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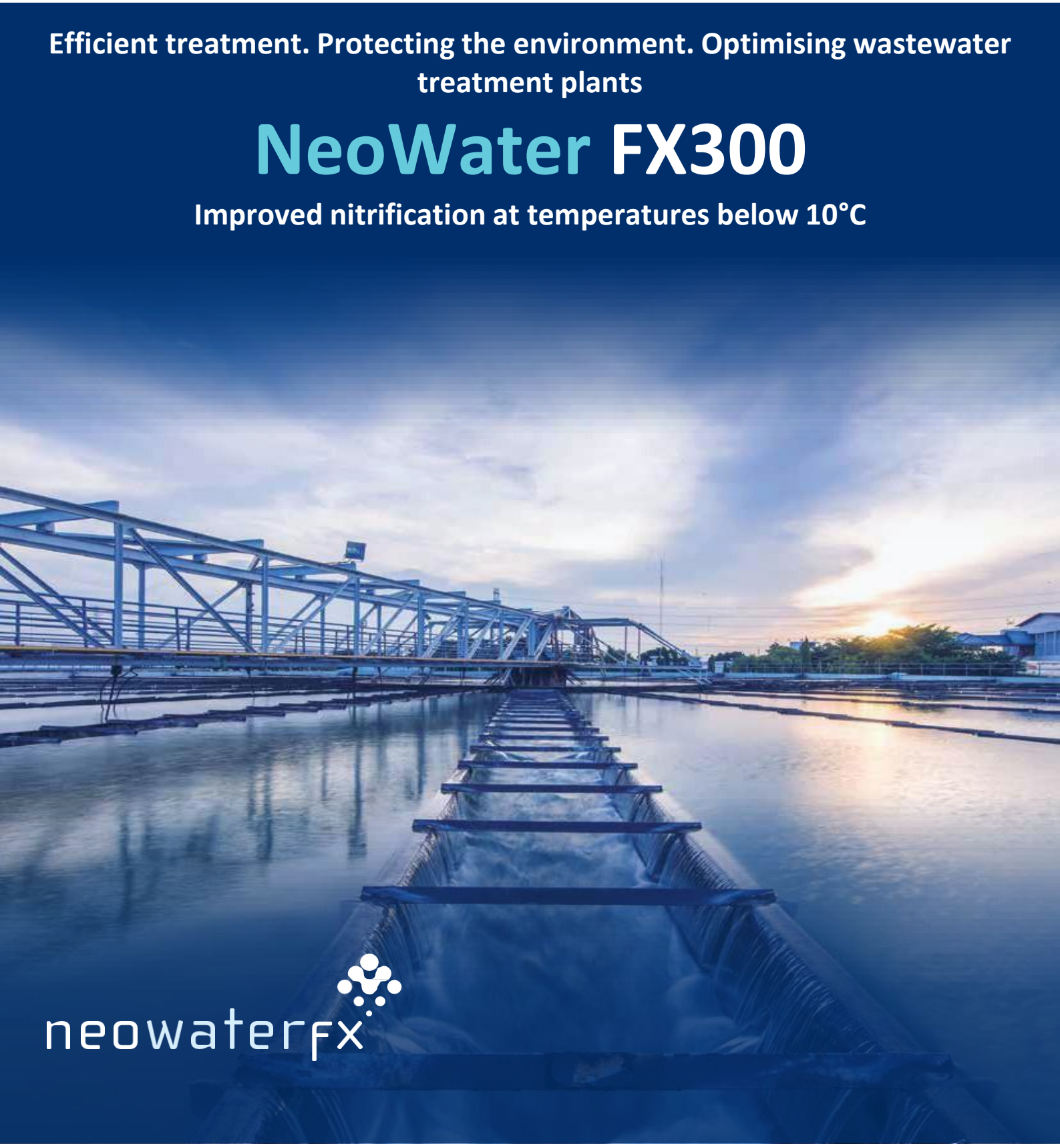
Efficient treatment. Protecting the environment. Optimising wastewater treatment plants

NeoWater FX300

Improved nitrification at temperatures below 10°C



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Neo WaterFX300
Precise phosphorus precipitation – without heavy metals

Neo WaterFX300 precipitates phosphorus using 4 to 8 times less product than conventional precipitants and generates significantly less precipitate sludge, which is also easier to dewater: guaranteed cost-effective wastewater treatment.

