

Case study: Cheese producer switches MBR to ClariPhos®; improves phosphorus removal, eliminates tertiary filtration

- ClariPhos® Rare Earth Coagulant
- MBR wastewater treatment system
- Ontario, Canada



The challenge:

Achieving phosphorus compliance and avoiding process upset

Phosphorus removal has never been better for an Ontario cheese producer after switching to ClariPhos® Rare Earth Coagulant for its onsite membrane bioreactor (MBR) system. Operators began using ClariPhos after experiencing inconsistent results with aluminum sulphate (alum) to achieve a phosphorus limit of less than 1 mg/L.

When the plant was commissioned several years earlier, alum was initially added directly to the MBR to precipitate phosphorus in the process tank; however, this resulted in excess foaming, significant swings in pH and frequent upsets to the biological process.

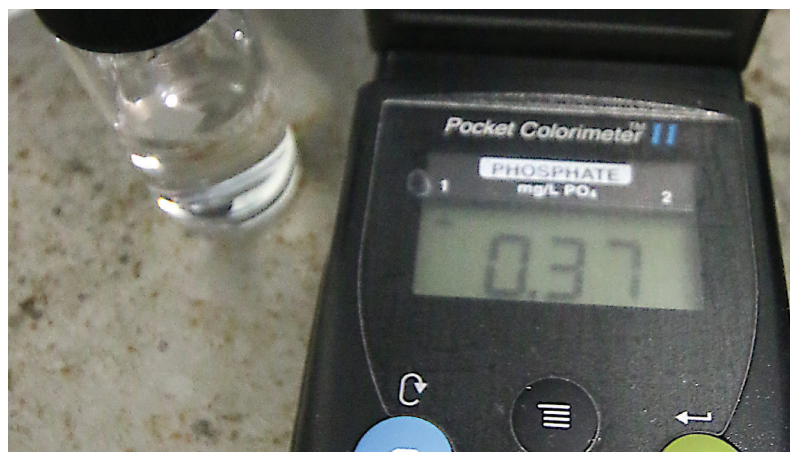
A tertiary filtration system was installed at a cost well into six figures, and though the system did alleviate the issues and consistently achieve the target phosphorus limit most of the time, it also significantly increased operating and maintenance costs. The operations team continued searching for a simple, cost-effective solution.

The solution:

Rare earth coagulant achieves compliance and operational improvements

Bench testing with ClariPhos showed promising results and in the spring of 2019 the plant began full-scale testing. The transition was simple since ClariPhos uses the same chemical feed equipment as alum.

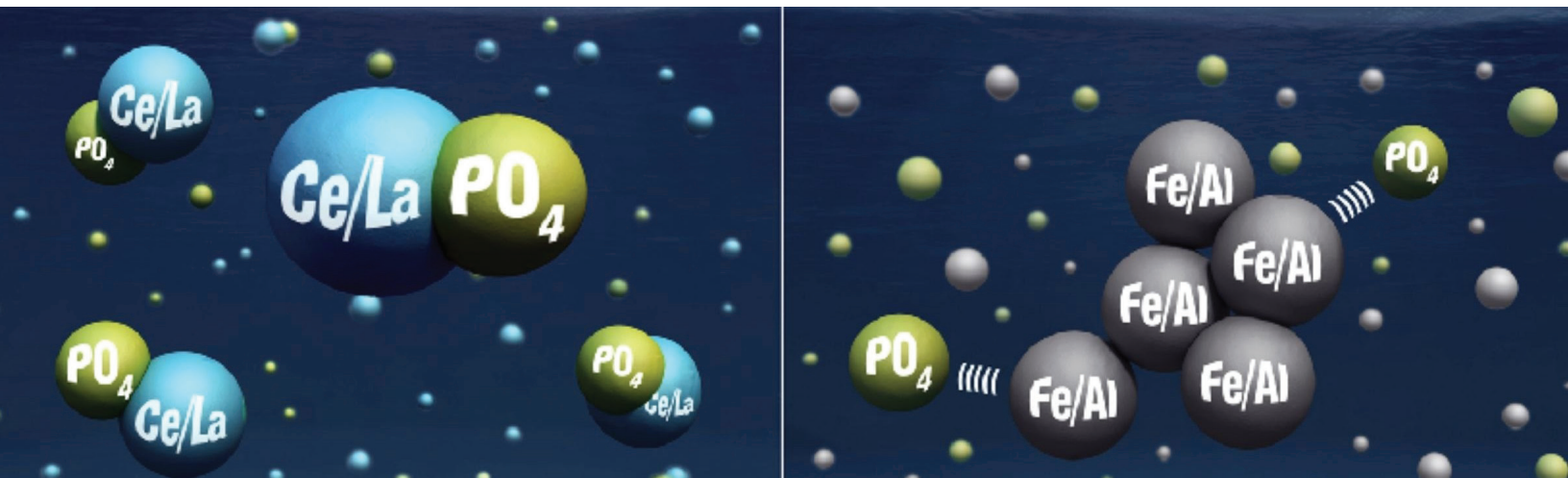
Operators simply replaced the tote, flushed the line and set the new, much lower dose rate for ClariPhos. Since one of the objectives was to eliminate the tertiary filtration system, the team decided to add ClariPhos directly to the bioreactor, despite the problems that were experienced with the alum.



The results:

Within a few days, several benefits of ClariPhos emerged for the operators.

- Foaming and pH swings were no longer occurring. ClariPhos is about 100 times less acidic than aluminum sulphate, which combined with the lower dose, enables overall system pH to remain close to neutral and avoid process upset;
- Caustic (NaOH) was no longer needed to balance the acidity of alum, saving the plant thousands of dollars and eliminating the need to store and handle this hazardous chemical;
- Consistent treatment performance and compliance with the phosphorus limit of $< 1 \text{ mg/L}$;
- Tertiary filtration is no longer needed, eliminating costs of operation and of handling of the secondary sludge wasting process;
- Reduced coagulant consumption. The ClariPhos dose at the site is consistently four to six times lower than aluminum sulphate;
- Improved operator safety. ClariPhos is rated non-hazardous, performs at a lower dose rate and often requires no pH adjustment. This means operators can dramatically reduce the volume of hazardous chemicals that are shipped, stored and handled at a plant.
- The low freeze temperature of ClariPhos (-40C) enabled the coagulant to be stored outside and did not experience gelling or require heat tracing.



Made with the rare earth elements, cerium and lanthanum, ClariPhos forms a tight, ionic bond with phosphate enabling WWTPs to achieve P limits of 0.1 mg/L or less while maintaining a 1:1 molar dose ratio. Aluminum- or iron-based coagulants are typically dosed at 5:2 molar ratio or greater which means more chemical usage, greater impact on pH and more sludge than ClariPhos.



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