

Henrico treatment plant expansion meets stringent nutrient removal requirements

HENRICO IS IN the final stage of a seven-stage program that will expand the suburban county's Water Reclamation Facility from 45 million gallons per day to 75 million gallons per day while meeting the more stringent nutrient discharge limits in the James River. The Henrico County Water Reclamation Facility is located east of Richmond and discharges effluent directly into the James. It opened in 1989 as a 30 mgd advanced treatment plant and was expanded to 45 mgd in 1998. Henrico was forced to expand the plant to 75 mgd relatively quickly because of explosive growth in the Richmond area.

In 1999, Henrico selected Hazen and Sawyer, P.C. to provide engineering services to implement the seven-stage program. The first six phases of the project provided the necessary 75 mgd capacity to meet current effluent limits. Phase 7 will include design and construction of enhanced nutrient removal (ENR) facilities to limit pollution of the Chesapeake Bay.

Staged construction

Henrico divided the \$86 million expansion into six construction contracts ranging from \$3 million to \$40 million. This approach allowed smaller, local contractors to bid on the work, resulting in four to seven bidders on each contract. The approach also allowed the county's staff to concen-

trate on each phase rather than having to review the project as a whole.

Nutrient limits

Henrico prepared for nutrient removal at the water reclamation facility since the mid-1990s. Although the county did not have a total nitrogen limit in their effluent permit, they

per liter (mg/l) was accepted during construction and was easily incorporated into the construction contract.

The county meets an annual average total nitrogen (TN) concentration of 8 mg/l for which the current treatment process is designed. The plant is now expected to receive a TN concentration limit of 5 mg/l as a part of the Chesapeake Bay nutrient removal initiative. Henrico will only have to spend about \$10 million to have its 75 mgd treatment plant meet this proposed TN limit. Ten million dollars for 75 mgd of capacity amounts to less than \$0.15/gallon. Plants of similar capacity without the built-in planning and design features of this facility have had to set aside as much as \$2 per gallon to achieve similar results.



Henrico County is spending \$86 million to significantly expand and upgrade the treatment capabilities of its Water Reclamation Facility.

ected to provide for some level of biological nutrient removal (BNR) in their process design. This approach gave the county valuable experience in operating a BNR facility and provided knowledge of the limitations of the existing plant. The county originally provided for three-stage BNR treatment in the 75 mgd expansion, but easily modified the facilities to five-stage BNR during construction once an effluent total nitrogen limit was implemented. A total nitrogen concentration limit of 8 milligrams

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