



### Major Northeast Power Plant Realizes Significant Cost Reductions in Condensate Water Treatment with Pall Hydro-Guard® Filters

Premature plugging of resin pre-coated, backwashable condensate filter elements with resin fines and contaminants is a common and wasteful occurrence at power plants. Premature plugging results in short runs, especially during start-ups when the contamination loading is at its highest. In addition to short runs, filter bypass, end-cap failures, and system trips due to high filter differential pressure are also common in condensate water backwash systems using typical, nominal rated commodity filtration.

#### The Challenge

A 775 MW combined cycle plant in the northeastern United States was experiencing premature plugging of resin pre-coated, backwashable condensate filter cartridges with resin fines and contaminants. This occurred especially during start-ups, when the contamination loading is at its highest. In addition to short runs, the plant also experienced filter bypass, end-cap failures, and system trips due to high filter differential pressure. The plant has a 275 MW steam turbine generator that uses an air-cooled condenser. The condensate polishing system consists of two Pall Septra™ backwash vessels in parallel, with one in operation and one on standby. Each vessel contains 420 filter cartridges, 2.50" diameter by 80" long.

The automated backwash cycle at the station consists of a sequence of operations that utilizes about 8,000 gallons of clean water, generating an equal amount of wastewater for each backwash event. The amount of resin and filter aid used for the pre-coat of the filters after each backwash is 100 cubic feet. The cost of the resin and the filter aid for each pre-coat is roughly \$2,500 US.

The plant had been using string-wound filter cartridges since its inception, but was

experiencing a number of issues with performance and integrity. The biggest issue was short runs or low condensate throughput, especially during start-ups. The fouling of the string-wound filter media with particulate contaminant and the fine powder resin resulted in high differential pressure, resulting in by-pass of untreated condensate. In addition, there were instances of filter cartridge end-cap detachment, string 'unwinding' due to repeated back flush and water hammer effects, and galling of the metal threads over time. Each such occurrence would require corrective action resulting in lost time and revenue.

#### The Solution

In light of the problems with the string-wound filters that the plant was experiencing, Pall recommended its Hydro-Guard® filter

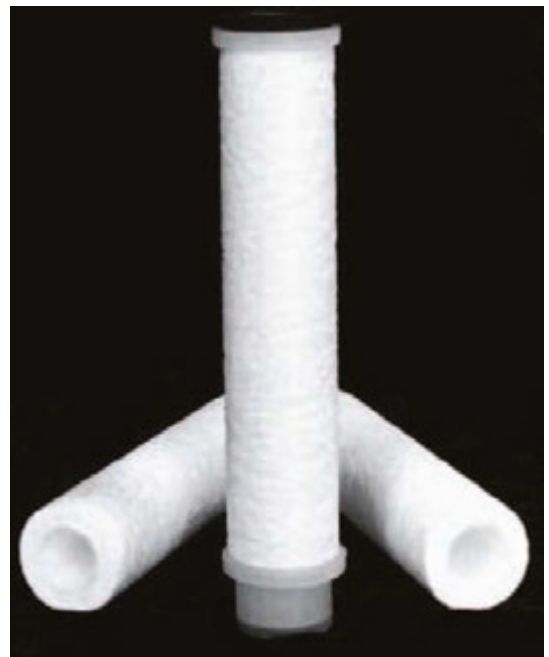


Figure 1 – Cutaway view of HydroGuard® filter element



Figure 2 – End-cap and connector of Hydro-Guard filter element (top) and the string-wound filters

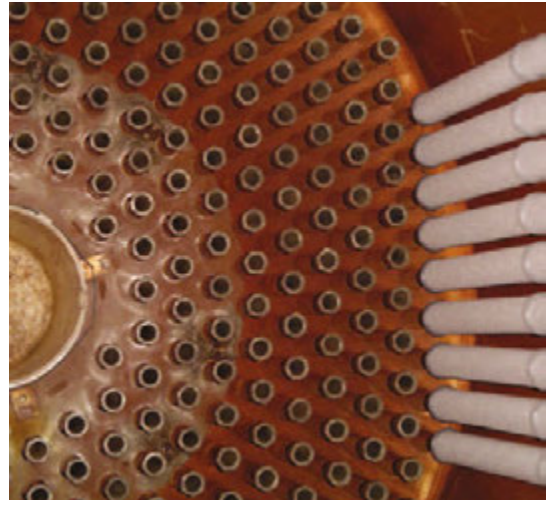


Figure 3 – Hydro-Guard filter element being installed

cartridges made with proprietary CoLD Melt™ technology. This technology creates a filtration matrix with small, micro-thin fibers for particle removal efficiency and Co-located Large Diameter (CoLD) fibers for the rigid structure and strength that is critical under the dynamic operating conditions encountered in this application. The filter cartridge offers

reverse depth gradient pore structure that effectively captures particles on the finer porosity, tighter outer surface. At the inner depths of the filter exists a more open fiber matrix that facilitates a forceful and efficient backwash, which is critical to the performance and longevity of the filters.

