

UV Water Treatment  
**Hydro-Optic™ Technology**

## Lunenburg Water District Improves Water Disinfection with Hydro-Optic™ UV Solution

*The Lunenburg Water District supports the drinking water needs of approximately 6,000 people in the Town of Lunenburg, Mass. In 2010, the District acquired an additional well field in close proximity to their existing wells to help them meet the community's growing water demand. In January 2011, Atlantium's Hydro-Optic™ (HOD) UV technology was installed as a non-chemical disinfection treatment approach to ensure regulatory compliance for the water treatment plant without imparting any negative effects on treated water.*



In 2010, the Lunenburg Water District (the District), which serves approximately 6,000 people in the Town of Lunenburg, Mass., acquired an additional well field in close proximity to its existing wells in response to the community's growing water demand. The wells are located in an aquifer with a high vulnerability to contamination due to the absence of hydrogeological barriers, such as clay, that can prevent contaminant migration. With the increased potential for contamination, the District used elevated doses of chlorine to ensure disinfection after which water authorities received complaints from residents regarding the unpleasant taste and odor of their drinking water.

A new disinfection solution was needed, one that would improve water quality, while being reliable, maintainable, and sustainable. As a physical disinfection process, UV does not impart any taste or odor onto treated water and provides an environmentally friendly solution that eliminates the reliance on chemical disinfectants and their associated risks (e.g., safety, storage, chain of supply, handling, and formation of carcinogenic disinfection byproducts).

Atlantium's HOD UV technology (RZ300 Series) was installed in 2011 as a non-chemical disinfection treatment approach to treat 1,500 gpm (341 m<sup>3</sup>/hr) and has proven to be a cost-effective solution. The HOD UV technology easily inactivates the microorganisms that threaten public health safety including chlorine-resistant pseudomonas, cryptosporidium and giardia. The technology has third-party validation for full 4-log virus EPA compliance using a live Adenovirus, not a surrogate.

According to the District, the Atlantium HOD UV system has been operating 24/7 since January 2011 and the automatic cleaning system has performed as expected ensuring easy operation and maintenance.

### Why HOD UV for Lunenburg?

- HOD UV helps eliminate unpleasant taste and odor, reduces DBPs.
- HOD UV is third-party validated to EPA criteria for 5-log microbial and 4-log virus.
- HOD UV features integrated system controls and software for operational ease.
- HOD UV automatically generates compliance reports.
- HOD UV features a space saving modular design that worked in the limited space at the WTP.
- HOD UV is easy to maintain and features 24/7 factory support.
- HOD UV has a proven track record of disinfection efficacy.

## HOD UV: Principles of Operation

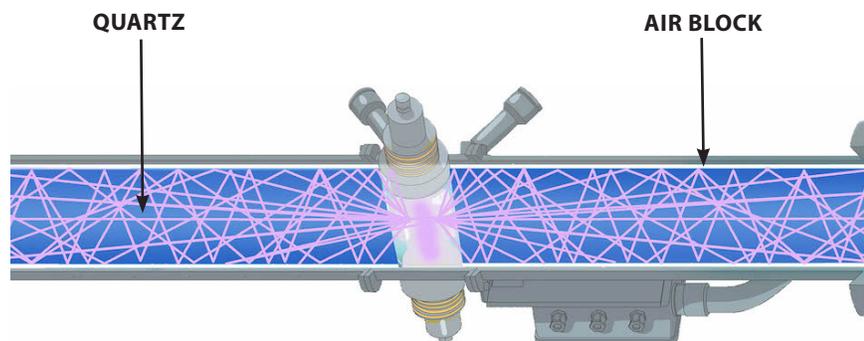
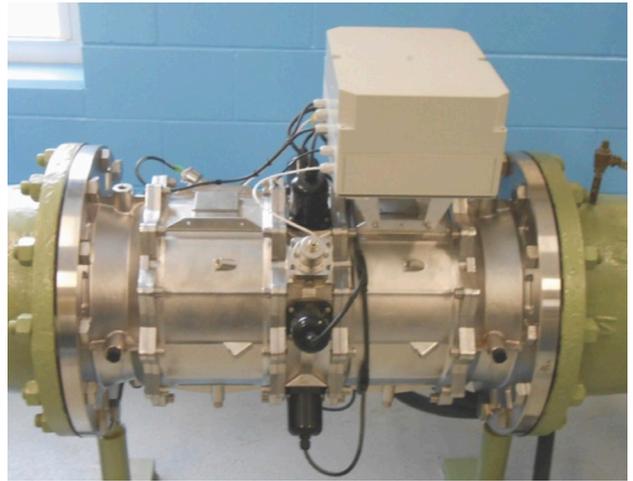
The HOD UV technology is a physical process for disinfection that exposes bacteria, viruses and protozoa to germicidal wavelengths of UV light, measured in nanometers (nm), to render them incapable of reproducing or further infecting a water system.

The HOD UV technology is equipped with medium-pressure (MP) UV lamps that provide polychromatic UV light (200-415 nm) to enable the production of a high-density broad-spectrum UV light that can inactivate a range of bacteria, viruses and organisms.

The Hydro-Optic UV technology measures four critical parameters including % UVT, flow rate, UV lamp intensity (kW) and UV apparatus (consisting of Total Internal Reflection and Dose Pacing) in real time to maintain the minimum required UV dose.

The system uses a proprietary Total Internal Reflection (TIR) based design that when coupled with the comprehensive monitoring of critical parameters allows the system to achieve and maintain the specified UV dose.

The system's patented TIR technology, which is similar to fiber optic science, recycles UV light energy within the HOD UV chamber. The core of the technology is its water disinfection chamber made of high-quality quartz surrounded by an air block instead of traditional stainless steel (Figure 1). This is especially important given that in traditional UV systems metal adsorbs or "detracts" the UV dose the closer it gets to metal, whereas the TIR enhances the UV dose.



**Figure 1: Atlantium Hydro-Optic™ UV Lamp and Chamber**

This configuration uses fiber optic principles to trap the UV light photons and recycle their light energy. The photons repeatedly bounce through the quartz surface back into the chamber, effectively increasing their paths and their opportunities to inactivate microbes.



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