

Daytona Beach CASE STUDY

Ralph Brennan WTP Installs Two (2) Integrity Municipal Systems' A-758™ Lime Slaker Systems to Replace its Wallace & Tiernan® A-758™ Lime Slakers

The City of Daytona Beach, Florida (the “City”), located on the central eastern coast of Florida, has a service area of approximately 85 square miles and currently supplies drinking water to a population of approximately 73,000. The City owns and operates water facilities that include raw water supply wells, the transmission and distribution conveyance system (which also includes hydrants, meters and services and storage), re-pumping facilities and the Ralph Brennan Water Treatment Plant (WTP).

Built in 1972 and later expanded in 1985, the Brennan WTP has a design capacity of 24 million gallons per day (maximum daily flow). The City is responsible for producing and distributing safe drinking water throughout its service area.

A crucial step in the plant’s treatment process is water softening, in which lime is added to hard water to remove calcium, magnesium, and other metal cations. Lime softening, which makes the water softer and less corrosive throughout the distribution system, involves

adding hydrated lime ($\text{Ca}(\text{OH})_2$) to the plant lime softening basins. Hydrated lime is produced by adding water to dry quicklime (CaO), a process known as slaking. Producing hydrated lime on-site with a lime slaker is much more cost effective than purchasing pre-made, hydrated lime.

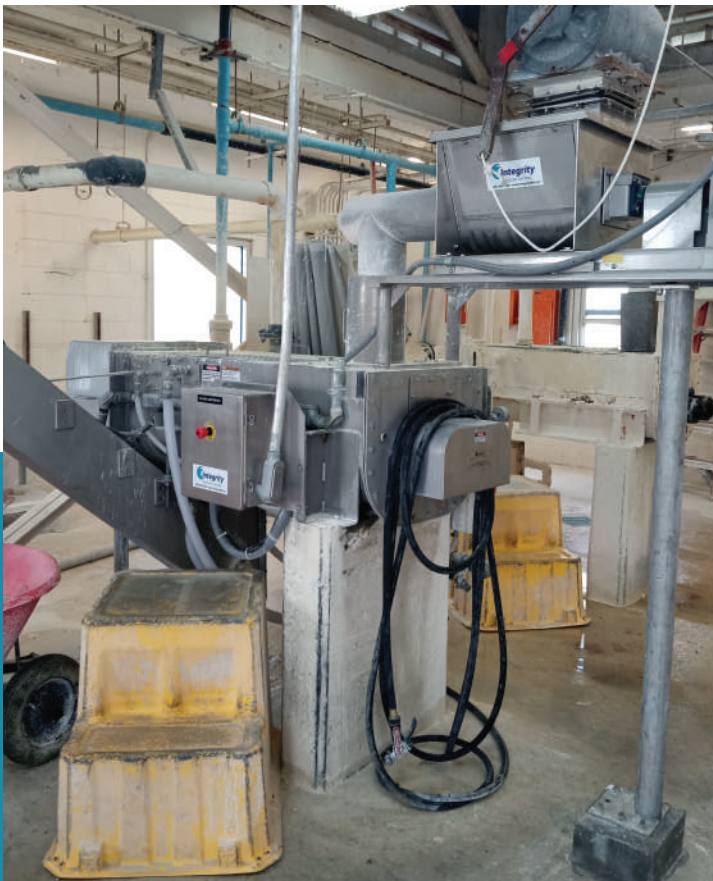
Four (4) Wallace and Tiernan® A-758™ paste-type lime slaker systems served the WTP well for three (3) decades. In 2021-2022, plant officials decided to replace two (2) of these systems (one in each silo) as they were nearing the end of their useful life. Due to the reliability and efficient operation of the WTP’s original systems, the City of Daytona Beach chose the A-758™ paste-type lime slaker systems manufactured by Integrity Municipal Systems LLC (IMS) as replacement. In addition, the systems fit into the exact space occupied by the previous lime slakers, requiring minimal re-piping and modifications to the existing infrastructure.

Paste-type lime slakers utilize a 2:1 water-to-lime slaking ratio to slake lime as a paste and to achieve the complete slaking reaction ($\text{CaO} + \text{H}_2\text{O} \rightleftharpoons \text{Ca}(\text{OH})_2 + \text{heat}$). This ratio

provides several benefits over the older 4:1 water-to-lime, or slurry, slaking process (detention slaking), including reduced power requirements, faster slaking, a smaller footprint and, most importantly, a more reactive lime slurry solution which reduces chemical costs for the WTP.

The IMS A-758™ lime slaker maintains the consistency of the paste using a mechanically actuated torque-controlled water inlet valve to control the water flow to the slaking reaction chamber. The slaker uses a gear reduction unit to drive the slaker mixing paddle shafts and maintain a specified torque. An increase in torque, indicating an increase in viscosity of the paste (paste too thick), opens the water valve, admitting additional slaking water to the inlet end of the slaking compartment. A decrease in torque, indicating a decrease in viscosity (paste too thin), closes the water valve and causes a reduction of the amount of water added to thicken the paste. The viscosity of the lime paste can be varied by adjusting the compression on the spring between the gear reducer and the water control valve.

The new IMS A-758™ lime slaker systems used at the Brennan WTP were both shipped in April of 2022 and started-up in October and December of 2022 respectively. Installation was performed by City crew. The systems



boast several enhancements that improve system reliability, accessibility, quality, and performance, while also reducing maintenance requirements and the number of system parts:

- Stainless steel materials of construction for the feeder, slaker trough, grit remover, and control panel make the system more resistant to corrosion.
- A patented, pre-assembled water panel simplifies water controls, eases connection complexity, and improves machine accessibility. All water piping, instrumentation and accessories are mounted on a stainless- steel panel providing a single water source-point.
- A modular dust arrestor and spray-bar allows quick assembly removal for cleaning and maintenance.
- Clean-out ports for the water weir and slaker bottom eases access to the slaking chamber.
- A screw-type feeder with few moving parts make maintenance easier.

Chief Operator, Stephen Sweade, was impressed with the performance of IMS on this project. Sweade said of IMS: *"You did a great job, and we look forward to working with you in the future."*