MUNICIPAL WASTEWATER

HACH®

Be Right™

Online Solutions
Lab Solutions
Portable Solutions
Service Solutions

Municipal Wastewater Nutrient Monitoring Reference Guide

Hach believes that people in homes, companies and industries all deserve safe, reliable water

Municipal wastewater facilities are under increasing pressure to meet tighter nutrient limits while controlling energy use, chemical spend, and operational complexity. Effective nutrient monitoring gives operators the confidence to respond to changing influent conditions, protect biological processes, and maintain consistent permit compliance—without over-aerating or over-dosing chemicals.

Why Nutrient Monitoring and Control Is Important in Wastewater Treatment

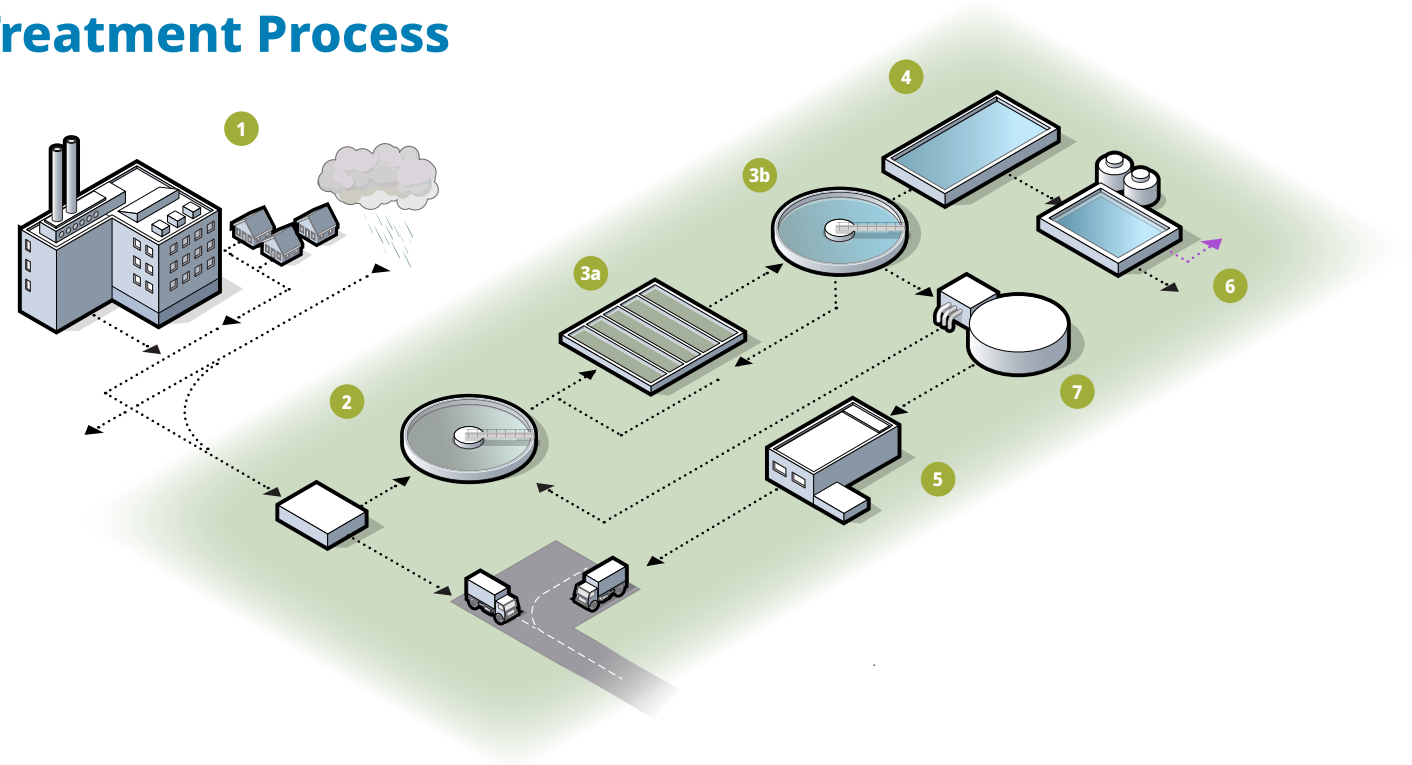
Nutrient monitoring and control are critical components of effective wastewater treatment because excess nitrogen and phosphorus discharged to receiving waters are a leading cause of water quality impairment. When nutrients are not adequately managed, they can stimulate excessive algal and aquatic plant growth, a process known as eutrophication. This leads to oxygen depletion, fish kills, loss of biodiversity, and the formation of harmful algal blooms which can produce toxins dangerous to human and ecosystem health.

