

Procorp

Enterprises LLC

Targeted phosphorus extraction
pellet reactor systems



*Zero waste, cost-effective
wastewater treatment*



Advancing Resource Recovery™

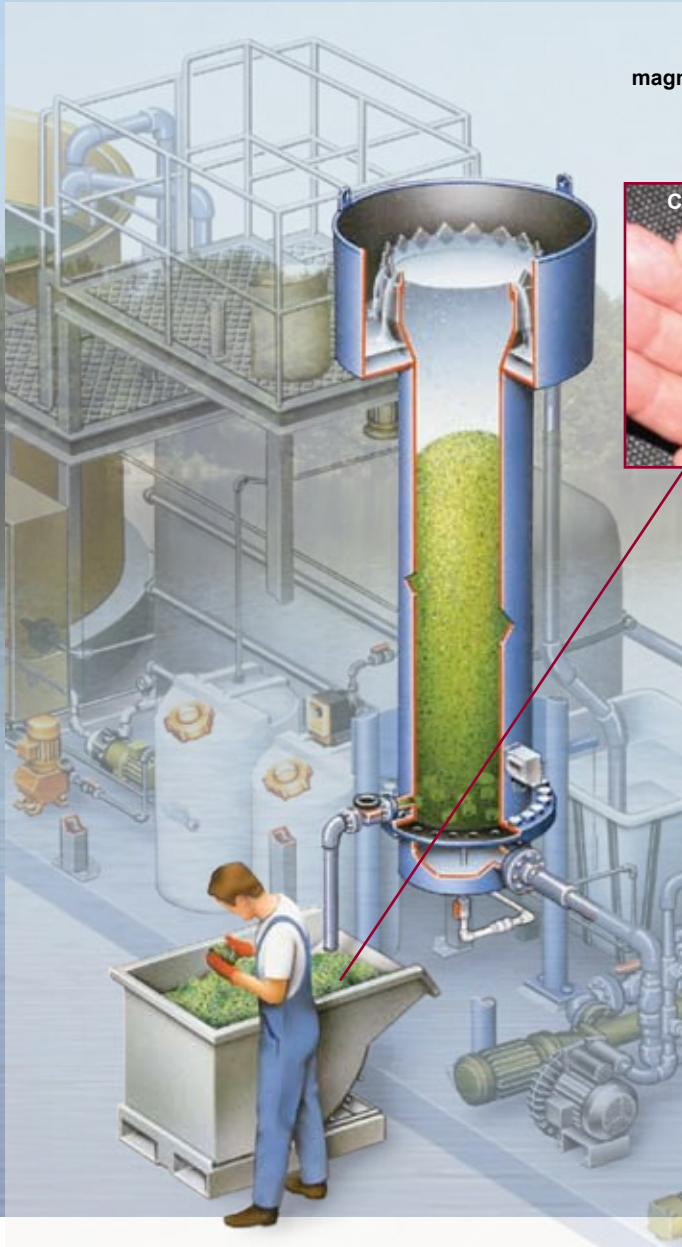
Sustainable wastewater treatment made simple . . . the Procorp way

Safely and quickly extract high purity calcium phosphate, magnesium phosphate or Struvite pellets directly into the recycle bin...

...like this



...instead of this



The Procorp pellet reactor is a simple, efficient, and reliable in-line wastewater treatment system:

- Minimizes sludge disposal and cost
- Crystallizes phosphorus into concentrated, self-dewatering, reusable pellets
- Eliminates phosphorus loading and run-off issues
- Removes both ammonia and phosphorus in one step
- Reduces chemical usage and cost
- Provides a small footprint, modular, skid mounted "plug and play" turnkey solution
- Minimizes operator attention with automated technology
- Robust, reliable chemical/mechanical system
- Eliminates biological variability

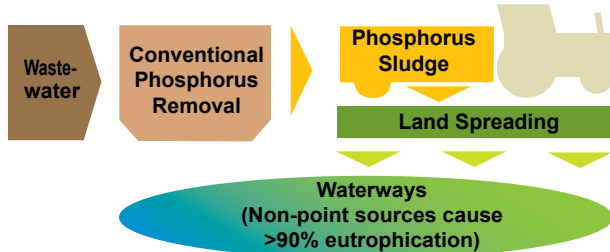
***Proven pellet reactor
technology is the efficient and
effective phosphorus removal
system for today's
wastewater treatment facilities.***

Since their introduction in the 1970s, fluidized bed pellet reactors have become increasingly popular for industrial and municipal water treatment. Full-scale operations for flows up to 120 MGD are in operation in more than 50 facilities worldwide. The proven design is supported by DHV WATER BV, the Netherlands, and is licensed exclusively in North America by Procorp Enterprises LLC.

Breaking the eutrophication cycle

Conventional biological and chemical phosphorus removal systems convert phosphorus into biosolids (sludge). These processes incur high costs for chemicals and waste hauling.

Of even greater concern, they generate increased non-point discharge through land spreading. *In a conventional P-removal process, every gallon of chemical generates about nine gallons of sludge.* This material eventually ends up in our waterways as a major source of eutrophication. Over 90% of eutrophication is a result of non-point source discharge; land application of biosolids is the major contributor.



