



Sustainable Water Solutions for the Mining Industry

WATER TECHNOLOGIES

Creating Water Solutions for the Mining Industry

Veolia Water Technologies partners with exploration, engineering, and mining companies to solve their water issues, from production of potable water or desalinated water in remote locations to process water and wastewater solutions for all types of hard and soft rock mining sites including solution mining.

We provide a full range of services including preliminary and detailed engineering, standard and custom water treatment equipment, project management, and maintenance services as well as long-term operation.



Dedicated experts at your service

Specialized expertise

We provide specialized water systems, thanks to our understanding of the unique requirements of mine operations and our worldwide expertise in mine water issues.

Focusing on system performance, compliance with process and environmental requirements and long-term cost-effectiveness, we are able to meet the demanding reliability, safety and quality standards of the mining industry.

Meeting your needs

- To **improve productivity** by treating water for production process requirements
- To **manage environmental risks** by treating contaminated water to achieve water quality suitable for reuse or for safe discharge into the environment
- To **add value** to the bottom line by treating sludge streams to recover suspended and dissolved constituents
- To secure **high quality drinking water**, even at remote mining sites
- To have **robust and reliable equipment** requiring minimal unplanned maintenance
- To cope with production peaks while **complying with stringent regulations**
- To guarantee long-term efficiency and cost control through **operations services**

Applications

Tailings pond water treatment for reuse or discharge

Gold / Silver cyanide solution treatment

Merrill-Crowe clarification filters

Treatment of contaminated pit and underground mine water

Reuse of mine water for irrigation

Heavy metals removal / metal recovery

Ammonia / Nitrate removal

Effluent treatment

Sulfate reduction

Potable water and sanitary systems (mining camps)

Resource recovery



A world of experience

1 MINE WATER

- › Ground water, surface water, grey water
- › Seawater desalination
- › Process water treatment

COEUR KENSINGTON COMET MINE

Alaska, USA

- Design and supply mine water treatment plant and expansion
- Capacity: 3,000 gpm
- Process: Actiflo® clarification, Multimedia filtration



2 LEACH LIQUOR FILTRATION

- › Recovery of precious metals from leach stream

ALLIED NEVADA HYCROFT

Nevada, USA

- Seven (7) Filtra-matic 3400 ft² pressure leaf clarification filters
- Full automation with DE handling system for precoat and body feed
- 3400-gpm for each filter; 20,000-gpm (4634 m³/hr) system design



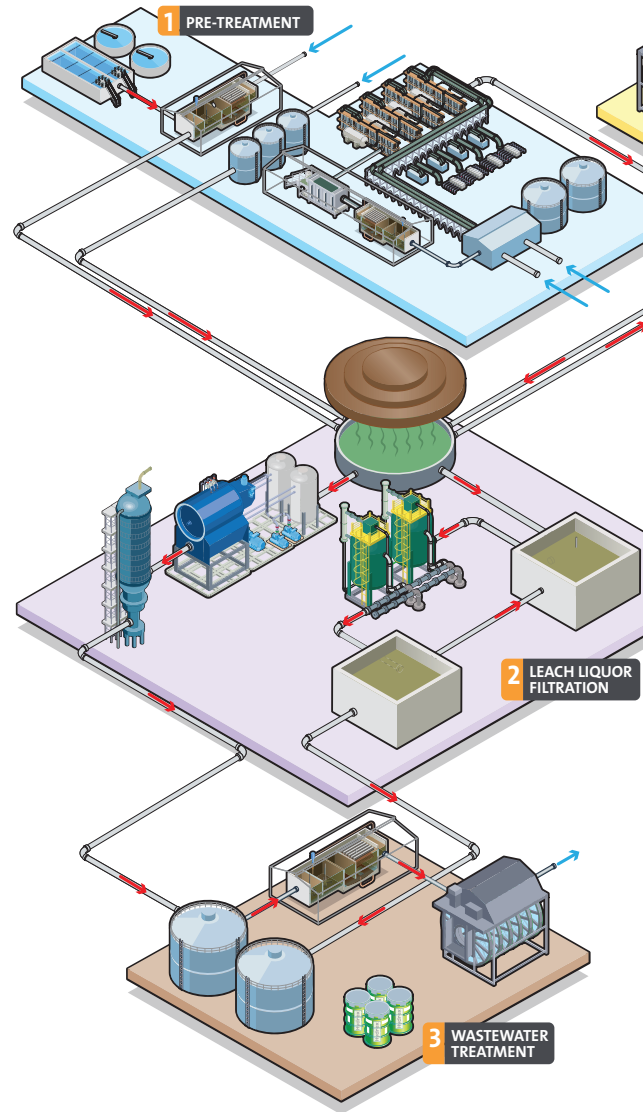
3 WASTEWATER TREATMENT

- › Removal of contaminants: suspended solids, heavy metals, cyanide, arsenic, selenium, iron, manganese, chromium, etc.