From a regulatory standpoint, wastewater treatment facilities are required to meet increasingly stringent discharge limits for total nitrogen and total phosphorus under permits such as the U.S. EPA's National Pollutant Discharge Elimination System (NPDES). Continuous and reliable nutrient monitoring allows operators to demonstrate compliance, avoid permit violations, and support long-term watershed nutrient reduction goals established under the Clean Water Act.

Operationally, nutrient monitoring provides essential feedback for process control. Biological nutrient removal (BNR) processes depend on carefully balanced conditions to support nitrification, denitrification, and biological phosphorus removal. Real-time or frequent measurement of nutrient species enables operators to optimize aeration, carbon addition, and sludge handling, improving treatment efficiency while minimizing energy use and chemical costs.

By controlling nutrients upstream, utilities protect downstream water quality, reduce treatment risk for drinking water sources, and maintain public trust in essential infrastructure.

Wastewater Treatment Process



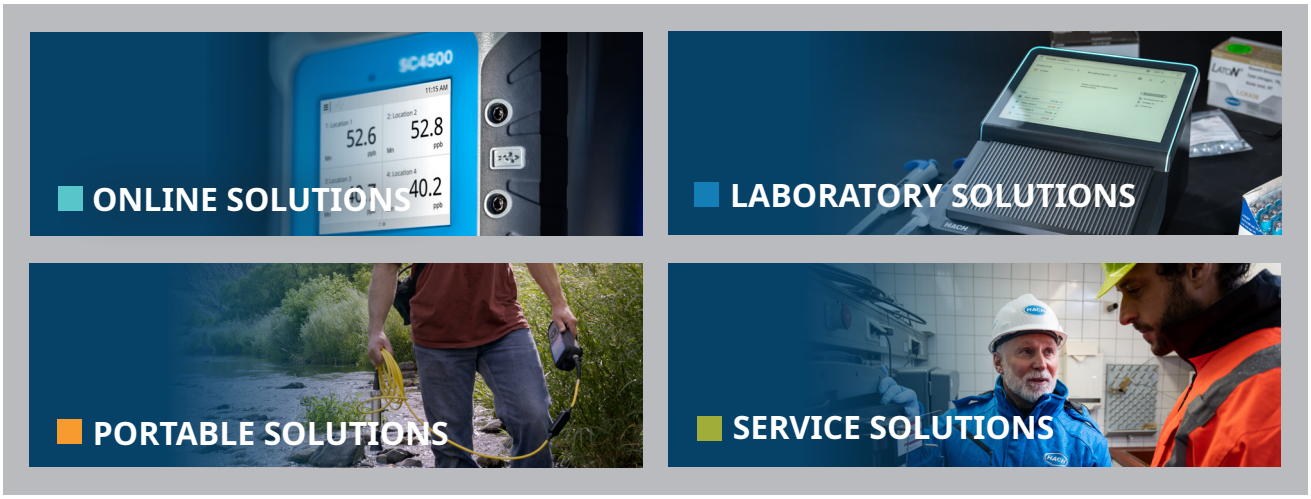
	WATER TREATMENT STAGE	PARAMETERS	REASON FOR MEASUREMENT	SUITABLE HACH OFFER
1	**Influent Monitoring**	H_2S, pH, ORP, conductivity, ammonia, nitrate, phosphorous, TOC, oil in water	Early detection of raw water contamination and loading	pHD, Solitax sc, inductive conductivity (3798sc), TSS sc, UVAS plus sc, BioTector, NH6000sc, NP6000sc , NT3100sc, FP360sc, GS2440ex
2	**Preliminary and Primary Treatment**	Ammonia, nitrate, nitrite, phosphate, dissolved oxygen, suspended solids, alkalinity	Address higher nutrient, organics and other contaminent levels entering the secondary process	NH6000sc, NP6000sc, NT3100sc, LDO 2 sc, pHD, Solitax sc/TSS sc, EZ
3a	**Secondary Treatment-Aeration**	pH, ORP, DO, ammonia, nitrate, phosphorous, solids	Process optimization, chemical feed, aeration control, permit	NH6000sc, NP6000sc, NT3100sc, LDO 2 sc, pHD, Solitax sc/TSS sc, EZ
3b	**Secondary Treatment-Clarifiers**	Sludge level	Remove solids from aeration process. Control RAS and WAS	Sonatax sc
4	**Tertiary Treatment/ Disinfection**	pH, suspended solids, alkalinity, chlorine, ORP, UV transmittance	Solids and organics removal	pHD, CL17sc, ULR CL17sc, EZ, UVAS plus sc
5	**Solids Handling**	Conductivity, pH, alkalinity, DO, alkalinity, VFA, solids	Digester efficiency, polymer dosing	EZ-hardness, EZ-alkalinity, pHD, Solitax sc, LDO 2 sc
6	**Effluent/Reuse**	Conductivity, pH, turbidity, solids, DO, ammonia, nitrate, phosphorous,	Final quality check. Permit compliance.	pHD, Solitax sc, NH6000, NP6000sc, NT3100sc, LDO 2 sc, Samplers
7	**Thickening and Digestion**	Conductivity, pH, turbidity, hardness, alkalinity	Installation life time and image	EZ-hardness, EZ-alkalinity, pHD, Solitax sc

