PLANTPROFILE

NAME:

Columbia Boulevard Wastewater Treatment Plant

LOCATION

Portland, Ore.

PLANT SIZE:

Secondary treatment capacity: 100 mgd
Peak wet weather hydraulic capacity: 400 mgd

INFRASTRUCTURE:

Headworks building, digesters, aeration equipment, influent pump station, dechlorination facility, cogeneration facility, bar screens, grit basins, clarifiers, septage receiving station, compactors, wet weather screening facility

Headworks building

Wet weather clarifiers

1.7-MW cogeneration facility

By Elizabeth Lisican

Optimal & Sustainable

Oregon wastewater treatment plant vows to curb combined sewer overflows

Dubbed "The City of Roses," Portland, Ore., is the state's largest city and the second-largest city in the Pacific Northwest. Residents typically enjoy partaking in the outdoor activities of this beautiful, scenic region and are dedicated to keeping it pristine. It is in this green spirit that the Columbia Boulevard Wastewater Treatment Plant (CBWWTP) is completing its largest plant expansion in 40 years.

This year, the CBWWTP is marking its 60th year of treating wastewater to protect public health, water quality and the environment. The plant is part of a collection and treatment system serving about 600,000 residential and commercial customers. The Tryon Creek Wastewater Treatment Plant, a second facility south of Portland, also is monitored at the Columbia Boulevard facility.

A Rich History

The city of Portland began building sewers in 1864, but before the CBWWTP opened in October 1952, the sewers conveyed the city's wastewater directly to the Willamette River and Columbia Slough without treatment. When Portland citizens realized that it would take new infrastructure to help clean up this serious problem, they approved a $12-million bond issue to build a wastewater treatment facility.

In 1969, the CBWWTP underwent a primary expansion, which included the enlargement of the plant's administrative building and the addition of a digester pump house. A slew of updates in the ensuing years have included the addition of secondary treatment in 1974, a digester expansion in 1982 and new headworks in 1996.

In 2000, many new facilities and major modifications were added to the CBWWTP to address combined sewer overflows (CSOs). In 2004, construction was initiated to further increase influent and effluent pumping capacity in anticipation of increased flows resulting from CSO improvements to be completed in the next few years.

Recent Improvements

Most recently, modifications were made to the secondary treatment process to allow plant staff to operate in step-feed mode during large storm events and thus keep solids from washing out in effluent. The plant also is installing mixers in anaerobic digesters that the city constructed more than 30 years ago to improve efficiency and biogas quality.

In keeping with the plant's commitment to efficiency, since 2009, two biogas-fueled engine generators have recovered heat and generated electricity for treatment plant operations. The cogeneration facility produces more than 40% of the plant's electricity, and a local industry purchases about 25% of the biogas for fuel in its roofing material manufacturing process. City staff currently is studying alternatives for utilizing the remaining 25% of the available digester gas.

In addition, the CBWWTP is utilizing Profibus (Process Field Bus) as a standard for field bus communication in automation technology, as a part of its push to increase the maintainability and efficiency of its plant operation and maintenance.

Odor control improvements also rank high on the plant's priority list these days.

"The treatment plant has activated a ventilation system for its new wet weather screening facility, and an air exhaust system and biofilter for the influent pump station," said Steve Behrndt, wastewater operations group manager for City of Portland-Environmental Services. "We will soon replace odor control fans for the chemical scrubber towers in the headworks building and change out bioreactor odor control filter media in our sludge processing area."

Prioritizing Treatment Objectives

In addition to increasing maintainability and efficiency, the city determined that one of the most significant challenges faced by the operations and maintenance staff is the task of ensuring reliable system operation.

"When developing the system plan, Portland staff realized that it was necessary to establish a prioritized list of objectives that are to be achieved by the system operators," Behrndt said. Staff identified and prioritized a clear set of nine objectives:

1. Protect and maintain the treatment plant's biological system and meet effluent discharge limits.
2. Capture and convey all dry weather flow.
3. Prevent releases to streets and/or basements.
4. Capture and convey maximum volume of wet weather flow.
5. Treat as much captured CSO through the plant's secondary treatment process as possible.
6. Protect the Columbia Slough (a sensitive water body).
7. Minimize energy usage and pumping costs.
8. Minimize odor problems.
9. Minimize sedimentation and settling in tunnels and avoid other maintenance issues.

"With the facilities and these priorities as a guide, operators are better able to develop and employ an optimal and sustainable system operating plan," Behrndt said. WWD

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