



**APPLICATION:** Water Disinfection // **SITE:** Pride Pak, Mississauga, Ontario, Canada

## Aquafine Ultraviolet Water Disinfection Units for Vegetable Washwater

### Abstract

This technical bulletin describes a pilot study carried out by Aquafine Corporation for a novel application of disinfecting a vegetable wash/rinse water stream, so that the water could be recirculated and reused. The study was carried out at Pride Pak Canada Ltd., a vegetable processing and packaging company. The objective is was to study the effectiveness of UV technology to disinfect water that had been used to wash/rinse vegetables, so that the water could be recirculated and reused.

### Introduction

Ultraviolet light treatment is an excellent method of disinfection of water and has several advantages over other disinfection methods, such as chlorination, ozonation etc. UV light does not add anything to the water, nor does it generate harmful by-products. It only adds energy in the form of ultraviolet radiation. Also, UV disinfection only requires a fraction of the contact time required by other disinfection methods. It is fast, efficient, effective, economical and environmentally friendly.

### Process Description

At this facility, chlorinated city water supply is used to thoroughly wash cut and chopped vegetables. The vegetables are exposed to the water for 20 seconds. The vegetables are then packed into salad bags and sealed, after which they are shipped to grocery stores and restaurants. In order for the wash water to be reused, the level of particles and bacteria in the water need to be significantly reduced. The wash water has a slight greenish tinge to it originating from the chlorophyll found in the vegetables.

Non-chlorinated wash water contaminated with micro-organisms and particles was stored in a chill tank. It was filtered using a bag-filter to remove suspended matter and was then treated by an Aquafine UV disinfection unit fitted with sample ports at the inlet and outlet. Water samples were collected from the inlet and outlet for microbiological analyses.

The analysis data, as plotted in the adjoining figure, show results from three different tests carried out and represent the pre-UV and post- UV microbial counts per milliliter of water sample on the logarithmic Yaxis. The analyses of the samples conformed to standard and established protocols. The results show that UV could be effectively used to disinfect the pre-filtered wash water stream. An important implication of the results is that UV could substitute the chlorine previously used as the primary disinfectant of the wash water.

Further, the tests also demonstrated that UV irradiation is quite effective on Listeria too. For the Listeria test, the water stream was actually inoculated with known amounts of Listeria. While chlorine is effective against most microorganisms, it is not very effective on Listeria. Contamination from Listeria was one of the major concerns for this vegetable processor and was addressed by the pilot study.

The microbiological analyses were performed by Gelda Scientific and Industrial Development Inc., Ontario, Canada, a professional and independent laboratory hired by Pride Pack.

### Conclusion

The data conclusively and definitively establish that UV can be effectively and efficiently used to disinfect water that had been used to wash vegetables, even with minimal pretreatment. The water thus disinfected could be used to process the next batch of vegetables. The data also shows that UV is not only effective against salmonella, but also against Listeria monocytogenes.