Advantages

Very low dosage for phosphorus precipitation (4 to 8 times lower dosage compared to FeCl3)
20–40% lower sludge production
Very good dewaterability of the precipitated sludge
Significantly lower acid input – improved buffering capacity Consequently, better nitrification at temperatures below 10°C
Not classified as a dangerous good under ADR

Applications

Phosphate precipitation
Reduction of the sludge index
Ideal for use in soft water areas (low pH shift)
Removal of fine suspended solids (GUS)

Water chemistry

Precipitating agent

NeoWater

Specifications

Specifications

$LaCl_3$	30 M %
$CeCl_3$	70 M %
Density (20 °C)	1.55 ± 0.63 g/cm³
Appearance	Brownish-yellow, cloudy solution
pH	> 4
Storage	IBC, tank

Operational benefits

The direct ionic binding of phosphorus leads to a massive reduction in flocculant consumption (4–8 times less than ferric chloride)

The lower product dosage and the significant reduction in hydroxide sludge lead to lower precipitated sludge production

The higher molecular weight leads to improved sludge dewatering and a better floc structure

The lower dosing volume and lower alkalinity of Neo WaterFX300 results in a 400- to 1000-fold reduction in acid addition during precipitation. This improves nitrification at low temperatures.

Change in organic/inorganic dry matter content in the biological stage through the use of **Neo WaterFX300**.

→ Activated sludge using **ferric chloride precipitation**

- 20% inorganic hydroxide sludge
- 80% organic activated sludge

→ Activated sludge with **Neo WaterFX300**

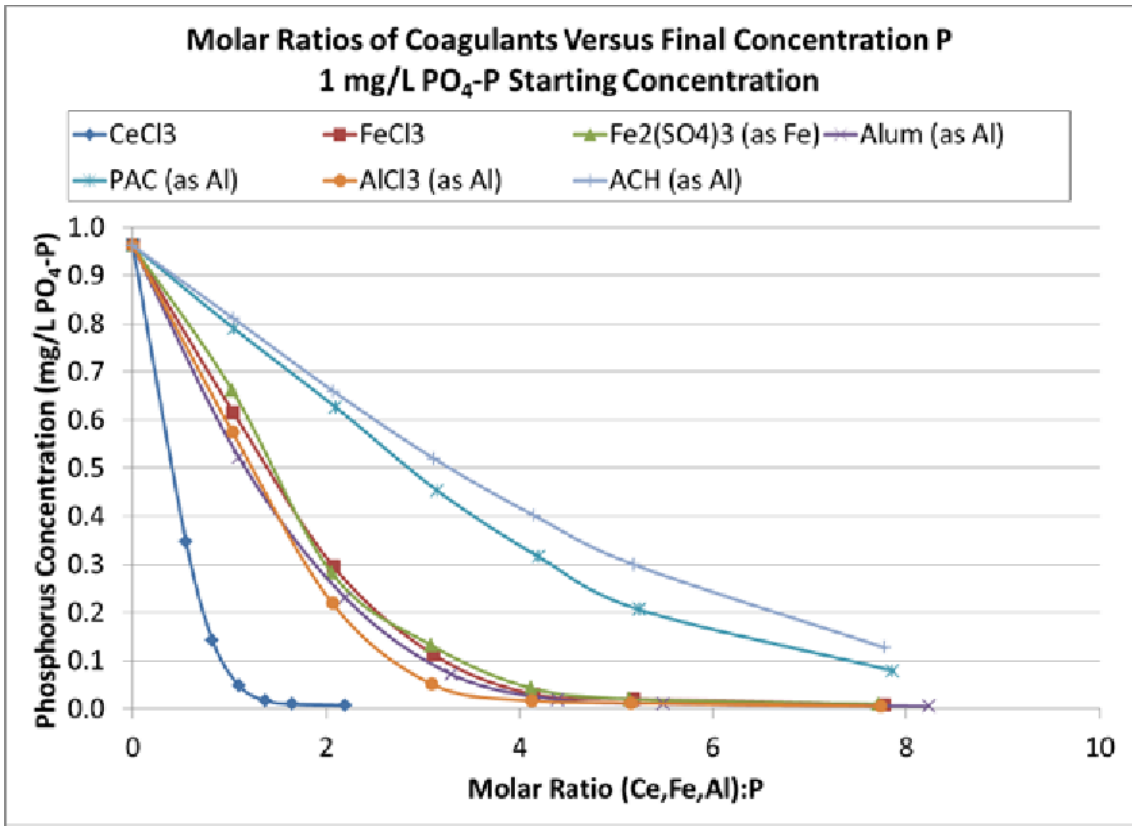
- 20% reduction in sludge volume
- 0% inorganic hydroxide sludge
- 100% organic activated sludge

