



### Site Example: Treating Micropollutants and Disinfecting with UV in Drinking Water

### PWN Water Supply Company North-Holland, the Netherlands



Using a combination of UV light and hydrogen peroxide, the TrojanUVSwift™ECT system provides superior disinfection without producing harmful by-products such as bromate.

PWN Water Supply Company, North Holland is currently operating a TrojanUVSwift™ECT UV-oxidation system to provide an additional barrier to micropollutants at their plant in Andijk, the Netherlands. In addition, the UV system disinfects, inactivating pathogenic microorganisms such as the spores of sulfite-reducing clostridia (SSRC), *Cryptosporidium* and *Giardia*. The drinking water treatment plant serves approximately half a million people and can treat up to 4,000 cubic meters per hour (or approximately 25 million gallons per day). It is the largest drinking water facility in the world to treat micropollutants with UV light.

PWN is leading the way in the application of Trojan's UV technology to meet the strict European Union standards limiting the concentration of pesticides in drinking water. Under the European Union's Water Framework Directive, the concentration of each individual pesticide may not exceed 0.1 parts per billion

(ppb). Additionally, the total concentration of pesticides in drinking water may not exceed 0.5 ppb. In contrast to other treatment technologies that can be used to treat such micropollutants, UV is simple to operate and does not produce harmful by-products such as bromate. It is also very effective in treating *Cryptosporidium*, *Giardia*, and SSRC. UV-oxidation has emerged as a cost-effective solution for treating micropollutants and microorganisms in water.

Like many water supplies throughout the world, IJssel Lake, the lake from which PWN extracts its water, can be impacted by industrial and agricultural activity. The threat of contamination from pesticides, herbicides, and other micropollutants such as endocrine disruptors and pharmaceuticals is ever-present. The Trojan UV-oxidation system will proactively ensure that the plant meets all future drinking water standards.

#### Design Parameters

- **Average flow rate:** 3,000 m<sup>3</sup>/hr (19 MGD)
- **Peak flow rate:** 4,000 m<sup>3</sup>/hr (25 MGD)
- **Approximate number of customers served:** 500,000
- **Disinfection method:** UV
- **Ultraviolet transmittance (UVT):** 80%
- **Oxidizer (for micropollutant destruction):** Hydroxyl radicals from UV/peroxide
- **Micropollutant treatment goal:** 80% reduction in influent concentration

**Joop Kruithof, Ph.D.**  
Chief Scientist,  
PWN Water Supply  
Company North-Holland:

*"With Trojan's optimized UV technology, we are cost-efficiently treating the water for micropollutants and disinfecting without forming harmful byproducts."*



IJssel Lake, which provides PWN with a reliable source of water, is fed by the River Rhine.

**The Trojan UV Solution**

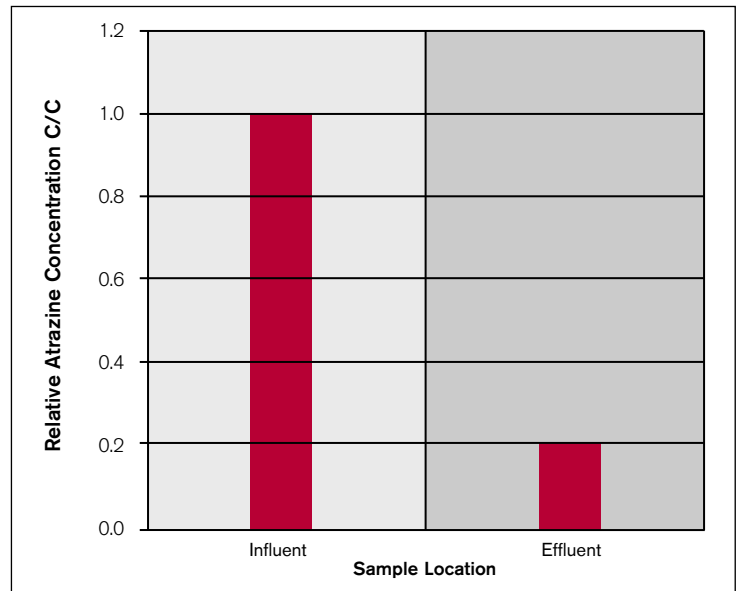
The plant at Andijk utilizes UV in conjunction with hydrogen peroxide to produce hydroxyl radicals. The hydroxyl radical is one of the most powerful oxidizing species known, and reacts quickly with organic constituents in the water. PWN is one of the first drinking water facilities to utilize UV as a contaminant treatment technology as well as a safe, chemical free disinfection tool.

The simultaneous treatment of micropollutants and microorganisms are performed using the TrojanUVSwift™ECT, Trojan's medium pressure lamp-based UV-oxidation system. Over the past several years, in a joint research effort, Trojan and PWN have optimized the treatment of micropollutants with UV light and hydrogen peroxide to minimize capital and ongoing operation and maintenance (O&M) costs.

**Proven Performance**

Following installation of the Trojan system, a series of performance tests were performed using the TrojanUVSwift™ECT at PWN. While micropollutants levels in IJssel Lake were relatively low (below European Union regulatory standards), finished water from the plant was redirected to waste while a number of pesticides and test microorganisms were introduced upstream of the reactors. The objectives of the testing were to validate the performance of the UV-oxidation system and ensure that predicted sizing was correct.

Trojan sized the full scale system using sophisticated computer modeling and data collected from the research collaboration between PWN and Trojan. Target micropollutant destruction was 80% of influent concentrations. As can be seen in Figure 1, this target was successfully achieved. The testing confirmed that full scale system sizing was accurate and normal drinking water supply operation continues currently.



**Figure 1.**  
Results of performance testing at PWN: Atrazine concentration reduction