McGill AirClean Corporation

An enterprise of United McGill Corporation—
Founded in 1951

Wet Electrostatic Precipitators

Steel Scarfing

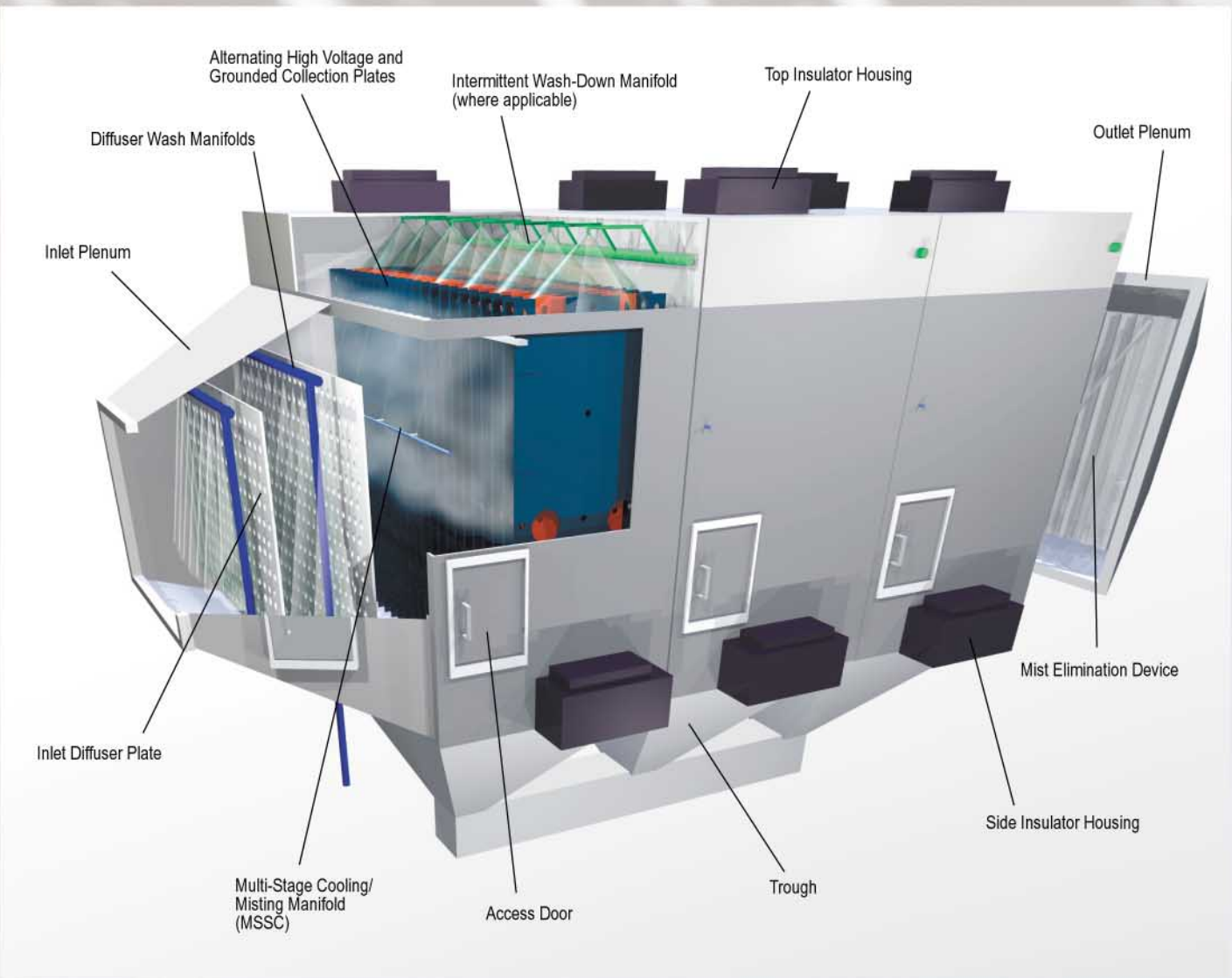
Wood-fired Boilers

OSB Dryers

MDF Dryers

Fiberglass Forming and Curing

Particleboard Dryers



Artist's concept depicting the overall collection/cleansing process of the McGill AirClean wet EP.

McGill AirClean Corporation puts more than 30 years of experience to work for you, solving air pollution control problems for a wide variety of industrial processes including boilers, furnaces, dryers, ovens, etc. Wet electrostatic precipitators (EPs) from McGill AirClean are a cost-efficient, highly effective way to meet very stringent air pollution control regulations and for sticky or flammable flue gas particulates.

