Miami Dade’s 285-mgd South District WWTP now treats to primary drinking water standards.
Higher contaminant levels in the feed water require direct potable reuse facilities to maintain rigorous health and safety protocols. Hazen and Sawyer is working with the WaterReuse Research Foundation to adapt the Hazard Analysis and Critical Control Point methodology to direct potable reuse (DPR) treatment and operations. First developed by NASA by the Pillsbury Company in the 1960s, the methodology has proven itself in the food and beverage industry.

Once the treatment system is established, operators constantly monitor the performance of the system’s Critical Control Points (CCP), following tested and proven response protocols to maintain protection of public health.

**Events**
Hazardous events that can cause spikes in contaminant concentrations, such as disease outbreaks (e.g., flu season) or accidental chemical discharges into the sewer system, are quantified.

**Contaminants**
Chemical and microbial risks are identified from the sewershed. Typical sources include industrial, institutional, medical, and municipal discharges to the sewer.

**Water Quality Goals**
Federal, State, and local regulations, as well as system-specific contaminants, combine to determine goals and the required treatment process.

**Risk Register**
Hazardous events and baseline conditions are used to confirm that the proposed DPR process and CCPs can manage public health risks.

Multiple barriers remove chemical and/or microbial containments.

There are seven CCPs in this sample treatment process at which controls can be applied to prevent, eliminate, or reduce public health risks to acceptable levels.

CCPs are monitored with process-specific sensors that return data to the operations staff. When a process monitor indicates “Alert” or “Critical” alarms, additional manual testing is triggered. A second Alert or Critical result triggers corrective action, as well as communications and incident recording procedures. Critical limit exceedance results in a process shutdown and immediate corrective action, ensuring continuous protection of public health.

Sample Operations and Response protocol:
- Manual Test to T55/min
- Pass
- Fail
- Shut Down
- Repair
- Return to Service

### Table: Inherent Risk vs. Risk Mitigation-Treatment

<table>
<thead>
<tr>
<th>Contaminant</th>
<th>Likelihood</th>
<th>Treatment Barriers</th>
<th>Risk Mitigation-Treatment</th>
<th>Post-Treatment Risk</th>
<th>Likelihood</th>
<th>Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microbial</td>
<td>Almost</td>
<td>UF, RO, UV, Chlorine</td>
<td>Low</td>
<td>Rare</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>Organic Chemical</td>
<td>Almost</td>
<td>UF, RO, UV, Chlorine</td>
<td>Low</td>
<td>Rare</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>Inorganic Chemical</td>
<td>Unlikely</td>
<td>UF, RO, UV, Chlorine</td>
<td>Low</td>
<td>Rare</td>
<td>Low</td>
<td></td>
</tr>
</tbody>
</table>
An Excuse to Prosper

New stormwater detention facilities have enhanced quality of life in a Philadelphia neighborhood, reminding us that almost any infrastructure upgrade can be much more if you design with the community in mind.

When the City of Philadelphia needed to better control stormwater flooding to the Schuylkill River, they sought to add as much community enhancement to the project as possible. After gathering input in a series of public meetings, the City built a $46-million project on Venice Island in Manayunk that includes a massive tank to hold four million gallons of stormwater, but also features a smart design – and several additional facilities – that benefit the surrounding community.

The completed project included a brand new, state-of-the-art community theater, basketball and volleyball courts, and scenic gardens, all wrapped in a beautiful public space that will provide relaxation and recreation to the surrounding community. The stormwater detention facilities themselves are housed beneath a LEED silver eligible building that includes a living roof, rain gardens, and a host of features that minimize energy consumption and dampen the noise of mechanical equipment.

Site Section Through Underground Water Storage Basin

1. The basin stores the excess water, which is then conveyed through a pipe to the basin.
2. The water is then conveyed through a pipe to the sewer by the pump station directly above.
3. When water levels in existing sewers exceed capacity, a chamber diverts the extra water.
4. The basin stores the excess water, which is later pumped back out to the sewer by the pump station directly above.

Performing Arts Center

The Venice Island Performing Arts and Recreation Center features a 250-seat theater with modern sound, lighting, and stage design. The theatre, a sizable lobby, and two multi-purpose rooms will also host community meetings, classes, and after-school and summer programming for local youth. It also has a partial green roof.

Pump Station

Sitting atop the stormwater detention facilities, the head house includes a sloped “living” roof that sprays rainwater into a rain garden, a glass stair tower to reduce the need for interior lighting, photo and occupancy sensors, shade and reflection devices to reduce the need for air conditioning, and water-conserving plumbing fixtures.

Athletic Courts & Amphitheatre

A volleyball court and a basketball court sit adjacent to tiered grass seating that doubles as a natural amphitheatre. Extensive public parking alongside the courts and the theater serves visitors and nearby businesses.

Over/low Chamber

Underground Basin

Park Setting

The 4-plus acre site features a public park well-suited for community fairs, markets, or simple relaxation and recreation.

Manayunk Canal

Schuylkill River

Manayunk Canal

Schuylkill River

Schuylkill River

Performing Arts Center

Park Setting

Athletic Courts & Amphitheatre

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New York City DEP

The Advanced Wastewater Treatment project has provided process, planning, design, and programmatic support to the City for nearly 15 years, developing near-by waterways.

Miami-Dade Water and Sewer

The upgrade of the South District Wastewater Treatment Plant produced one of the largest high-level disinfection facilities, and the largest on-site hypochlorite generation facility, in the U.S. This program required integrated scheduling of 14 projects to meet federally-mandated deadlines. The plant was in service 15 months ahead of schedule and 10% under the $618 million budget.

Five Florida Counties

For the C-51 Reservoir public-private partnership (P3) in Palm Beach County, seven water utilities in South Florida collaborated to investigate the potential to harvest and store stormwater and use it to recharge the surficial aquifer – enabling water utilities to extend their existing water source and provide a cost-effective water supply to South Florida residents.

New York City DEP

At the Newtown Creek Wastewater Treatment Plant, the project team applied innovative design and construction techniques and a groundbreaking method of treatment that allowed the City to achieve its secondary treatment goals almost two years ahead of schedule.

Indiana American Water

The Hidden Lake water treatment facility is part of a $25 million initiative that greatly enhances water quality by removing iron and manganese through new treatment processes, improved system reliability, and increased capacity.

Each year, we help our clients submit several projects for recognition by local and national industry associations. The projects pictured to the right won awards in 2014 for their innovation, sustainable design, complexity, future value to the engineering profession, and exceptional delivery from organizations such as the ACEC, DBIA, and AAEES.

AND THE WINNER IS...

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