SASOL EDR BRINE

South Africa

- Design, supply, installation and commissioning of a system for desalination and reuse of mine water
- Capacity: 3,240 m³/d Electro-dialysis Reversal (EDR) brine feed
- Evaporation capacity: 134 T/h
- Process: The largest forced circulation evaporator in Africa along with three crystallizers



7 SERVICES

- › Complete water cycle management & outsourcing
- › Mobile and temporary solutions

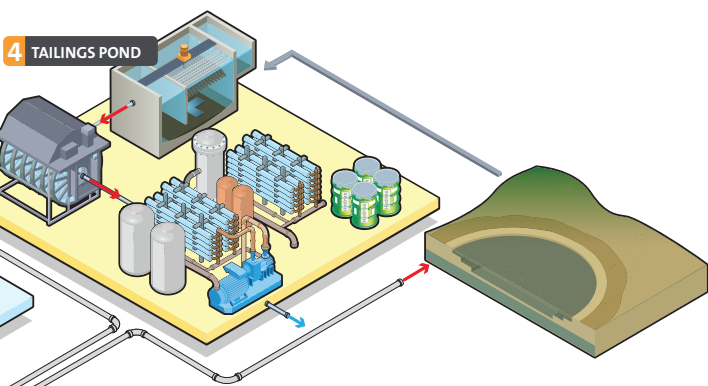
WHEAL JANE MINE

Cornwall, England

- Operate and maintain a treatment plant that extracts water from a closed tin mine until 2020
- Capacity: 405 l/s (max)
- Process: Sludge recirculation, reaction using lime addition, lamella clarification, sludge management



in the mining industry

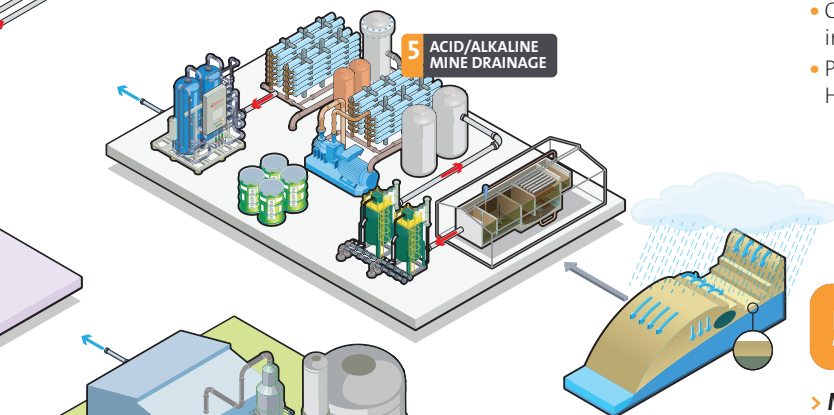


4 TAILINGS POND

- > Dewatering and drying
- > Water Recovery and Reuse
- > Discharge compliance
- > Positive water balance control

GOLDCORP MARLIN GOLD MINE Guatemala

- Design and procurement of a cyanide oxidation and metals removal plant to treat tailings impoundment
- Capacity: 500 m³/h from tailings impoundment
- Process: Actiflo[®] clarification and Hydrotech[™] Discfilter

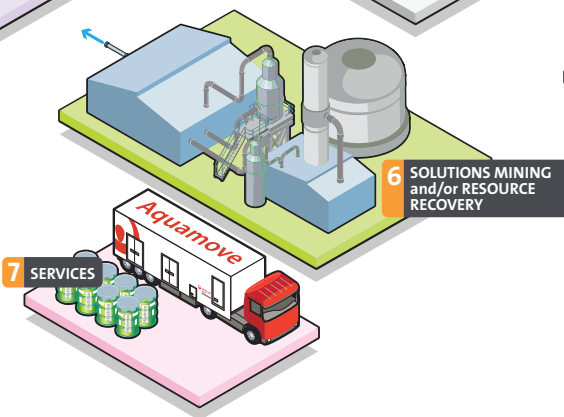


5 ACID/ALKALINE MINE DRAINAGE

- > Mine water control
- > Positive water balance control
- > Groundwater reclamation

MEPCO, LLC Pennsylvania, USA

- Design and procure an AMD treatment plant for a coal mine
- Capacity: 910 m³/h
- Process: DenseSludge[™], maximizing water recovery and minimizing sludge volume



