

## Municipal Water

### Case Study: Hillsborough, New Hampshire, USA Water Disinfection that Meets Regulations



The Town of Hillsborough NH gets its water supply from the Loon Pond surface water reservoir, treating it with slow sand filters.

Because of high organic load in their raw water, they dosed it with chlorine to achieve EPA virus disinfection standards, resulting in violations for carcinogenic disinfection by-product limitations and a consent decree to change the disinfection process to reduce the threat.

#### The Objective

Hillsborough sought a cost-effective solution that would solve their DBP issues while still giving them 4-log virus credit before their first customer (nearby).

They piloted several traditional technology treatments, but none could solve the problem in a cost effective way.

Realizing that UV disinfection could be a good solution to reduce chemical treatment, they requested proposals for a UV system for 3-log virus reduction, with a validated reduction equivalent dose of  $143\text{mJ}/\text{cm}^2$ . Because of seasonal changes they needed a system that could achieve the dose even when the Ultraviolet Transmittance (UVT) declined to 80%.

#### Atlantium Wins the Project

Three top-tier UV disinfection companies, including Atlantium, responded with proposals, and an Atlantium Hydro-Optic™ Medium Pressure UV system was chosen.

The Atlantium design featured two RZ300-17 units, each with seven single-lamp modules in two parallel trains including a standby redundant lamp, that fit into the available space. Each lamp has two sensors that measure the UV intensity and the UVT so the system automatically adjusts the dose in real time.

The Atlantium unit provides 3-log virus credit, requiring only 1-log credit from the chlorine addition. The solution provides the required virus credit before the first customer, keeps residual in the distribution system on spec, and ensures that DBPs remain at acceptably low levels regardless of seasonal fluctuations in water temperature and quality.



Figure 1: Loon Pond surface water reservoir - Hillsborough water supply

#### Hillsborough Chose Atlantium for:

- DBPs remain low despite seasonal fluctuations
- Reliable, instantaneous 3-log virus credit
- Integrated UV system controls & software, and compliance reports automatically generated
- Fits within limited existing available WTP space
- Ease of system calibration and efficient lamp cleaning
- Low system head loss
- Tech-support availability and operator requirements



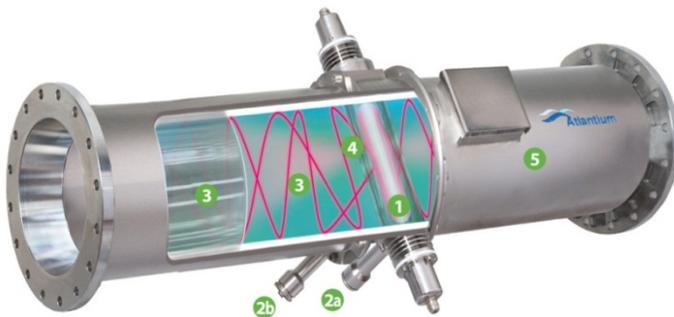
Figure 2: Atlantium RZ300-17 system with monitoring & control software indicating an on-spec 3-log virus UV dose being delivered

**Why Atlantium?**

Atlantium UV easily inactivates the microorganisms that threaten public health safety including chlorine-resistant pseudomonas, cryptosporidium and gardia. It inactivates viruses and heat resistant spores too.

Atlantium is the only UV company in the market today that provides UV water treatment that was previously thought to be unattainable without chemicals; the only UV company with third-party validation for full 4 log virus EPA compliance using a live Adenovirus challenge in full scale.

Atlantium has been able to change the UV paradigm thanks to patented hydro-optic principles, medium pressure high-intensity UV lamps and integrated software .



1. **Medium Pressure broad spectrum UV** easily inactivates even highly-resistant microorganisms and disables their repair mechanisms. Medium Pressure UV is efficient in cold water too (0-60 C / 32-140 F)!
2. **Integrated software automatically adjusts UV power to continuously maintain the required UV dose**
  - a. One sensor monitors UV lamp intensity
  - b. Another sensor monitors and controls the UV lamp to assure that it maintains the required dose
3. **Patented Atlantium technology recycles UV photons** optimizing energy efficiency. Fiber optic effects of Total Internal Reflection enable a uniform dose distribution, ensuring that the entire water volume is treated completely and uniformly
4. **Thick quartz tube separates UV lamp from water chamber** for quick & easy lamp replacement; avoids risk of broken glass and mercury in water
5. **Stainless steel housing** meets industrial standards



Figure 3: Monitor shows status of critical parameters in real-time, including actual dose being delivered.

“Based on the proposals, life-cycle costs at two projected water demand growth rates were estimated including initial purchase and installation, energy and bulb replacement.

Other key selection considerations included: UV system controls and software; ability to fit within the limited existing, available WTP space; ease of system calibration; type of bulb cleaning system; system head loss; technical support availability; and operator requirements.

...The Town selected the Atlantium system. Their system is more compact given the WTP space constraints; offers the greater reliability of a dual-train configuration; an ultrasonic cleaning system rather than a mechanical wiper system; and the possibility that a medium-pressure system is more effective for virus inactivation than the low-pressure systems...”

**Excerpt from ACE 2014 poster session**  
**“Controlling Disinfection Byproducts in a Slow Sand Filtration Plant”**  
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