ACTIFLO®
The Ultimate Clarification Process
This highly efficient water and wastewater clarification process combines microsand enhanced flocculation and settling.

The Actiflo® technology is a compact process that operates with microsand as a seed for floc formation. The microsand provides surface area that enhances flocculation and acts as a ballast to form robust and rapidly settling floc.

The unique settling characteristics displayed by the microsand ballasted floc allow for clarifier designs with high overflow rates, short retention times and minimal sludge presence within the unit. These designs result in footprints that are five times smaller than classic lamella clarifiers or dissolved air flotation (DAF) units and up to 20 times smaller than conventional clarification designs.

The Actiflo® clarifies water for the cooling tower, steam generator, scrubber, and various other uses at this Power Plant.

### Key Advantages

- **High treatment efficiency** - removal rate of turbidity and TSS up to 99%
- **Very small footprint** compared to conventional or enhanced clarification processes; ideal for plants with limited building areas, and for retrofit and upgrade of existing plants
- **Flexible and stable operation** - reacts quickly to changing flow rates and raw water quality; provides consistently high quality effluent
- **Quick start-up time** - fully operational within 15 minutes
- **Sludge treatability** - the produced sludge can be easily thickened and dewatered
- **Easy to operate and maintain** - no need to routinely take unit out of service
- **20 years** of operating experience and 1,000 Actiflo® installations worldwide
- Prefabricated packaged plants up to 8 MGD or custom-engineered solutions for flow rates up to 50 MGD in a single train, depending on the application
The Actiflo® is a high-rate clarification process developed and patented exclusively by Veolia Water Technologies. With 1,000 Actiflo® installations worldwide and 20 years of operating experience, this proven technology has reduced costs, increased operating efficiency and improved system reliability for customers in a variety of industries.

**Actiflo® is an ideal solution for:**

- **Surface Water and Groundwater Pretreatment**
  - Color and organics removal
  - TSS and turbidity removal
  - Iron, manganese and other metals removal

- **Process Water Production**
  - Boiler demineralizer supply
  - Cooling tower make-up
  - Water softening
  - Silica removal

- **Wastewater Treatment**
  - Removal of heavy metals
  - Removal of TSS fines and associated BOD and COD
  - Barium removal
  - 99% phosphorus removal in tertiary polishing

- **Reuse and Recycle**
  - Treatment of municipal secondary effluent for make-up water to industries
  - Treatment of effluent for recycle back to production

- **Stormwater Runoff Treatment**
  - Removal of TSS and other pollutants

The Actiflo® process effectively treats water throughout the water cycle.
6. Microsand Recirculation: The underflow is pumped to the hydrocyclone where the sludge is separated from the microsand. The clean microsand is recovered and returned to the injection tank. The sludge is continuously removed for further processing.

Performance Data

Performance for industrial process water and wastewater applications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Actiflo® Clarified(^1) (percent removal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turbidity</td>
<td>95-99(^2)</td>
</tr>
<tr>
<td>TSS</td>
<td>95-99%</td>
</tr>
<tr>
<td>True Color</td>
<td>90-99%</td>
</tr>
<tr>
<td>TOC</td>
<td>30-60%</td>
</tr>
<tr>
<td>Manganese</td>
<td>60-98(^3)</td>
</tr>
<tr>
<td>Arsenic</td>
<td>50-98(^3)</td>
</tr>
<tr>
<td>Iron</td>
<td>60-98(^3)</td>
</tr>
<tr>
<td>Zinc</td>
<td>95-99%</td>
</tr>
<tr>
<td>Nickel</td>
<td>95-99%</td>
</tr>
<tr>
<td>Copper</td>
<td>95-99%</td>
</tr>
<tr>
<td>Lead</td>
<td>95-97%</td>
</tr>
<tr>
<td>Particle Count (2-15 μm)</td>
<td>1.5-3.0 log</td>
</tr>
</tbody>
</table>

Performance for industrial biological wastewater applications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Primary Settling(^3)</th>
<th>Tertiary Polishing(^3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSS</td>
<td>75-90%</td>
<td>50-80%</td>
</tr>
<tr>
<td>COD</td>
<td>55-80%</td>
<td>20-50%</td>
</tr>
<tr>
<td>Total Phosphorus</td>
<td>50-95%</td>
<td>50-95%</td>
</tr>
</tbody>
</table>

(1) Values are based on performance of operating industrial plants and pilot tests
(2) If combined with sand filtration, filtered water typically < 0.5 NTU
(3) With pre-oxidation or aeration
ACTIFLO® Package Plants and Pilot Units

Actiflo® Package Plant: fast-track and modular solutions

For small to medium-sized applications (200 - 5,800 gpm or 45.4 - 1,317 m³/h), a range of package plant solutions has been designed.

