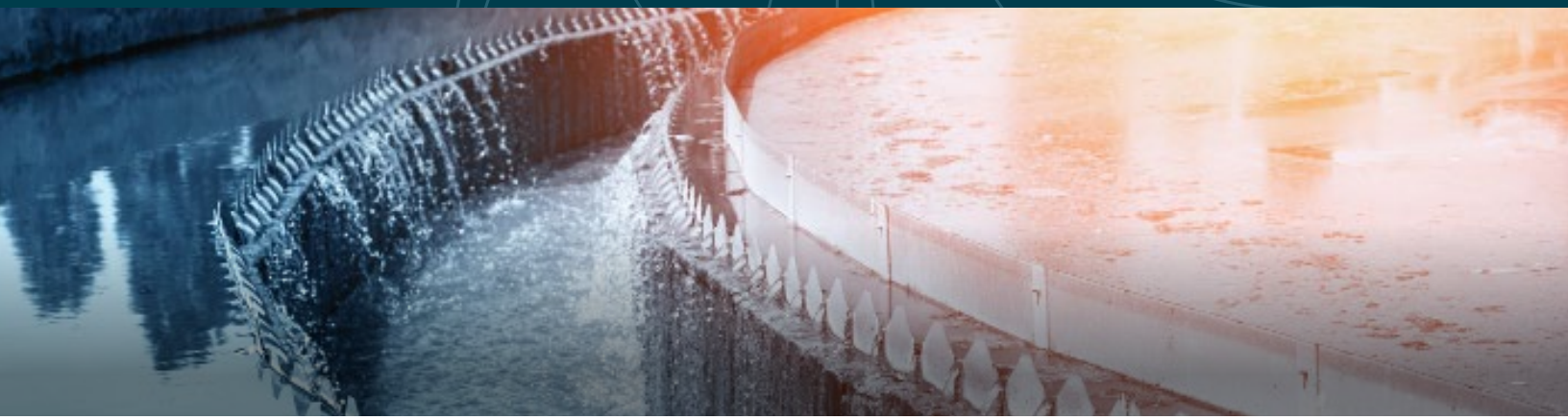
CASE STUDY

CITY OF LIBERTY, MO: WATER TREATMENT HYDRATE CONVERSION



Enhancing Safety and Efficiency by Transitioning from Quicklime to Hydrated Lime for Water Treatment

Municipal water and wastewater treatment plants across the U.S., primarily constructed during the 1970s and 1980s, are reaching the end of their operational lifespans.

With facilities designed to last 50 years and equipment designed for 20, municipalities now face significant challenges, including system upgrades, equipment replacement, and in many cases, complete rebuilds.

The Role of Calcium Hydroxide in Water Treatment

Calcium hydroxide, commonly used for water purification, effectively removes hardness (softening) and adjusts pH levels. Compared to alternative chemistries, calcium hydroxide offers municipalities superior efficiency, safety, and cost predictability, making it an attractive option for water treatment systems. In 2020, MLC engaged with its customers to identify challenges and demonstrate the benefits of using lime products in modern water treatment.

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The City of Liberty, MO: A Focus on Safety and Efficiency

The City of Liberty's water treatment plant was nearing the end of its operational life. The municipality prioritized safety and operational efficiency when evaluating options to update its system.

The existing system used MLC quicklime (calcium oxide), which required on-site slaking with water to produce calcium hydroxide slurry. This process involves an exothermic reaction that generates high heat and pressure, necessitating careful design and operation. Additionally, quicklime introduces insoluble elements such as grit and other non-functional materials.

To address these challenges, Liberty considered transitioning to pure, dry hydrated lime (calcium hydroxide), which eliminates the need for on-site slaking. This modern alternative offers numerous benefits, including reduced equipment wear, improved safety, and the elimination of grit, resulting in a higher-quality slurry.

Partnering with MLC for a Smooth Transition

To explore the feasibility of converting to hydrated lime, Liberty partnered with MLC to assess its current lime system and performance. MLC provided its innovative mobile hydrate make-down system, allowing Liberty to conduct trials and evaluate the benefits of hydrated lime before committing to permanent equipment upgrades.

