



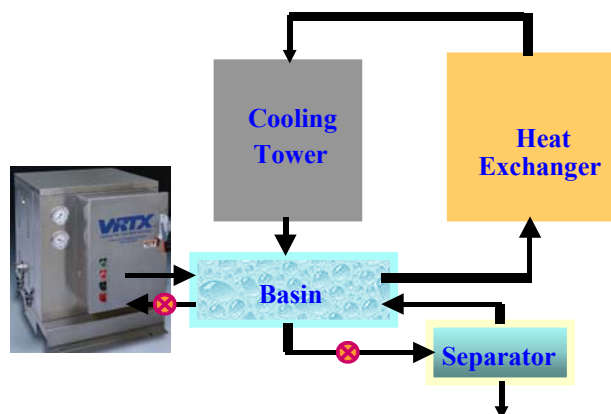
Strategic Envirotechnology Partnership Fact Sheet

VRTX Technology

Introduction: This fact sheet is a concise summary of a more detailed analysis conducted by the Office of Technical Assistance for the Massachusetts Strategic Envirotechnology Partnership (STEP). For further information on the full report, see the STEP web site, at <http://www.stepsite.org>, or contact Jenny Braun-Friedman at (617) 626-1052. For further information on the VRTX Technology, contact A.W. Chesterton Company at (210) 661-8800 or (800) 722-0476.

Technology Description: Cooling towers traditionally require the use of a chemical treatment maintenance program to prevent scaling, corrosion, and biological fouling. The VRTX system is a mechanically induced treatment system that prevents the formation of scale deposits, corrosion, microorganisms, and slime in the water and completely eliminates the need for a chemical treatment program. No chemicals are added to the cooling tower water.

The VRTX unit, which connects to the basin water reservoir, consists of a mechanical device that uses hydrodynamic cavitation (the formation, growth, and implosive collapse of small gas bubbles within a liquid) to remove solids and carbon dioxide from cooling tower water. Typically, a side-stream of water is removed from the cooling tower basin, pumped through the VRTX unit,



and returned back to the tower basin. The water discharge from the VRTX unit is returned to the basin and a second side-stream taken from the bottom of the cooling tower basin passes through a cyclonic separator or filtration system where the solid calcium carbonate precipitate and other incidental solids can be easily separated from the water and collected. The collected solids are backflushed or siphoned from the system daily.

Technology Application: VRTX systems are currently in use for cooling tower systems in industries such as food processing and storage, plastic injection molding, investment casting, electronics manufacturing, soft drink bottling, cold storage, and wire drawing.

Technology Performance: Five full-scale applications of the VRTX technology at Pillsbury (Minnesota), Richmond Cold Storage (Virginia),

Lancer Corp (Texas), International Paper Co. (Virginia), and Fujitsu Corporation (Oregon) demonstrated that use of the VRTX system eliminates the need for chemical treatment of cooling towers and can:

- prevent scaling, corrosion, and biological fouling;
- decrease water consumption;
- decrease blowdown;
- increase cycles of concentration;
- eliminate chemical use; and
- result in cost savings from elimination of treatment chemicals and reduced water consumption.

Cost Information: Pillsbury's VRTX unit, which has a flow rate of 60 gpm, was purchased for approximately \$60,000, including the cost of installation, with a pay back period of less than one year. Limited specific cost information was provided from the other four facilities using the technology. Annual savings on chemical purchases due to the use of the VRTX system at these four facilities ranged from \$7,200 to \$20,000 per year. International Paper calculated an estimated payback period of three years for the equipment.

Regulatory/Safety Requirements:

Water discharge regulations are the primary permitting area anticipated for the VRTX non-contact cooling water system. Depending on the nature of discharge and the disposal route selected, different regulatory requirements may apply. There are four disposal routes for non-contact cooling water: holding tanks, for shipment off-site to a treatment facility; sewer discharges; surface water discharges; and groundwater discharges. Each of these disposal routes has different regulatory requirements from different jurisdictions (local, state and/or federal –

see the full report for more information). The water-related permitting requirements noted here do not trigger any air or hazardous waste requirements, based on test results indicating that discharges from the VRTX system are similar to or cleaner than ordinary non-contact cooling water discharges.

Implementation Considerations:

The most significant start up issue at Pillsbury concerned the removal of existing scale within the evaporative condensers. Some of the pipes in the cooling system experienced clogging when existing scale broke off from heat exchange surfaces and entered the water stream. This scale also interfered with the flow through the VRTX chamber, affecting the vacuum and the unit's overall performance. For this reason, the manufacturer recommends purging the system periodically during the first 2-4 weeks following installation. Alternatively, the cooling tower system could be cleaned prior to VRTX installation to eliminate the need to purge the system.

Pillsbury also found that while VRTX maintenance demands are much less than what is required for a traditional chemical treatment program, it is important to follow the unit's required maintenance schedule to ensure its proper operation. This includes monitoring the vacuum and other settings within the chamber, monitoring the solids separator to ensure proper separation, periodically cleaning strainer baskets, and tracking calcium, magnesium, total plate counts, and corrosion levels within the system.