NeoWaterFX300: Clean water. Fewer chemicals. Greater sustainability

The beta value of Neo WaterFX300 is 1:1 even at low phosphate concentrations

Another difference between iron- and aluminium-based coagulants is the molar ratio of the coagulant to phosphorus – which is required to remove phosphorus in the desired quantity. The figure below shows the phosphorus removal performance of various iron-, aluminium- and $CeCl_3$-based coagulants, plotted against the molar ratio of the coagulant to phosphorus.
Regardless of the initial P concentration, the addition of Neo WaterFX300 in the form of $CeCl_3$ results in the lowest P concentration, with a maximum beta value of 1:1. By comparison, Fe- and Al-based coagulants must be dosed in higher molar ratios (at least 2.5:1 (Fe or Al):P) to achieve similar P concentrations.

This behaviour shows us that systems with low pH limits, such as 0.5 mg/L or lower, precipitate particularly efficiently with Neo WaterFX300.



Adding **Neo WaterFX300** to wastewater has the potential to remove several different anions. In addition to phosphorus in the form of phosphate, **Neo WaterFX300** can form insoluble complexes with carbonate (CO_3^{2-}), hydroxide (OH^-), fluoride (F^-) and arsenic (As^-).

Improved sludge dewatering and settling of activated sludge

→ Lanthanum and cerium are significantly heavier elements than iron and aluminium.

→ This property is evident in the rapid settling of the activated sludge.

→ The separation of digested slurry in the sludge pile is subsequently improved (which is a major problem with some aluminium coagulants)

→ Sludge dewatering can also be optimised thanks to the heavy, compact flocs.

→ There is less deposits (struvite/MAP) in centrate water pipes, on dewatering machines and on secondary clarifier filter systems, as the lanthanum phosphate complex (rhabdophane) does not form any additional bonds and is therefore not deposited.

→ Furthermore, the solubility product is significantly less soluble than iron phosphate and does not undergo re-dissolution during the rest of the process.

Significant savings thanks to the use of NeoWaterFX300

NeoWaterFX300 application in the SBR reactor in Avenches (Switzerland)

Switching entirely to NeoWaterFX300 results in a significantly lower volume of settled sludge, as the inorganic content of the activated sludge is substantially reduced. Furthermore, NeoWaterFX300 does not build up massive hydroxide sludge in the biological treatment stage, such as iron or aluminium hydroxide products. Consequently, the dosing point can also be moved to the outlet of the biological treatment stage to precipitate the phosphorus.

In addition, the inorganic dry matter content should be measured, and this reduction should be taken into account in the total dry matter content. NeoFX also promotes the growth of organic biomass. (In most cases, a 20% reduction in dry matter content results in the same decomposition rate)

Like aluminium salts, NeoWaterFX300 does not form a direct bond with sulphide. We therefore recommend adding a small amount of iron salts to wastewater treatment plants that use anaerobic digestion followed by biogas recovery, as these systems need to bind the sulphur. Based on our practical experience, 5–10% of the total amount of iron coagulant is usually sufficient to ensure adequate sulphide binding.

All that is required is to add a small amount to the excess sludge using an IBC container.

Hybrid application of NeoWaterFX300

NeoWaterFX300 can also be used in conjunction with a coagulant as follows:

1. The amount of ferric chloride precipitant is reduced by 50%.
   (Example: from 200 litres of $FeCl_3$ per day reduced to 100 litres of $FeCl_3$ per day)

2. The shortfall in ferric chloride is supplemented by NeoWaterFX300, which corresponds to approx. 20% of the original iron quantity.
   (Example: 1/5 of 100 litres corresponds to 20 litres of Neo per day)

A major advantage is that the amount of acid added is practically halved, allowing the positive effects of NeoWaterFX300 to come into play:

→ Settling is improved (sludge volume index), thereby replacing costly specialised products.