6 SOLUTIONS MINING and/or RESOURCE RECOVERY

- > Production systems and product recovery

AMERICAN SODA Parachute, CO USA

- Crystallization system for production of sodium carbonate monohydrate, sodium bicarbonate, and recovery of sodium carbonate decahydrate from purge stream
- Capacity: Na₂CO₃·H₂O = 1 million tons/year, NaHCO₃ = 150,000 tons/year, Na₂CO₃·10H₂O
- Process: Production from solution mined nacholite



- > Water treatment chemicals
- > Spare parts and consumables
- > Local support staff

NIOBEC MINE Quebec, Canada

- Temporary treatment system, operation and chemical supply for a WWTP for a niobium mine
- Capacity: 417 m³/h
- Process: Actiflo[®] clarification for TSS removal and Hydrex[™] chemicals



Expansive Technology Portfolio

Veolia's more than 350 patented technologies allows for comprehensive water solutions for mining operations of all types and scales. Focusing on system performance, compliance with process and environmental requirements and long-term cost-effectiveness, we are able to meet the most demanding standards of reliability, safety and quality.

VEOLIA'S INNOVATIVE MINING TECHNOLOGIES INCLUDE:



OPUS®

Optimized Pretreatment and Unique Separation Technology for Surface Water Discharge or Reuse



AnoxKaldnes™ MBBR

Compact Moving Bed Biofilm Reactor engineered to effectively remove BOD/ COD and nitrogen, with a high tolerance to load variation and toxicity



Multiflo™

Proprietary softening process that incorporates chemical precipitation with sludge thickening to produce an effluent with low concentrations of scale-formers and a highly concentrated sludge that can be easily dewatered



HPD® Evaporation & Crystallization

Brine concentration and product precipitation. Crystallizers for product purification.



Actiflo® High-Rate Clarifier/Softener

Small-footprint technology in which water is flocculated with microsand and polymer to increase settling velocity for the removal of more than 99% of TSS



DenseSludge™

High density sludge process that reduces the volume of sludge that needs to be disposed by as much as 90% compared with conventional processes



Hydrotech™ Discfilters

Ultra-compact water filtration technology that consumes minimal power and is low-maintenance



Auto-Jet™ Filtra-Matic™

Fine filtration (< 1 micron) technologies that treat process streams with high temperature and high solids content



Hydrex™ Chemicals

Wide range of proprietary water treatment chemicals for use in all process, utility and wastewater applications

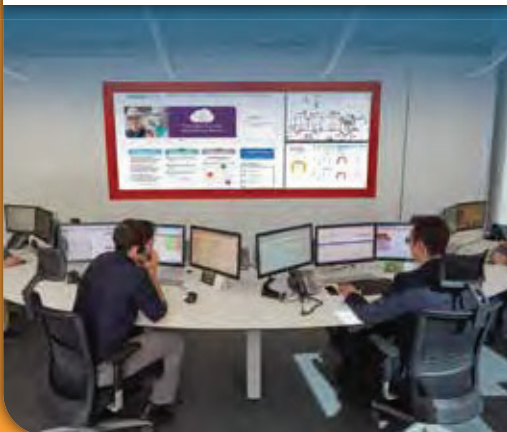
Comprehensive Service Offering

Veolia is experienced in turn-key project delivery that takes your project from conception to implementation. Our organization also offers an expansive line of in-plant and aftermarket services to support your water/wastewater equipment and operations.

Our Services Include:

- > Laboratory Service / Testing
- > Bench-Scale Tests
- > Pilot Tests
- > Studies & Evaluations
- > Design Engineering
- > System Integration
- > Start-Up / Commissioning
- > Aftermarket Parts / Service
- > Full-Time On-Site System Operations

AQUAVISTA™
DIGITAL SERVICES



Mobile Water Solutions

Veolia's mobile fleet includes a wide range of technologies for temporary, emergency and long-term water treatment applications, including reverse osmosis (RO), clarification/softening, and more.



Veolia Standard Products Pre-Engineered for Fast Implementation

Veolia offers a comprehensive line of pre-engineered, skid-mounted products for mine applications where a custom design is not required. These technologies include reverse osmosis (RO), filtration, ion exchange, and wastewater treatment.



Smarter Water Management

To enhance water and wastewater treatment at your facility, Veolia Water Technologies has developed an all-in-one digital service called AQUAVISTA™.

AQUAVISTA is accessible Anytime, Anywhere and on Any Device through a single private portal. This advanced service allows our customers to efficiently manage their water treatment equipment in real-time, 24/7. AQUAVISTA can be implemented for a single technology or a complete water treatment facility.

A Faster Response to Your Needs

Using AQUAVISTA, Veolia can also perform a virtual site visit to a facility to more efficiently provide troubleshooting and emergency support.