The trial, conducted with MLC's portable hydrated lime system, demonstrated the superior quality and performance of MLC's Hydrated Lime. Encouraged by the results, Liberty decided to proceed with the transition.

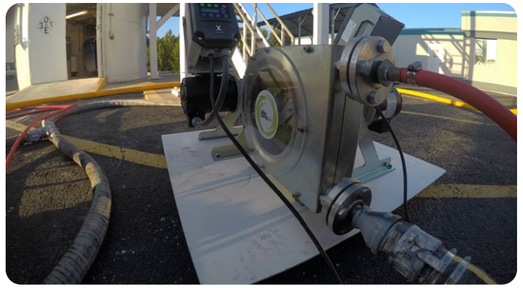
Figure 1.1. Mobile lime slurry equipment used to conduct the trial

MLC™ T104 Trailer Make-down System

Type	Hydrate and mixed water on site
Capacity	23,000 gallons
Electrical requirement	480v / 60A / 3ph
Water requirement	140 gpm
Compressed air requirement	30 cfm @ 90 psi
Footprint	61'-0"L x 8'8"W x 18'-0"H

MLC™ T64 Trailer Mix System

Type	Lime slurry storage
Capacity	8,000 gallons
Electrical requirement	480v / 100A / 3ph
Water requirement	n / a
Compressed air requirement	n / a
Footprint	42'-6"L x 8'0"W x 10'-6"H



MLC™ Peristaltic Pump Skid

Type	Precision dosing pumps
Capacity	6 gpm
Electrical requirement	110v / 30A
Water requirement	n / a
Compressed air requirement	n / a
Footprint	4'-0"L x 4'0"W x 2'-0"H

Figure 2.1. Reduction in sludge production

	2020 — Quicklime	2021 — Hydrate	2022 — Hydrate	2023 — Hydrate
Sludge flow (MG)	75	52	46	49
Lime lbs used (MG)	2.14	1.27	2.34	2.40
Slude generated (T)	13,090	9,792	8,973	9,506
Raw flow (MG)	1,168	1,200	1,203	1,208
Backwash flow (MG)	22.3	23.7	27.3	24.7
Finished flow (MG)	1,007	1,124	1,150	1,166

Results and Outcomes

The new system, implemented in mid-2021, delivered significant improvements in safety, efficiency, and cleanliness. Notably, the change reduced the plant's sludge production from 13,000 tons in 2020 to 9,000 tons in 2023. By eliminating grit, the Liberty plant no longer needs to haul sludge away in dumpsters, and operators have reported easier handling and cleaner operations.

Key Metrics Before and After Transition

Figure 2.1 shows the reduction in sludge production realized by the city of Liberty. The sludge flow decreased dramatically from 2020 to 2023 due to the change to hydrated lime. As a result, the sludge generated dropped from 13K tons to 9K tons and no longer needed to be hauled off in a dump truck.

A Cleaner, Safer Future

Kevin Ash, Plant Manager at Liberty, reports, "**We have no regrets about switching to hydrated lime**." The transition not only enhanced operational safety but also simplified plant maintenance and improved cleanliness. With assistance from MLC, equipment manufacturer Merrick, and years of operational experience, the City of Liberty successfully modernized its water treatment plant to better serve its community for years to come.

Learn more about MLC equipment solutions:

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ABOUT US | MLC is a leading global supplier of high-calcium lime products and technical solutions headquarted in St. Louis, Missouri. These offerings bring essential performance and value to a range of market applications, including metals, construction, chemicals, water and emissions treatment, glass, plastics, elastomers, agriculture, foods and beverages. With over a century in business, MLC has built a reputation on the quality of its products and services, as well as an unwavering commitment to safety, sustainability and service. The company's expanding global footprint includes a diversified, reliable network of production and distribution facilities in the U.S., as well as in the U.K. through its Singleton Birch business. MLC is an HBM Holdings company.

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