→ At best, a higher dry matter content can be maintained during winter operation, thereby reducing the nitrite concentration.

→ The separation of digested slurry is significantly improved, resulting in a lower sludge volume and thus reduced disposal costs

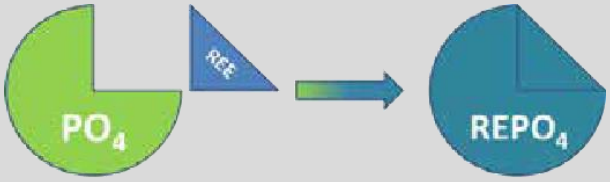
→ The acid capacity and pH value can be increased. (This further reduces the need to use lye, lime or chalk for pH stabilisation.)

→ Reducing the amount of ferric chloride also means fewer deliveries, which has a positive impact on staff and also on the carbon footprint of the logistics chain.[2]

NeoWaterFX300 in use in an SBR reactor (Switzerland)

Precipitation kinetics of phosphate: NeoWaterFX300 vs. Fe/Al precipitation

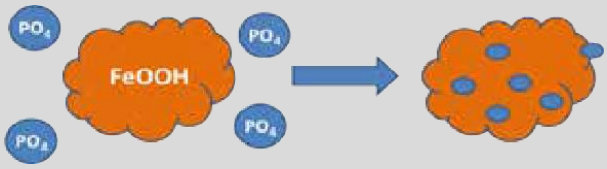
Lanthanide elements



Lanthanide elements form strong, crystalline bonds with phosphorus.

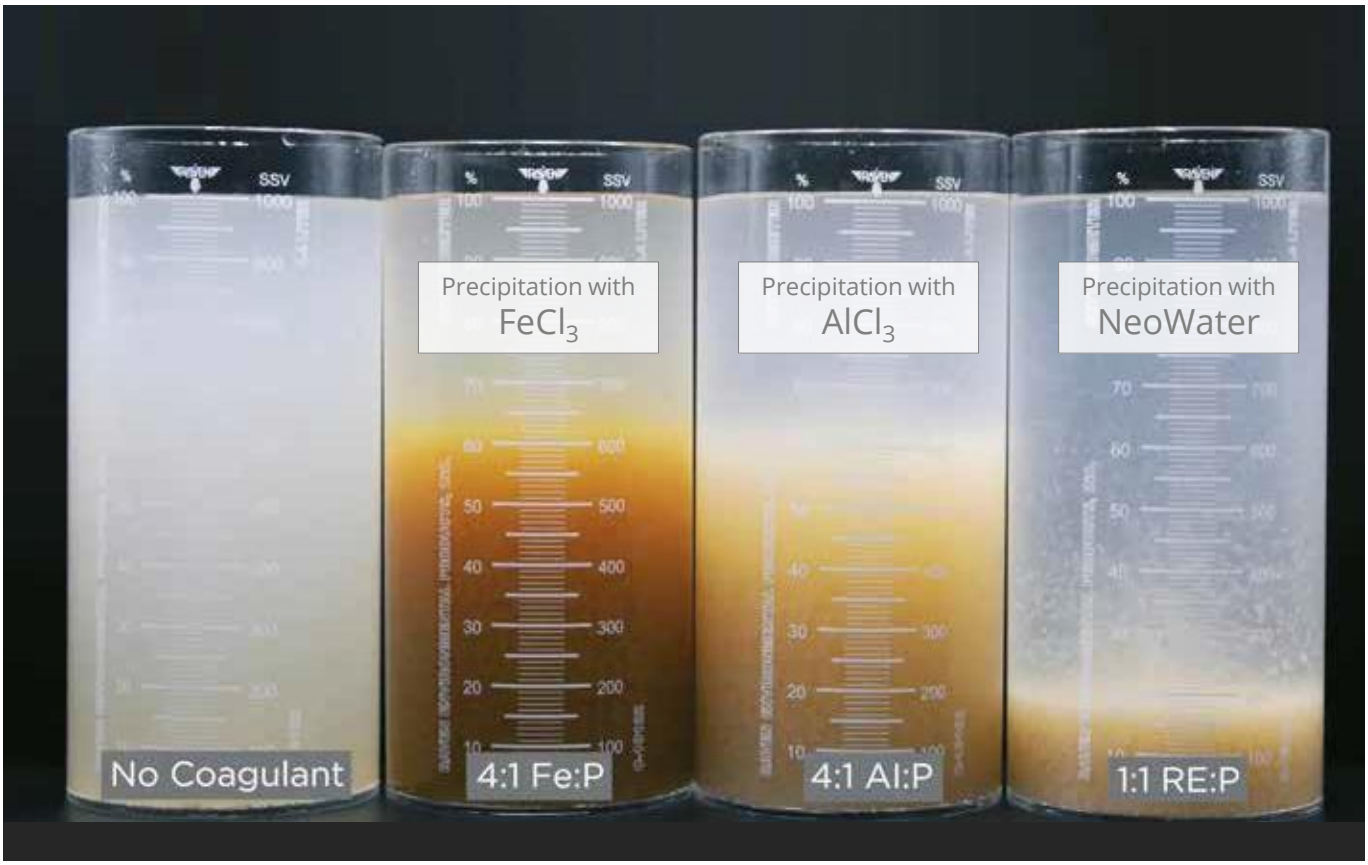
→ The precipitate is CePO4 / LaPO4 (RE = rhabdophane)
→ Forms ionic bonds
→ Reacts preferentially with phosphorus
→ Achieves a molar ratio of 1:1
→ Phosphorus is bound and cannot be easily redissolved
→ Reduced precipitate