What Operators Are Up Against

Municipal wastewater plants must balance strict NPDES nutrient limits with highly variable influent loads and tight operating budgets. Common challenges include:

- Influent variability disrupts biological nutrient removal
- Rising energy and chemical costs, especially in aeration
- Limited visibility into ammonia, nitrate, and phosphorus performance
- Risk of permit violations during load swings or wet-weather events
- Manual sampling that delays corrective action
- Real-time nutrient insight allows operators to adapt quickly, stabilize biology, and avoid costly over-correction

Where Hach Fits Across the Treatment Process



Hach nutrient solutions are designed for the realities of municipal wastewater treatment—variable flows, demanding environments, and limited operator time.

Our portfolio supports:

- Energy-efficient aeration control through accurate DO, ammonia, and nitrate measurement
- Chemical optimization by preventing over-dosing and unnecessary adjustments
- Operational confidence with lab-quality results from online, portable, and laboratory solutions
- Simplified maintenance with automated cleaning, calibration, and long service intervals

From headworks to effluent, Hach provides a consistent measurement approach which helps operators respond faster, operate more efficiently, and stay in compliance.

FEATURED WATER ANALYSIS SOLUTIONS

Online: Controllers

SC4500 Controller

- Dual-channel controller with touch screen
- Connect combination of sensors or analog inputs
- Create networks up to 5 controllers
- Multiple output configurations including 4-20mA (5), Modbus TCP/IP, Ethernet IP, Modbus 485, Profinet, Profibus, LAN
- Configurable with up to 7 relays
- Cloud enabled communications for instrument health and diagnostics

SC1000 Controller

- Color touch-screen display
- Probe module accepts 1-8 sensors with up to 2 Analyzers.
- Optional DIN-rail communication modules
- Communication options include 4-20mA, Modbus TCP/IP and Modbus 485
- Network up to 3 Probe modules with 1 display

FEATURED WATER ANALYSIS SOLUTIONS

Online: Sensors and Analyzers

Ammonia - NH6000sc

- GSE Gas Sensing Electrode
- Lab quality results
- 6-month maintenance interval
- Auto calibrating and cleaning
- Indoor or outdoor installation
- Integrated filtration control
- Lightweight and robust filtration
- Multiple ranges, user defined
  - Measuring range 1: 0.02 - 5.0 mg/L NH_4-N
  - Measuring range 2: 0.05 - 20 mg/L NH_4-N
  - Measuring range 3: 1 - 100 mg/L NH_4-N
  - Measuring range 4: 10 - 1000 mg/L NH_4-N

WHERE YOU MIGHT USE:
Primary effluent, aeration, post aeration, and effluent

Ammonia – A-ISE sc

- Ion Selective Measurement
- Effective measurement when lab quality results are not needed
- Applications where ammonia is greater than 1.0 mg/L NH_4-N
- Internal potassium correction with temperature
- Convenient pole-mounting hardware can attach to handrail
- 6-month sensor cartridge replacement
- Indoor or outdoor installation
- Optional (recommended) air blast cleaning system
- Budget friendly

WHERE YOU MIGHT USE:
Final influent, pre-aeration, and pre-aeration splitter box

FEATURED WATER ANALYSIS SOLUTIONS

Online: Sensors and Analyzers

Nitrate – NT3100sc

- UV absorbance
- Lab quality results
- Multiple pathlengths available to accommodate your application
  - 1mm 0.1-90 mg/L NO_3-N Influent and process (TSS over 5000 mg/L)
  - 2mm 0.05-50 mg/L NO_3-N Influent and process, effluent
  - 5mm 0.02-25 mg/L NO_3-N Effluent
- Convenient pole-mounting hardware can attach to handrail
- Optional flow through mounting
- Indoor or outdoor installation

