

Sustainable Cooling Tower Formulation with Soltellus 2400L

A Case Study on Unwavered Operational and Environmental Goals



Background

Cooling towers are critical components in industrial and commercial facilities designed to remove excess heat generated by HVAC systems or industrial processes. These systems rely on water to absorb heat and release it into the atmosphere via evaporation. However, this repeated cycle can lead to calcium carbonate scale formation, a major issue that disrupts heat transfer efficiency.

Challenges of Scale Formation

- **Efficiency Loss:** Scale acts as an insulating layer, reducing the system's ability to transfer heat effectively. This forces cooling systems to consume more energy, increasing operational costs.
- **Maintenance Burden:** Scaling narrows pipes and clogs equipment, necessitating frequent cleanings with hazardous acids and operational downtime.
- **Environmental Concerns:** Conventional scale inhibitors often contain harsh chemicals, posing risks to the environment and water ecosystems.

Objective

An industrial partner sought a solution to prevent scale formation without interfering with biocides or contributing to bacterial growth. The goal was to match the effectiveness of traditional scale inhibitors while improving environmental performance.

Solution

An industrial partner piloted Soltellus™ 2400L in cooling tower scale and corrosion inhibitor product formulation at a university and a convention center. The biodegradable polymer successfully inhibited calcium carbonate scale, demonstrating compatibility with biocides and avoiding degradation into a bacterial food source for a closed-loop system.

Results

- **Performance:** Soltellus successfully matched the performance of conventional polymer-based scale inhibitor solutions.
- **Energy Cost Savings:** The incorporation of Soltellus into a sustainable cooling tower formulation effectively prevented calcium carbonate scale formation on cooling tower surfaces. Scale buildup can reduce heat transfer efficiency by up to 40%, leading to increased energy consumption. By mitigating scale formation, annual energy cost savings can reach up to \$22,000.
- **Water Savings:** The incorporation of Soltellus into a sustainable cooling tower formulation contributed to increased cycles of operation, delivering approximately 16% water savings.
- **Compatibility:** There was no interference with biocides or bacterial systems in closed-loop operations.
- **Sustainability:** Due to its biodegradable nature, Soltellus reduced toxicity in water treatment processes, supporting environmental goals.

Impact

By maintaining efficiency and reducing toxic chemical use, Soltellus enables institutions to achieve operational and sustainability goals. The pilot success has opened avenues for further testing to evaluate derivatives and corrosion inhibition improvements.

Next Steps

Future studies will assess long-term impacts on cooling system performance and explore the feasibility of replacing additional conventional inhibitors with Soltellus derivatives.