Lowell Regional Water Utility Plant Manager Ned Tarmey: "HYDRODARCO® 3000 exceeded my expectations."

Massachusetts Water Treatment Plant Finds "A Much Better Value" In NORIT Granular Carbon

Lignite-based HYDRODARCO® 3000 replaced bituminous-based GAC

Lowell, MA is 35 miles northwest of Boston and has a population of 100,000. Lowell Water Works, the potable water treatment plant, is a 30 mgd facility that draws raw water from the Merrimack River less than one mile upstream from the plant.

The facility originally consisted of three automatic backwash (ABW) sand filters. Four dual-media ABW filters (anthracite over sand) were added in the 1970s, as were four mono-media granular activated carbon (GAC) ABW filters. Currently, all effluent from the sand and dual-media filters routes through the GAC ABW filters before entering the clearwell.

Each of the 80 GAC ABW filter cells holds 64 ft^3 of GAC. In 1991, NORIT Americas Inc. lignite-based HYDRODARCO® 3000 replaced the bituminous-based GAC service carbon. Bituminous-based carbons were used in these filters for the previous 10 years.

Case study monitors physical particle parameters and adsorptive capacity

At the time of the changeout, a case study was begun to monitor the physical properties and adsorptive capacity of the GAC while in service. Samples were collected several times a year and analyzed, and GAC performance was determined by particle parameters including Geometric Mean Diameter, Effective Size, and Uniformity Coefficient; and by adsorptive tests including Molasses R.E. and Molasses Number, Iodine Number, and Tannin Value.

The Geometric Mean Diameter remained statistically unchanged for the three years of testing, as did the Effective Size and Uniformity Coefficient. This shows that no GAC was lost from the filters during backwashing (every 20-30 hours) from carbon particle abrasion or lower density.

Tannin Value increased gradually, except during a microbiological T&O episode at month 17, indicating the carbon was exposed to fairly constant levels of larger organics. Over the life of the test, Molasses R.E. value diminished steadily, indicating significant capacity for adsorption of larger organics remaining. Molasses Number and Iodine Number both show decline over the 36 months of testing, indicating continuous utilization of adsorption sites.