WHERE YOU MIGHT USE:
Pre-anoxic zone, post aeration, and effluent

Nitrate – N-ISE sc – AN-ISE sc Combination ammonia/nitrate

- Ion Selective Measurement
- Effective measurement when lab quality results are not needed
- Applications where nitrate is greater than 1.0 mg/L NO_3-N
- Internal chloride correction with temperature
- Convenient pole-mounting hardware can attach to handrail
- 6-month sensor cartridge replacement
- Indoor or outdoor installation
- Optional (recommended) air blast cleaning system
- Budget friendly

WHERE YOU MIGHT USE:
Pre-anoxic zone, post aeration, and RAS recirculation

FEATURED WATER ANALYSIS SOLUTIONS

Online: Sensors and Analyzers

Orthophosphate – NP6000sc

- Colorimetric measurement
- Lab quality results
- 6-month maintenance interval, including reagent replacement
- Grab sample/verification port
- Auto calibrating and cleaning
- Indoor or outdoor installation
- Integrated filtration control
- Lightweight and robust filtration
- Multiple ranges, user defined
  - Low range 0.015-5.0 mg/L PO_4-P
  - Medium range 0.05-15 mg/L PO_4-P
  - High range 1-75 mg/L PO_4-P

WHERE YOU MIGHT USE:
Post chemical mix, primary influent, post secondaries, and effluent

Filtration – FX620 – NH6000sc and NP6000sc

- Rugged, light weight construction 7.7 lbs.
- Lower height dimension 16”
- Single filter element
- More robust air scouring
- Self-cleaning analyzer supply line cleaning
- Hinged module mounting creates less stress
- Simple element replacement without removing tubes

FEATURED WATER ANALYSIS SOLUTIONS

Online: Sensors and Analyzers

Solids – Solitax sc

- 90 degree measuring method
- Dual beam optics
- Backscatter detection for heavy solids applications
- Self-cleaning wiper
- Indoor or outdoor installation
- Immersion or insertion mounting
- SS or PVC construction (application dependent)
- Ranges:
  - 0.001-50 g/L TSS
  - 0.001-500 g/L TSS
- Can measure turbidity 0.001-4000 NTU
- DIN EN ISO 7027

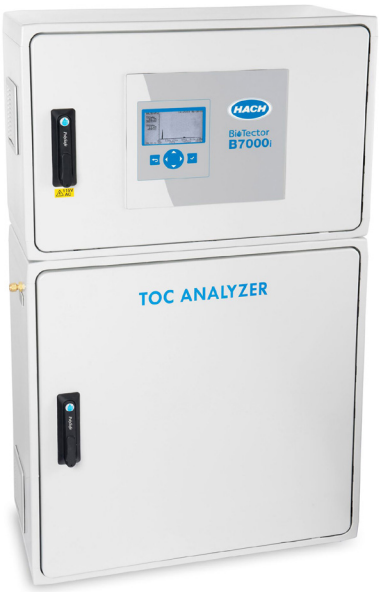
WHERE YOU MIGHT USE:
WAS, RAS, aeration basin, sludge handling (presses, centrifuges, thickeners), and effluent

EZ Series – special application analyzers

- EZ sc Series Online Analyzers offer multiple options to Multiple stream analysis (1-8 streams) reducing cost per sampling point
- Multiple, single parameter configurations available
  - Ammonia
  - Nitrate, total nitrogen
  - Ortho and total phosphorous
  - Alkalinity
  - VFA
- Multiple ranges and dilutions available (filtration as required)
- Indoor only

FEATURED WATER ANALYSIS SOLUTIONS

Online: Sensors and Analyzers



TOC – BioTector

- 0-20,000 mg/L C
- 1,2,4 or 6 stream configurations
- Two-stage advanced oxidation
- Self cleaning oxidation technology
- Oversized tubing eliminates filtration
- Cycle time as low as 6.5 minutes
- 6-month service interval
- Influent and effluent applications

Samplers

- All weather, indoor, and portable configurations
- Fully programmable
- Flow, time-based, or event sampling
- Composite or discrete bottle set up
- Full bottle shut-off
- Liquid detection
- Compartment heater (all weather models)