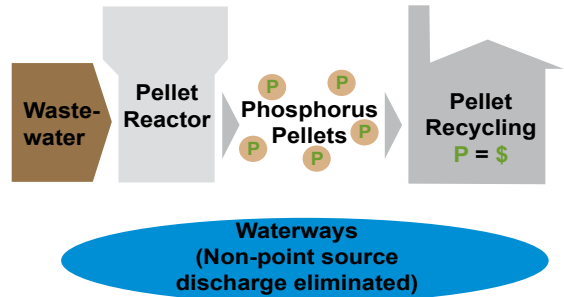
The Procorp pellet reactor, installed in new or existing wastewater treatment facilities, breaks the phosphorus-eutrophication cycle once and for all. The pellet reactor extracts phosphorus as pure, solid pellets which are a valuable recyclable resource for industry. The self-dewatering pellets are dramatically more convenient and cost-effective to manage compared to biosolids, and essentially eliminate non-point source discharge.



Procorp is a team of water experts that fully understands the challenges facing industrial and municipal wastewater operations. We partner with our customers to create sustainable, cost-effective, environmentally-balanced systems that maximize resource recovery in conjunction with reducing operating costs.

Closing the phosphorus loop

The Procorp pellet reactor recovers phosphorus as a renewable byproduct - closing the loop.



This automated, turnkey approach provides substantial benefits over conventional phosphorus removal methods:

- Dramatically improves space utilization
- Creates valuable phosphorus pellets for uses such as ceramic filler for cement, agricultural feed supply, fertilizer feedstock
- Minimizes sludge volume and improves N:P ratio
- Enables energy recovery opportunity

Procorp pellet reactor phosphorus removal reduces costs and improves surface water quality:

Treatment Method	Phosphorus Removal (\$/lb @ Specified Volume)		
	1 MGD	10 MGD	100 MGD
Anoxic/Oxic + Al*	30.91	16.09	12.23
Anaerobic/Anoxic/Oxic + Al*	39.55	17.14	12.55
Procorp Pellet Reactor + Ca	16.70	14.70	13.20
Procorp Pellet Reactor + Ma	14.20	11.60	10.70

* Estimation of Costs of Phosphorus Removal In Wastewater Treatment Facilities. Water Policy Working Paper #2005-011, Jiang, Beck, Cummins, Rowles, Russell. (2005)

The heart of the Procorp system is the pellet reactor. Water is pumped in an upward direction maintaining the seed material in a fluidized state – the crystal pellets form around the seed material. The pellets grow and move toward the reactor bottom. Periodically, the pellets are discharged from the reactor and fresh seed material is added without any downtime, parallel capital equipment or labor. Simple atmospheric drying produces readily handled and virtually water-free, pure pellets.

"In 2000, states, tribes, territories, and interstate commissions report that about 40% of streams, 45% of lakes, and 50% of estuaries that were assessed were not clean enough to support uses such as fishing and swimming. About 33% of U.S. waters were assessed for this national inventory of water quality. Leading causes of impairment in assessed waters include bacteria, nutrients, metals, and siltation. Runoff from agricultural lands, municipal point sources, and hydrologic modification, are the primary sources of impairment. Although the United States has made significant progress in cleaning up polluted waters over the past 30 years, much remains to be done to restore and protect the nation's waters."

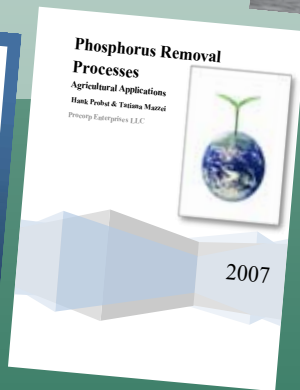
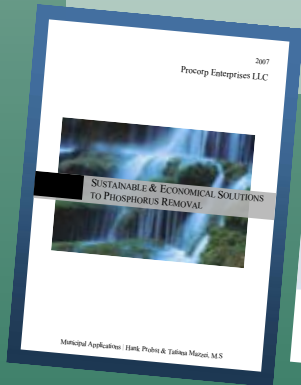
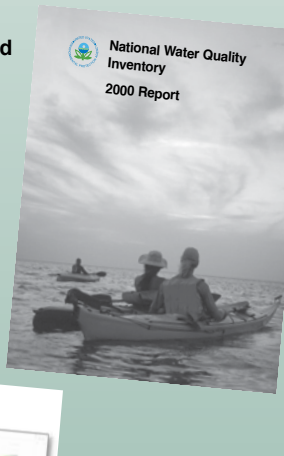
From "Water Quality Conditions in the United States" A Profile from the 2000 National Water Quality Inventory EPA Report

Visit our website for a free pdf copy.

Also available on our website:

"Sustainable & Economical Solutions to Phosphorus Removal – Municipal Applications"

"Phosphorus Removal Processes – Agricultural Applications"



Better. Faster. Closer.

Procorp's passion is Advancing Resource Recovery in water and wastewater treatment. We implement the pellet reactor technology and minimize our customer's risk by applying comprehensive engineering practices:

- Scientifically proven technology
- Water quality evaluation
- Process modeling and performance forecast
- Verification through bench scale testing in R&D
- Estimate of equipment and capital requirements
- On-site pilot testing to prove system performance
- Final equipment design and cost
- Manufacturing and factory testing of equipment packages
- Shipment and installation of skid-mounted, plug and play solutions
- On-site commissioning and training
- On-going technical support

To find out if pellet extraction is right for your application, please complete and submit the Phosphorus Removal Questionnaire on our website. Or, call or email us for a copy.

Please visit our website for more information on pellet extraction and other Procorp water treatment products.

Procorp Enterprises LLC

10200 Innovation Drive, Suite 500 • Milwaukee, WI 53226
800.449.8777 or 414.258.8777 • Fax: 414.258.8066
email: eng@procorp.com • www.procorp.com