Iron/aluminium chloride

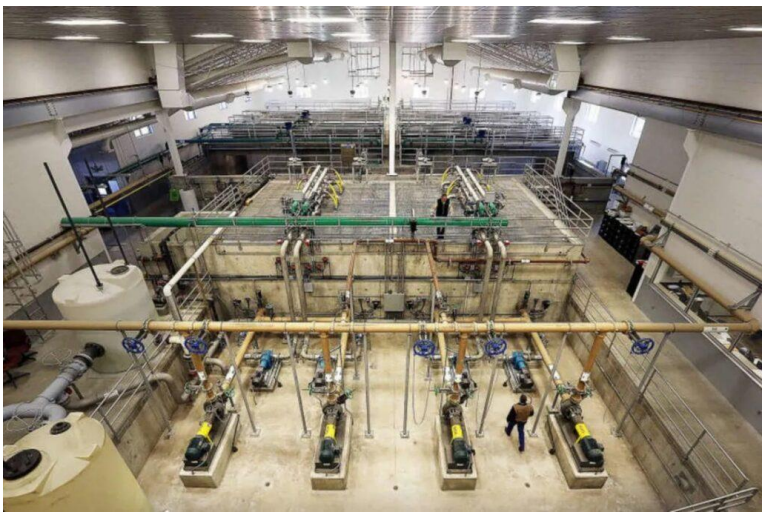


Iron and aluminium chloride form an amorphous 'cloud' in solution.

→ These attract phosphate to metal hydroxide flocs.
→ Forms Fe/AlOOH and Fe/Al(OH)3 intermediates for the adsorption of phosphate
→ Phosphate is adsorbed onto the surface of the flocs (surface attraction chemistry)
→ Phosphate can be mechanically separated (pump, centrifuge)



Case study: Precipitant savings in Utah (USA)



The Jordanelle wastewater treatment plant in Utah (USA) has a very low total phosphorus limit (0.06 mg/L). Following the switch, NeoWaterFX 300 replaces the previously required 500 litres of aluminium sulphate with less than 50 litres per day, achieving full compliance with the limits throughout the year and generating annual savings of USD 25,000 on chemical costs alone.

At the same time, the need for caustic soda for pH correction was virtually eliminated and the solids content in the filter cake was significantly improved, whilst sludge production was reduced by around 14%. These results confirm that NeoWater Treatment's technology represents an economical, efficient and operationally advantageous solution for phosphorus removal and sludge reduction.

