

Market Overview:

Bottled water production plants fall under FDA authority as a food product. State primacy regulations can also add to a bottlers requirements and reporting. FDA and States regulations must meet the U. S EPA Safe Drinking Water requirements.

Bottlers have used Ultraviolet Disinfection and Ozone treatment for years and now face upgrades to the UV Dose to meet the 4 LRV requirements for Virus of 186 mJ/cm² and monitor the disinfection byproducts that Ozone can produce. As such the dosage of Ozone has been reduced and the reliance on UV and pre filtration to meet the 4 LRV of bacteria, virus and cryptosporidium is now becoming standard practice for this industry.

Product recalls can be devastating to a bottler's brand and reputation and UV pretreatment is an essential part of the treatment train to provide water veritually free of particulates, organics, color, etc.

Market Applications

Spring Water - installation March 2012

Case #1 Pittsburgh, PA

Goal improvement to filtration treatment train for additional virus reduction, lower pressure requirements, lower CIP costs, lower operating costs.

Flow rate - 180 gpm

Partice levels - 10,000 - 30,000 particles 80% fine (<1 um) per 15 ml
UV was upgraded previously to meet the 186 mJ/cm² dosage



Existing PES .6 um stage 1 (lower right vessel) and .2 um stage 2 PES filters (lower left vessel) were replaced with .45 um absolute backwashable filters in stage 1 and Charged Membrane Filters in stage 2. The 2.5 x 30 inch cartridges were designed to fit exiting filter vessel making the change out steamless to product line.

Stage 1: Backwash frequency is based upon PSID or time at the direction of the Plant Manager. Started out everyday and currently extended to every other day. PSID prior to backwash has been <6psi. Santi rinse is performed after cleaning. SOP is to replace cartridges every 6 months however the first set of cartridges were still performing after 9 months or ~6.5 million gallons.

Stage 2: Charged Membrane Filtration performance is superior to the PES .2um filters used in the past and have not seen PSID loading that would require premature replacement. Lower pressure drop, virus reduction and longer life have been achieved. First set of cartridges were changed at 9 months but now on 6 month SOP.

Cost: New cartridge costs were not significant part of decision to upgrade since they were very comparable. However the reduced pressure losses, performance improvement, reduction in CIP and longer filter cartridge life were significant.

Market Applications

Reverse Osmosis Water - Pre Membrane upgrade Installation March 2014

Case #2 Pittsburgh, PA

Goal improvement to pre filtration of Reverse Osmosis system to protect from bio film and improve RO performance over life of membranes.

Flow rate - 180 gpm

City Water

Particulate levels - ~10,000 particles 80% fine (<1 um) per 15 ml

UV was upgraded previously to meet the 186 mJ/cm² dosage

Existing 10 um particulate filters were replaced with .High Capacity Charged Membrane Filters.

The 2.5 x 30 inch cartridges were designed to fit exiting filter vessel making the change out seamless to product line.

Installation date of upgrade August 2013.

The High capacity charged membranes have provided improve filtration and bottler has seen *reduced silica* levels in RO premate water. Membrane transpressure have remained low.

New RO membranes were replace shortly before this upgrade. SOP is to replace these filters every 6 months.



Reverse Osmosis Water - Post Storage upgrade - Installation August 2012

Goal improvement to post filtration of Reverse Osmosis stored water for improvement to water quality for virus reduction and to standardize on Charged Membrane Filters vs PES membranes.

Flow rate - 180 gpm

Particulate levels - N/A

UV was upgraded previously to meet the 186 mJ/cm² dosage

Existing .2um PES filters were replaced with Charged Membrane Filters.

The 2.5 x 30 inch cartridges were designed to fit exiting filter vessel making the change out seamless to productline.

SOP is to replace these filters every 6 months.

Cost: New cartridge costs were not significant to decision to upgrade since they were very comparable. However the reduced pressure losses, performance improvement, reduction in CIP and longer life were significant.



Market Applications

Distilled Water - Post Storage upgrade - Installation August 2012

Goal improvement to post filtration of Distilled stored water for improvement to water quality for virus reduction and to standardize on Charged Membrane Filters vs PES membranes.

Flow rate - 180 gpm

Particulate levels - N/A

UV was upgraded previously to meet the 186 mJ/cm² dosage

Existing .2um PES filters were replaced with Charged Membrane Filters. The 2.5 x 30 inch cartridges were designed to fit existing filter vessel making the change out seamless to productline.

SOP is to replace these filters every 6 months.

Cost: New cartridge costs were not significant to decision to upgrade since they were very comparable. However the reduced pressure losses, performance improvement, reduction in CIP and longer life were significant.



Market Applications

Spring Water - installation March 2014

Case #1 PA

Goal improvement to filtration treatment train for additional virus reduction, lower pressure requirements, lower CIP costs, lower operating costs.

Flow rate - 300 gpm ~ 8 hours per day operation

Particulate levels - 150,000 particles 80% fine (<1 um) per 15 ml

UV was upgraded previously to meet the 186 mJ/cm² dosage

Existing Spring filtration was completely upgraded to add screen filters (rocks, etc) new multi round filter vessels were replaced that use our .45 um absolute backwashable filters in stage 1 and Charged Membrane Filters in stage 2.



Stage 1: Backwash frequency is based upon PSID or time at the direction of the Plant Manager. SOP is to replace cartridges every 6-12 months.

Stage 2: Charged Membrane Filtration performance is superior to the PES .2um filters used in the past and have not seen PSID loading that would require premature replacement. Lower pressure drop, virus reduction and longer life have been achieved.

Cost: Upgraded old filter vessels which used a non standard 2.5 x 50" 7 round configuration. These tall filters experienced water hammer issues that periodically broke the filters. The original vessels used 10 um dirt filters that were not adequately protecting the post filters.

Cost analysis showed pay back in 3-4 years.



Filtration Series
Line 1 of 2 - 300 gpm



Post filters -UV lower
left 186 mJ/cm² 4LRV



3 way plug valves manual
backwash