

Chichester WWTW: Achieving Stormwater Disinfection with UV

Southern Water's innovative UV system disinfects difficult stormwater discharge to protect an international treasure

Chichester Harbour in West Sussex, UK is recognized as a water environment of national and international importance for natural beauty and conservation. Southern Water's Chichester wastewater treatment works (WWTW) discharges into these pristine and internationally recognized waters. Significantly upgraded in 2008 to meet new consent standards for discharging into waters designated as sensitive under the Urban Wastewater Treatment Directive, the Habitats Directive, and the EC Shellfish Waters Directive, its discharge requirements are among the most stringent.

While the upgrade increased treatment capacity and stormwater storage capacity, overflows of untreated stormwater and wastewater from the storm tank still flowed into the harbour during severe storm events.

Project Scope

The long-term solution to resolve the infiltration problem will require several years. To protect the harbour until then, in 2012 the Environmental Agency (EA) agreed to allow the plant to treat the settled stormwater with ultraviolet (UV) disinfection prior to discharge.

"The Duron intelligent protocols and automatic controls have helped ensure we can treat stormwater quickly and effectively - helping to protect the beautiful Harbour."

Solution

The project team selected the Wedeco Duron system to provide the UV disinfection for this critical installation in large part due to the extensive validation and intelligent control of the Duron system. The Duron disinfection efficiency has been thoroughly assessed via biosimetric testing (validation) by an independent third party. Biosimetry is a process that determines the biological kill rate of a UV system under defined operating conditions, and links these to surrogate-specific UV dose values.

This validated dose method is much more accurate for ensuring disinfection than the previous calculated dose method that



END USER: Chichester WWTW
CLIENT: Southern Water
ORDER DATE: April 2013
COMPLETION: March 2014
XYLEM'S ROLE: UV disinfection system provider
XYLEM SCOPE: Design, delivery, installation and commissioning of the Duron UV system to treat flows of up to 300 liters/second. Project included 10 banks of self-cleaning UV lamps in sequence, with integrated lift system, WTW's online UVT sensors and intelligent UV system controls for automatic operation.

considered only the output of the lamps, the UV transmittance (UVT), and the theoretical contact time. As the Environmental Agency's guidance on UV disinfection requirements was not applicable to stormwater, a new design approach had to be determined. Following international best practices, the involved parties decided to permit a "validated UV dose" – making it the first installation in the UK which is designed and operated under this new approach.

Depending on storm intensity, time of year, and the time within a storm event, both flow through the system and water quality may vary drastically. The engineer, Montgomery Watson Harza (MWH), had to ensure that the chosen system would deliver the required validated dosage throughout the entire range of operating conditions so validation, particularly at low UVT, was a prime concern.

Due to the Duron system's particularly broad validation envelope all the conditions of Chichester's projected stormwater flow and quality were covered during validation. Equipped with 10 UV banks in sequence, the number of banks in operation and power to the lamps are continuously adjusted to deliver the precise dose required without wasting energy and while minimizing lamp run time. Real-time monitoring of UV intensity, UVT and flow are crucial parts of this intelligent and reliable UV system control. A continuous self-cleaning mechanism keeps the quartz sleeves of the lamps clean.

Result

Low maintenance requirements and minimal operator attention are major advantages to the Duron system. Automatic on-off, as well as continual online monitoring and dosage adjustment assure the Duron system runs itself, allowing operators to attend to the wastewater treatment side of the operation. The Duron UV system demonstrates that properly designed low pressure systems are an attractive alternative to the energy intensive medium pressure systems previously used in stormwater applications.

Reliability has been demonstrated even at very low UVT conditions and under all flow conditions. Placed in service in 2014, the Duron system has consistently met permit requirements for 1 log virus reduction and E. coli reduction to <1000 cfu/100 ml.

The Duron UV disinfection system is playing an essential role in preserving the beauty and health of an environmental gem, the Chichester Harbour. Southern Water has peace of mind, knowing they can count on the Duron system to deliver the required dosage without wasting energy.

To learn more about how Wedeco, and other Xylem brands, can help you address your water, wastewater and stormwater challenges, visit us on the web at <http://www.xylem.com/treatment>.



Integral automatic lifting provides comfortable access to all UV module components



Easy, safe and fast replacement of UV lamps with no need for specialized tools