- These units can be set in a multiple stream arrangement to handle much larger flows; they are ideal when low cost, fast-track, pre-tested treatment units are required.

- These package plants, manufactured in epoxy coated steel, can be delivered on a trailer and installed within days. The layout of these package solutions is extremely flexible, and they are ideal for space-constrained sites.

Actiflo® Pilot Testing and Mobile Units: water treatment on wheels

- To demonstrate the effectiveness of the Actiflo® process, the services of a mobile Actiflo® pilot unit equipped with a laboratory can be provided.

- The pilot unit is mounted on a trailer and, once delivered on site, can be operational within hours.

- Mobile Actiflo® units (up to 1,500 gpm or 341 m³/h) can also provide temporary or supplemental treatment during plant failure or unforeseen flow or quality variations.
With 1,000 installations, the Actiflo® process meets the needs of customers worldwide.

High Desert Power Plant
Victorville, California, USA

Stora Enso Paper Mill
Port Hawkesbury, Canada

Nestlé Coffee and Milk Factory
Cagayan De Oro, Philippines

Toyobo Microelectronics Facility
Inuyama, Japan

Madison Paper Mill
Chicago, Illinois, USA

Calpine-Hermiston Power Plant
Hermiston, Oregon, USA

Delta Diablo, Water Treatment for Industrial Plants
Antioch, California, USA

Soko Seiren Textile Facility
Kanazawa City, Japan

Petróleo Brasileiro S/A Petrobrás Refinaria
Gabriel Passos - Regap
Sao Paulo, Brazil

Aguas Industriales de Jose Water Treatment for Refineries
Venezuela
Serving a Variety of Industries

Our Actiflo® systems reduce cost, increase operation efficiency and improve system reliability in a variety of industrial applications.

**Oil & Gas:** Petrobras, Brazil

Tertiary treatment for refinery wastewater
- **Capacity:** 8.5 MGD (32 MLD)
- **Process:** Three Actiflo® package units provide tertiary clarification as pretreatment to ultrafiltration and reverse osmosis systems
- **Application:** The treated refinery wastewater is reused as industrial water and boiler feed water

**Mining:** Goldcorp Red Lake Mine, Canada

Design and build a water treatment plant to minimize arsenic in the tailing ponds
- **Capacity:** 7.9 MGD (30 MLD)
- **Process:** Two Actiflo® ACP-750R units and an ActiDyn™ thickener to treat the sludge
- **Application:** Arsenic removal before environmental discharge

**Power Industry:** Bayswater Water Treatment Plant, Australia

Upgrade and refurbish the four existing water treatment plants at Bayswater Power Station as well as a 5-year operation and maintenance contract
- **Capacity:** 31.7 MGD (120 MLD)
- **Process:** Lime softening, pre-treatment using eight Actiflo® units for clarification process, ion exchange, filtration, reverse osmosis, brine concentration and crystallization
- **Application:** Reduce the salinity of Lake Liddell through an increased salt removal capacity to provide cooling water while maintaining Bayswater as a Zero Liquid Discharge power station

**Primary Metals:** ThyssenKrupp Steel and ThyssenKrupp Stainless Alabama, USA

Design and build two separate installations to provide supply water as well as wastewater treatment
- **Capacities:** 14.4 MGD (54.5 MLD) river water system; 5.8 MGD (22 MLD) wastewater system
- **Process:** High rate clarification to remove high total suspended solids from supply water; chromium reduction, metals removal and pH adjustment for wastewater
- **Application:** Pretreatment for use of river water as process water, cooling tower make-up, and boiler feed water; final clarification of combined industrial wastewater streams prior to discharge
Resourcing the world