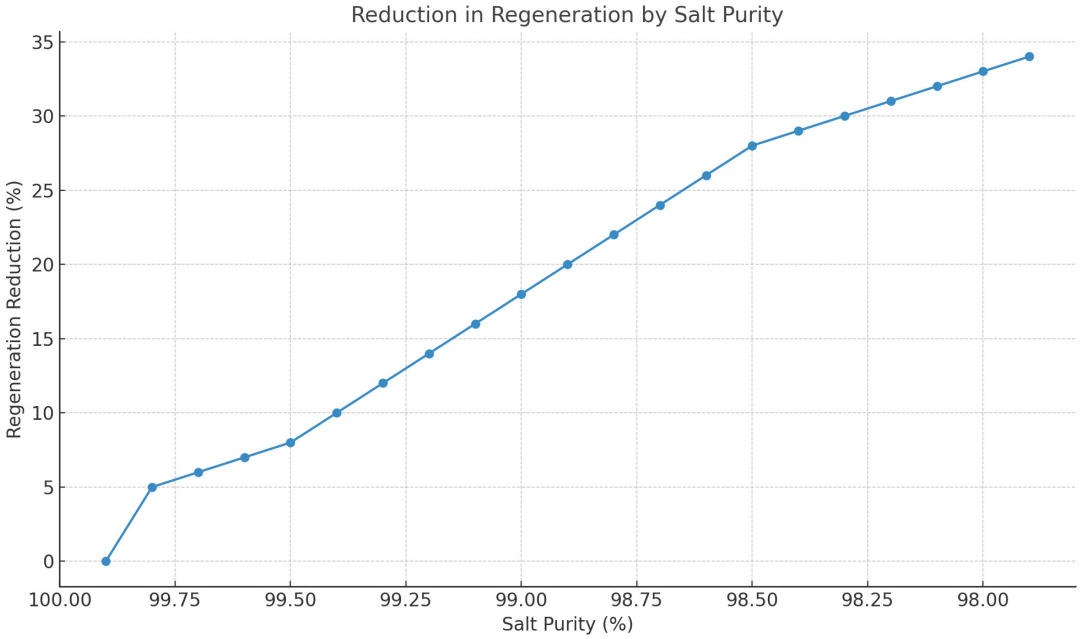

4. Supporting Industry Evidence

- 1. TREA (Technology Research and Exchange Association)
Title: Water Softener Regeneration: Method and Apparatus
U.S. Patent: 7207398B2
Source: https://trea.com/information/water-softener-regeneration/patentgrant/352c6211-8e28-4790-87f1-c6f9610a5d6c
Summary: Demonstrates that lower purity salts lead to higher residual hardness leakage. Vacuum salt shows 1.4 ppm leakage vs 8.2 ppm for rock salt.

2. Flodman, H.R., & Dvorak, B.I. (2012)
Title: Brine Reuse in Ion-Exchange Softening: Salt Discharge, Hardness Leakage, and Capacity Tradeoffs
Journal: Water Environment Research, 84(6), 535–543
DOI: 10.2175/106143012X13347678384661
Summary: Lower salt usage increases hardness leakage and reduces softening capacity—an important efficiency tradeoff.

3. Water Softener Regeneration Manual
Title: Effect of Commercial Salt Impurities on Regeneration Efficiency
Hosted on: Scribd
Source: https://www.scribd.com/document/705120386
Summary: Notes that commercial salts can contain up to 1.5% calcium, which negatively impacts the softener's performance and leads to more frequent regenerations.

4. Industrial Water Solutions
Title: Hardness Leakage and Salt Dosage in Industrial Water Softeners

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Source: https://industrialh2osolutions.com/industrial-water-softener-sizing-application-hardness-leakage/
Summary: Explains how salt dose levels affect regeneration frequency and residual hardness, showing that efficient dosing can reduce salt use but requires careful management to prevent leakage.

5. Conclusion

Switching to Hydrosoft can result in fewer regenerations, longer resin life, and lower long-term operating costs.

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