FEATURED WATER ANALYSIS SOLUTIONS

Online: Sensors and Analyzers

Dissolved Oxygen – LDO sc Model 2

- Luminescent Dissolved Oxygen (LDO) is an optical dissolved oxygen probe that accurately measures dissolved oxygen levels in water
- Probe has a robust design with a small footprint
- Hach LDO probe comes ready to use right out of the box, with no calibration required for life of the sensor cap
- 3-year warranty, and the sensor cap has a 2-year warranty
- Pole mount and flow through options

pH/ORP – Differential pH and ORP Sensors

- Rugged, rebuildable pH and ORP sensors.
- Salt bridge and fill solution approx. 6-month service life
- Single filter element
- Air or water cleaning available
- Immersion, insertion and flow through mounting
- Simple and quick calibrations
- Measure sensor life in years not months

pH/ORP – LCP pH and ORP Sensors

- Liquid crystal polymer construction
- Rebuildable sensors
- Great for challenging application like scrubbers and digesters

FEATURED WATER ANALYSIS SOLUTIONS

Laboratory Analysis Products

DR6000 UV-VIS Spectrophotometer

- Dual-channel controller
- Connect combination of sensors or analog inputs
- Create networks up to 5 controllers
- Multiple output configurations including 4-20mA (5), Modbus TCP/IP, Ethernet IP, Modbus 485, Profinet, Profibus, LAN
- Configurable with up to 7 relays
- Cloud enabled communications for instrument health and diagnostics

DR4900 Laboratory Spectrophotometer

- Over 240 built-in water quality test methods
- Reading mode: transmittance (%), absorbance and concentration
- Wavelength accuracy: ± 1.5 nm
- Wavelength range: 320 - 1100 nm
- Designed for seamless integration with Hach TNTplus®, Vial Chemistries
- Water protection is IP67 (waterproof)
- Wavelength resolution: 1 nm

FEATURED WATER ANALYSIS SOLUTIONS

Laboratory Analysis Products

TNTplus Nutrient Chemistries

- Use with DR4900 or DR6000
- Barcode technology reduces errors
- No reagent blanks needed
- Safe and easy handling
- Multiple parameters and ranges available including:
  - Ammonia
  - Nitrate
  - Phosphorous (ortho and total)
  - Nitrogen (TKN, total)

DRB200 Digital reactor block

- Pre-programmed with all standard digestions
- Single or dual block
- Accommodates 13,16 and 20mm vials
- Displays time and temperature
- Multiple vial configurations

FEATURED WATER ANALYSIS SOLUTIONS

Portables

Portable TSS

- Measures TSS, Turbidity and sludge level
- Multiple calibration curves
- TSS range 0.001-400 g/L
- Turbidity range 0.001-9999 FNU
- Air bubble compensation

HQ Series

- Rugged design for field or lab use
- Model options for up to 3 probes simultaneously
- Supports multiple parameters for drinking water, wastewater, and industrial applications
- USB data transfer

SL1000/SL250

- 4 Chemkey ports (SL1000)
- 2 HQ Intellical sensor ports
- Supports multiple parameters
- Drinking water, Wastewater and industrial applications

*Sample filtration may be required for wastewater and industrial applications

FEATURED WATER ANALYSIS SOLUTIONS

Service

Warranty Upgrade – WRTUPG

- Basic startup included – takes the place of Visit 1 on the instrument
- Preventative maintenance per the factory recommended schedule

  Parts, labor and travel included
- Calibration, verification, and/or certification conducted per the factory recommended schedule
- Repairs on site at no additional cost
- No additional travel costs
- For new instruments only

What Is Included

STARTUP	Commissioning	✓
	Calibration/ Certification	✓
MAINTENANCE	Preventive Maintenance Wear Parts Included	✓
	Repairs Spare Parts Included	✓
LOCATION	On Site	✓
	Hach Service Center	

Field Service Partnership – FSP

- Preventative maintenance conducted per the factory recommended schedule

  Parts, labor and travel included
- Calibration, verification, and/or certification conducted per the factory recommended schedule
- Repairs on site at no additional cost
- No additional travel costs

What Is Included

STARTUP	Commissioning	
	Calibration/ Certification	✓
MAINTENANCE	Preventive Maintenance Wear Parts Included	✓
	Repairs Spare Parts Included	✓
LOCATION	On Site	✓
	Hach Service Center	

Bench Service Plus – BSP

- Preventative maintenance conducted per the factory recommended schedule

  Parts, labor and travel included
- Calibration, verification, and/or certification conducted per the factory recommended schedule
- Repairs at factory - no additional cost
- Loaners available