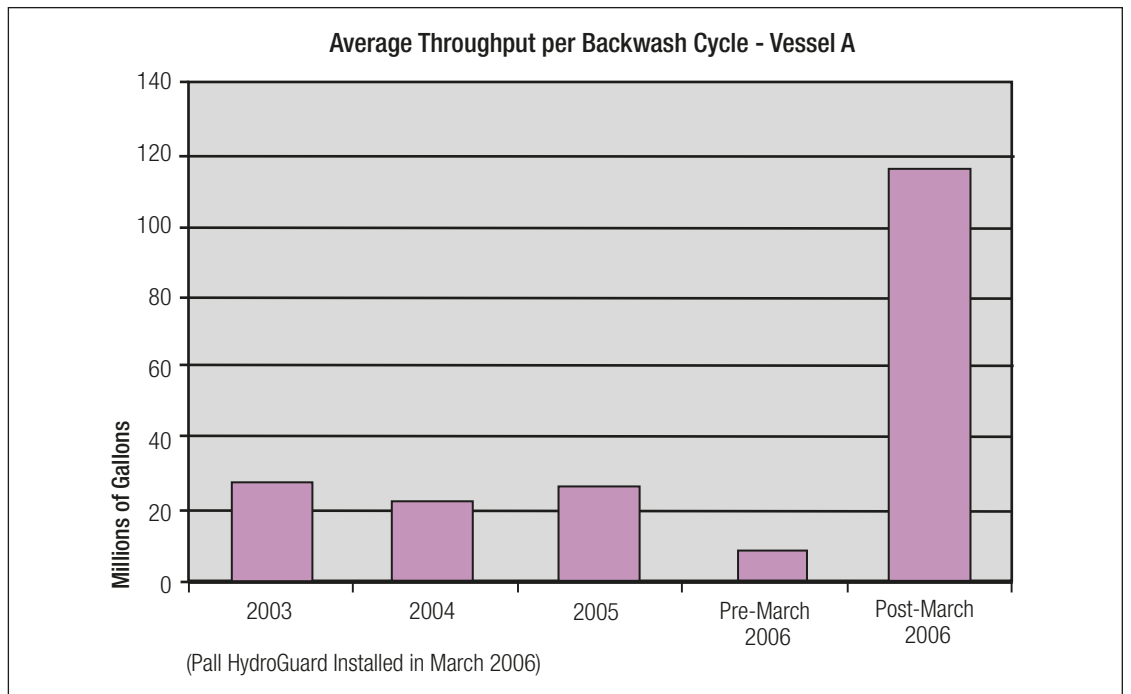


Figure 4 – Average Throughput Data

The filter cartridges are made with 100% polypropylene, inert melt-blown fibers, containing no surfactants, wetting agents, or other extractables that are associated with string-wound construction, thus eliminating the issue of these materials contaminating the system. The absence of the extractable materials in melt-blown media saves time and water – both the clean water and the wastewater required to rinse off the extractable materials. A total of 420 Pall Hydro-Guard filter cartridges, 2.5" diameter by 80" long, were installed in the bottom tube-sheet vessel, without any modifications to the vessel.

Plant records show that of the 69 total backwash cycles that the system underwent between 2003 and 2006, prior to the installation of the Pall cartridges, five were caused by high conductivity and two were caused by resin trap problems; the rest were due to high differential pressure (DP). Since the installation of the Pall filter cartridges, the system has undergone 10 backwash cycles, all of which were due to water conductivity.

The power plant has reported an average throughput of 94.25 million gallons, which is

about 4.4 times the throughput obtained with the string-wound filters between the backwash cycles. The longer runs have lessened the need for pre-coat resins, resulting in more than \$60,000 in savings over a period of eight months. Based on the positive experience with the first vessel, the plant has retrofitted the second vessel. Since then, the plant has reported total cost savings of more than \$140,000 over a period of 18 months, realized through higher efficiency, improved productivity, and lower resin and chemical treatment costs.

**Benefits:**

- Melt-blown technology is inherently resistant to the ‘unwinding’ associated with the string-wound design
- Thermal bonding of the media pack with the polypropylene end caps eliminates media pack separation from end caps eliminating iron and resin bypass
- Elimination of thread galling common to metal-to-metal connections
- Contains no surfactants, wetting agents, or other extractables associated with string-wound construction, thus eliminating the issue of these materials contaminating the system



## Power Generation

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