

Case study:

Coping with rising phosphorus loading at a municipal WWTP

- ClariPhos™ Rare Earth Coagulant
- Lakeshore West Water Pollution Control Plant
- Kingsville, Ontario, Canada

Greenhouses are growing rapidly in Kingsville, Ontario and along with them is the volume of nutrient-rich wastewater that is sent to the community's Lakeshore West Water Pollution Control Plant (LWWPCP), which currently treats an average of 5.4 million litres per day.

The plant releases treated effluent into Lake Erie and although it consistently meets regulatory limits for phosphorus removal, public works managers are taking steps to ensure it will continue to do so as nutrient loading increases. Maintaining tight control of phosphorus discharge is also critical to mitigate harmful blue-green algae blooms that are increasingly occurring in Lake Erie.

Trial aims to improve P removal and avoid large capital projects

In March 2021 the town began working with the Ontario Clean Water Agency (OCWA) and Bishop Water to assess the increasing phosphorus loading to the plant and evaluate Bishop Water's ClariPhos Rare Earth Coagulant as an innovative solution to replace traditional ferric chloride.

The 12-month trial will evaluate the ability of ClariPhos to improve phosphorus removal at the plant and avoid costly capital projects to expand clarifier capacity or add tertiary filtration systems.

"If the project is a success, ClariPhos would replace conventional ferric chloride and offset the need for expensive capital upgrades for the Town."

*Andrew Plancke,
Kingsville Director of Infrastructure
and Engineering*

"Phosphorus loading has been a focus for the town because of the rising number of new greenhouses in the area," said Andrew Plancke, Kingsville Director of Infrastructure and Engineering.

"OCWA was very proactive, working with the MECP and Bishop Water to develop and secure 100% funding to conduct a demonstration project. If the project is a success, ClariPhos would replace conventional ferric chloride and offset the need for expensive capital upgrades for the Town."

Bishop Water's ClariPhos coagulant can be tested or fully implemented at a treatment plant often without any modifications to equipment, piping or pumps. Operators simply replace their conventional coagulant with ClariPhos, select the optimum dose location, set the dose rate, and immediately begin using it.

“This project will demonstrate an innovative solution to address the emerging challenges that many wastewater treatment plants face for simple, cost-effective phosphorus removal and recovery,” said Indra Maharjan, Director of Innovation for OCWA. “We plan to share the results of this project with the broader municipal community to enable other wastewater plants to adopt this technology and benefit from it.”

Over 50 treatment plants in the US and several in Ontario have replaced conventional coagulants with this rare earth product to achieve stringent phosphorus limits, gain operational advantages and reduce overall operating costs.

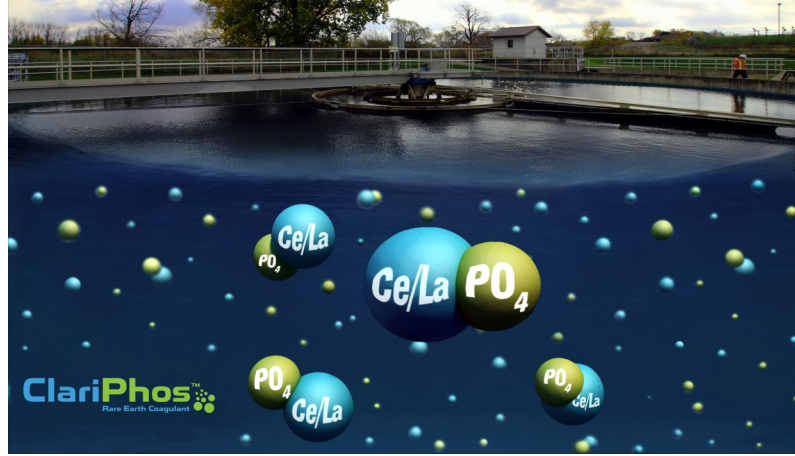
Rare earth formula brings extraordinary benefits

Unlike conventional aluminum- or iron-based coagulants, ClariPhos is made with the rare earth elements cerium and lanthanum. These elements form a stronger bond with phosphorus which means far less of the coagulant is needed to achieve the phosphorus removal target—even when facing ultra-low phosphorus limits.

For example, to achieve a low target phosphorus concentration of 0.07 mg/L, ClariPhos is dosed at a 1:1 molar ratio. Aluminum- or iron-based coagulants are dosed at a much higher molar ratio—typically around 5:2, but the ratio can go as high as 8:1.



A comparison of precipitate produced to remove an equivalent amount of phosphorus.



ClariPhos forms a tight bond with phosphorus to produce a more stable, denser precipitate that settles up to two times faster than conventional coagulants. This improves clarifier performance and reduces the risk of carryover of suspended

ClariPhos also forms a denser, heavier precipitate which settles up to two times faster than conventional alternatives, enabling clarifiers to operate more efficiently, while also providing higher quality effluent.

Other benefits of ClariPhos include:

- Up to 50% reduction in sludge production and improved sludge dewaterability, which translates into significant savings in sludge management, hauling and disposal costs;
- About 100 times less acidic than Al or Fe coagulants, enabling plants to reduce or eliminate the storage, handling and use of pH adjustment chemicals;
- Rated non-hazardous for improved operator safety;
- Low freeze temperature (-40°C) reduces or eliminates the need for heated storage and heat trace lines.

The project is fully funded through the Ontario Ministry of the Environment, Conservation and Parks (MECP) Great Lakes Program.



Bishop Water Technologies

220 Carswell Street, Renfrew, Ontario, Canada, K7V 2G4

T: 1-343-361-0463 | F: 1-844-272-6102 | E: info@bishopwater.ca

www.bishopwater.ca

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