What Is Included

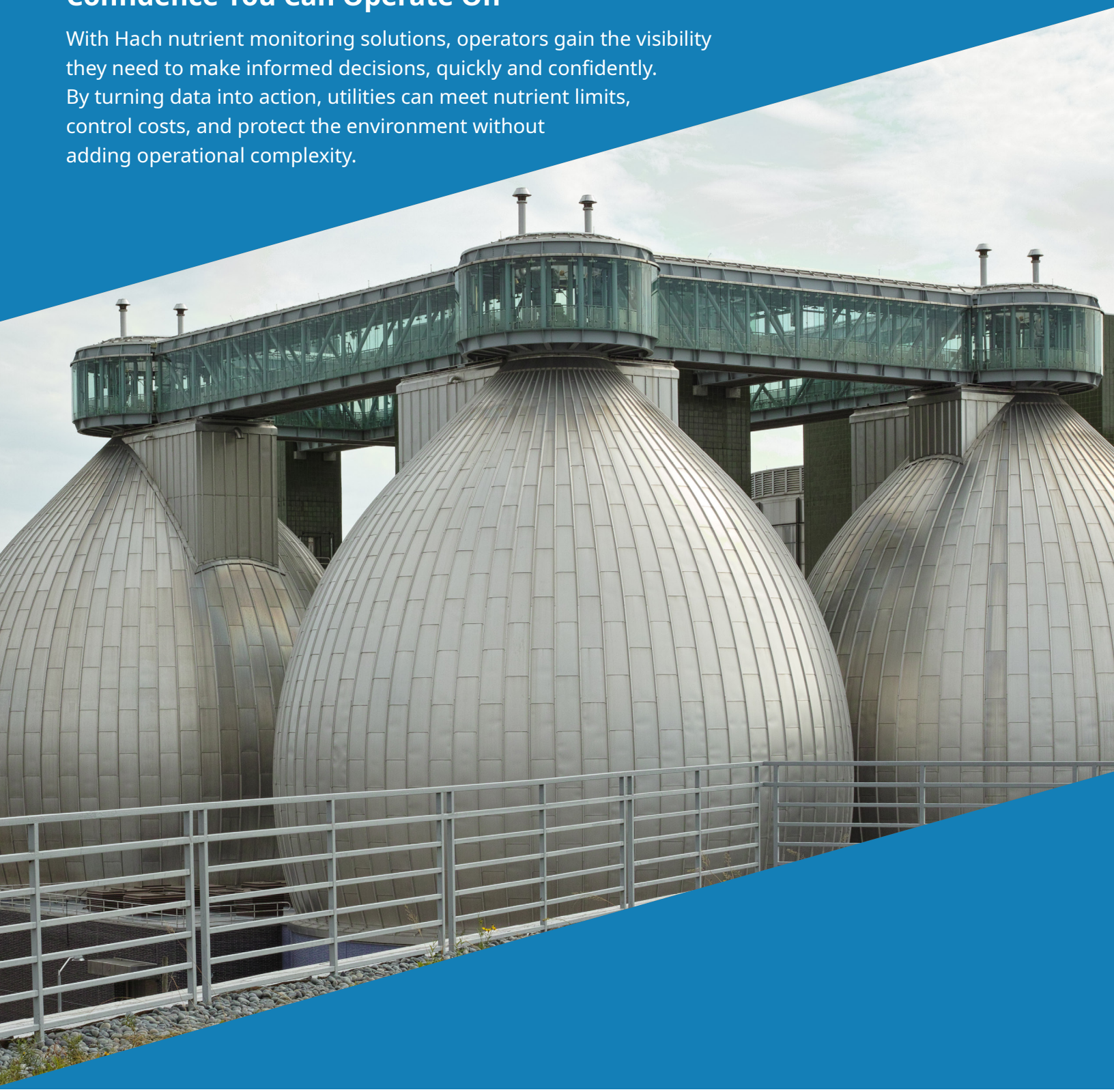
STARTUP	Commissioning	
	Calibration/ Certification	✓
MAINTENANCE	Preventive Maintenance Wear Parts Included	✓
	Repairs Spare Parts Included	✓
LOCATION	On Site	
	Hach Service Center	✓

To inquire for other service offerings please contact your Sales Representative

MUNICIPLE WASTEWATER

Confidence You Can Operate On

With Hach nutrient monitoring solutions, operators gain the visibility they need to make informed decisions, quickly and confidently. By turning data into action, utilities can meet nutrient limits, control costs, and protect the environment without adding operational complexity.



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