Metropolitan Tokyo is working toward an ideal water environment by providing stable water supplies and realizing effective utilization of water resources. As part of these efforts, the Tokyo Bureau of Sewerage produces reclaimed water from treated wastewater and supplies it to building in redevelopment district.

Three treatment facilities in Tokyo provide reclaimed water: Ariake (Rinkaifukutosshin district), Ochiai (Nishi-Shinjuku and Nakano-Sakaue districts) and Shibaura (Shinagawa Sta. East, Osaki and Shiodome districts).

Ariake Water Reclamation Center has been supplying Rinkaifukutosshin with reclaimed water via an area-wide circulation loop since 1996. The district is designated as a core metropolitan center for urban facilities development and is noted for its future-oriented, self-contained and low-water design. Garbage disposal and wastewater treatment, for example, are part of a closed system in which waste processes are handled locally. Reclaimed water is supplied to commercial buildings, and the Rinkaifukutosshin district is also the only area in Tokyo where reclaimed water is provided to homes.

The Reclaimed Water Supply Facility is located in the first and second floors of the Advanced Treatment Building. The third, fourth and fifth floors of the building house the Koto City Sports Center Training Gym and a heated pool that are open to the public.
Reclaimed water can be used for much more than flushing toilets. It also used to wash trains cars, water plants and wash down road surfaces. In 2004, the Bureau of Sewerage established its Earth Plan, which promotes the effective use of reclaimed water for environmentally friendly urban development.

**Quality of Reclaimed Water**

<table>
<thead>
<tr>
<th>Item</th>
<th>FY2008 Performance</th>
<th>Self-Monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOD (mg/l)</td>
<td>1</td>
<td>---</td>
</tr>
<tr>
<td>COD (mg/l)</td>
<td>7</td>
<td>---</td>
</tr>
<tr>
<td>pH</td>
<td>7.4</td>
<td>---</td>
</tr>
<tr>
<td>E. coli</td>
<td>Not detected</td>
<td>Not detected</td>
</tr>
<tr>
<td>Chromaticity (index)*</td>
<td>4</td>
<td>less than 5</td>
</tr>
<tr>
<td>Turbidity (index)*</td>
<td>0.6</td>
<td>less than 2</td>
</tr>
<tr>
<td>Color*</td>
<td>Offenseless</td>
<td>Offenseless</td>
</tr>
<tr>
<td>Chloride ions (mg/l)*</td>
<td>150</td>
<td>less than 250</td>
</tr>
<tr>
<td>Free residual chlorine (mg/l)*</td>
<td>0.48</td>
<td>more than 0.1</td>
</tr>
<tr>
<td>Combined residual chlorine (mg/l)*</td>
<td>0.57</td>
<td>more than 0.4</td>
</tr>
</tbody>
</table>

*Samples taken from the center pumping station.

**Flowchart of Water Reclamation Facility**

- Discharge to Adachi-Nindai Canal
- Reclaimed water distribution tank
- Tap water
- Treatment tank
- Pressure tank
- Overflow from the circulation loop to maintain water pressure
- Additional facilities: 2001

**Facility Information**

- Location: 2-3-5 Ariake, Koto City, Tokyo
- Site area: 4.7 ha
- Planned coverage: 681 ha (Kita-Fukasumi district, 448 ha) + surrounding districts (233 ha)
- Planned treatment capacity: 120,000 m3/day
- Current treatment capacity: 30,000 m3/day
- Planned reclaimed water volume: 30,000 m3/day
- Current reclaimed water facility capacity: 15,000 m3/day
- Start of operations: February 1996
- Main uses of reclaimed water: toilet flushing, train washing (Yurikamome Line Cars), miscellaneous use
- Number of supplied facilities (as of 1998): 74 (61 commercial buildings, 13 housing complexes)
- Supplied volume of reclaimed water: 2,470 m3/day
- Quality values required by law:
  - Combined residual chlorine (mg/l): 0.57
  - Turbidity (index): 0.6
  - Chromaticity (index): 4
  - E. coli: Not detected
  - pH: 7.4
  - COD (mg/l): 7
  - Combined residual chlorine (mg/l): 0.57
- Remaining organic matter (BOD) and suspended solids in secondary effluent can be effectively removed in biological filtration tanks. In this filter, secondary effluent is passed down through a packed bed of granular anthracite. Diffusing air up through the bottom of the bed causes the formation of a biofilm of anaerobic organisms that break down dissolved organic matter.

**Self-Directed Environmental Management**

We have set management standards that exceed the water quality values required by law in order to provide the best quality of reclaimed water possible.

**Various Uses for Reclaimed Water**

- Toilet flushing, train washing (Yurikamome Line Cars), miscellaneous use
- Start of operations: February 1996
- Current reclaimed water facility capacity: 15,000 m3/day
- Planned reclaimed water volume: 30,000 m3/day
- Current treatment capacity: 30,000 m3/day
- Planned treatment capacity: 120,000 m3/day
- Site area: 4.7 ha
- Location: 2-3-5 Ariake, Koto City, Tokyo

**Biological Filtration Tank**

- Ozone Generator
- Ozone Destructor
- Pumping Station
- Fiber-Membrane Rapid Filter

- Remaining organic matter (BOD) and suspended solids in secondary effluent can be effectively removed in biological filtration tanks. In this filter, secondary effluent is passed down through a packed bed of granular anthracite. Diffusing air up through the bottom of the bed causes the formation of a biofilm of anaerobic organisms that break down dissolved organic matter.

**Ozone Generator**

Ozone (O3) can be created by discharging oxygen (O2). Heated air is sent into the many discharge tubes inside the generator, and a high voltage (1 kHz, AC6-7V) is applied to synthesize ozone. This ozone is then diffused into biologically treated water that has been pumped into the ozone contact tank to decolorize and disinfect the water.

**Ozone Destructor**

As ozone is a harmful substance, any unreacted ozone remaining in the contact tank must be collected and made harmless. Off-gas from the contact tank is passed through an activated charcoal bed in the ozone destructor, where any remaining ozone is absorbed and neutralized. The air is then released into the atmosphere.

**Pumping Station**

The station automatically pumps a fixed amount of returning water from the circulation loop to maintain water pressure. Additionally, supply and return lines are fitted with residual chlorine meters that continuously monitor the water to ensure appropriate concentrations of residual chlorine.

**Fiber-Membrane Rapid Filter**

This filter was installed in 2001 to ensure water quality and prevent contamination with chironomid (bloodworm) eggs and parasites. The filter membrane is made up of 3mm thick polypropylene fabric squares of 5mm that are suspended in the filter device. Water is forced up into the device, where the filter captures any contaminants in the reclaimed water.