Project Key Figures

	Aluminium sulphate	NeoWater
Dosage	500 l	40–50 l
TP limit complied with (0.06 mg/L)	Not consistently	24/365
Caustic soda	140 l/day	-
Sludge reduction	-	14%
Press filter cake solids	16.5%	17.5%
Annual savings	-	25,000

Case study: Waste disposal cost savings, Dallas (USA)

The wastewater treatment plant in Dallas, Georgia (with an average flow rate of approximately 4 million litres per day) had previously been using polyaluminium chloride (PAC) at a dosage of 150–250 litres per day for phosphorus control, with a permissible total phosphorus limit of 1.0 mg/L. The plant had to contend with significant sludge production, high alkalinity consumption and operational difficulties in cold weather, as PAC thickens and gels at temperatures below 2 °C.

Following the switch to Neo WaterFX 300, 60 l/day was sufficient to maintain total P at a stable 0.5 mg/L, whilst simultaneously reducing caustic soda consumption by 25%, significantly reducing algae growth in the secondary clarifiers and simplifying winter operation – thanks to NeoWater's low freezing point (-40°C). Chemical costs alone yield annual savings of USD 10,000. Added to this are significant savings on sludge disposal,

Project Key Figures

	PAC	NeoWaterFX300
Coagulant dosage (l/day)	150–250 (PAC)	50–60
TP in effluent	0.5–0.8 mg/L	stable at 0.5 mg/L
Caustic soda (caustic, l/day)	100	75
Chemical sludge production	-860 kg/day	significantly reduced
Algae growth in settling tanks	problematic	significantly reduced
Annual savings (chemicals only)	-	10,000

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Our products

Water chemistry range

Products for phosphorus precipitation

_ Iron salts (ferric chloride/ferrous chloride)
– Aluminium salts (aluminium chloride, aluminium sulphate, polyaluminium chloride)
– Neo WaterFX300 (lanthanum chloride solution)
– Products for controlling filamentous bacteria
– Blended products (iron-aluminium blended products)
– Combined products with charge carriers

Polymers for sludge dewatering
- Anionic emulsions (liquid)
- Cationic emulsions (liquid)
- Cationic dispersion emulsions (liquid)
- Anionic and non-ionic solid polymers
- Cationic powder polymers

Products for pH regulation
- Sulphuric acid (25–50%)
- Sodium hydroxide solution (30–50%)
- Hydrochloric acid (25–32%)
- Chalk/lime

Cleaning/Scale reduction/Defoaming
- Ropur RWI® 8000 Scale inhibitor
- Membrane cleaner (alkaline, hypochlorite or acid)
- PressClean (cleaner for dewatering machines and removal of impurities contaminants caused by iron products
- Hydrogen peroxide 35%
- Phosphoric acid (80–85%)
- "Special" defoamer for digestion towers and biological treatment

Odour reduction
- Ensola Antiodour

Range of process measurement technology a sampling

- Maxx sampling devices
- WTW/Xylem process measurement technology Nitrogen (NH4/NO3, TS solids measurement and Oxygen, pH
- 3S TOC Analyser
- 3S Process Photometer Phosphate, Nitrite, Ammonium
- Microtronics decentralised measurements

Range of dosing technology

- **GEA/Flocmix:** Dynamic mixing and dosing systems
- **Grundfos:** Dosing pumps for coagulants
- **Watson Marlow:** Dosing pumps for coagulants and polymers
- Tank construction (1–100 m^3)
- Dosing panels (0 – 4000 litres/day)
- IBC agitators

Laboratory analysis range

- Macherey & Nagel laboratory photometry
- WTW/Xylem laboratory measurement technology
- IDL laboratory consumables
- Laboratory reagents and process chemicals

Gas monitoring and safety technology

- Riken Keiki Mobile and stationary gas monitoring
- PSA – Tripods, fall protection and lifting cranes

Our services

- Process measurement services
- Laboratory measurement services
- Calibration service for gas and safety technology
- Rental of process measurement equipment and measurement campaigns
- Temporary data acquisition
- Short-term fault rectification

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Ensola

Due to the varying conditions in environmental technology, solutions are difficult to standardise. Requirements and applications can vary significantly depending on the location.

We work with reliable partners and high-quality products to develop bespoke solutions with our customers.

Thanks to our many years of experience with countless systems, we can support you in addressing your specific challenges with practical, tried-and-tested expertise.

Competent. Reliable. Fast.

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