The Process of the McGill AirClean Wet EP

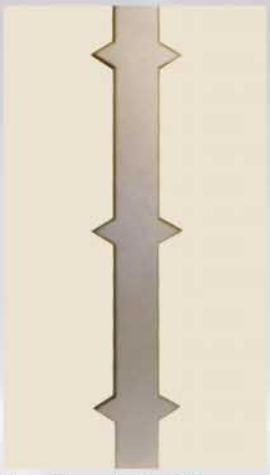
Water is sprayed into the gas stream to cool it to its saturation point and condense many of its pollutants. Once the stream is saturated, solid particles and condensed pollutants are given an electrical charge so they can be collected on the wet EP's plates.

Manifolds continuously spray the quench section and inlet diffusers to saturate the gas stream and help prevent hardening or burning of the collected material. Additional manifolds are utilized inside the EP to keep all interior surfaces wet and wash the collected matter from the plates. Depending on the application, secondary manifolds are sequentially activated to produce a more concentrated stream of water to wash the collected material from the plates. That is accomplished through the use of fixed manifolds or a traveling spray header.

Water is typically filtered and recirculated through the system. During operation, small amounts of the contaminated water may be drained and replenished with clean water. This cycling process allows the wet EP to operate continuously and reduces the cost of water use and disposal. McGill AirClean can supply a complete water treatment system featuring minimal blowdown and disposal requirements.

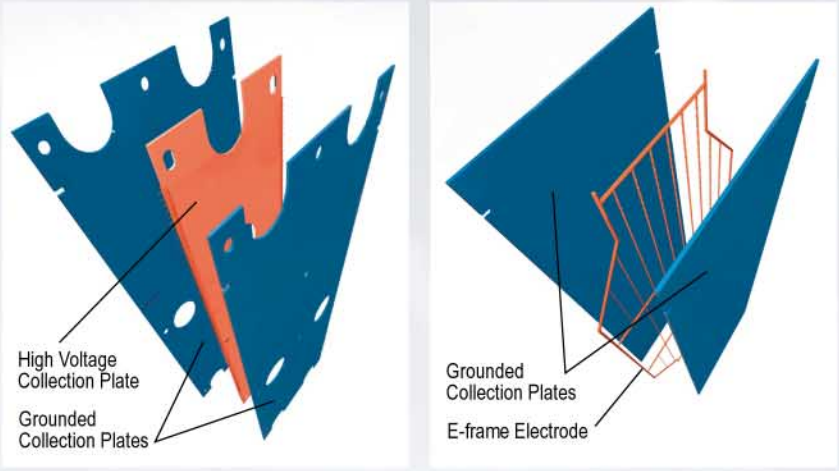
A view of a section of needles mounted on the edge of a high voltage collection plate

A view of the same needles under normal applied DC voltage. Corona current flows from the needle tips through the gas stream to a resistive layer on the grounded collection plate.

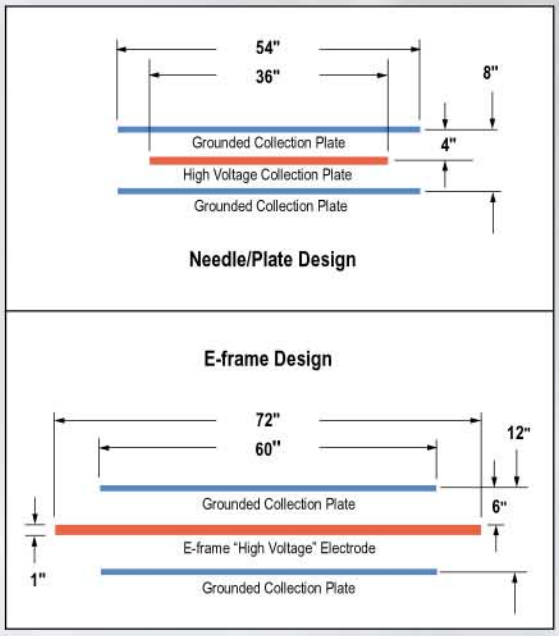


The e-frame electrode has precision-cut sharp points and is rigidly supported in a heavy pipe frame.

View of the e-frame electrodes and collection plates installed in a module.



Simplified illustrations, approximately to scale, showing a side-by-side comparison of McGill AirClean's standard needle/plate collection electrode design (left) and its e-frame electrode design (right).



Plan view illustrations comparing typical dimensions and collection plate spacings of the needle/plate design (top) and the e-frame design (below)

Electrode/Plate Systems

McGill AirClean offers two very different electrode/plate configurations, and can help you select the one best suited for your application.

Needle/Plate—McGill AirClean's patented high-voltage needle/plate collection design uses an electrode for generating the corona current and electrostatic field. A series of sharp needles are mounted along the leading and trailing edges of high-voltage collection plates. The needles produce an electrical charge that causes particulate in the flue gas stream to collect on the electrode plates. This unique design enables our wet EPs to combine high collection efficiency, low operating costs, low maintenance costs, and small sizes.

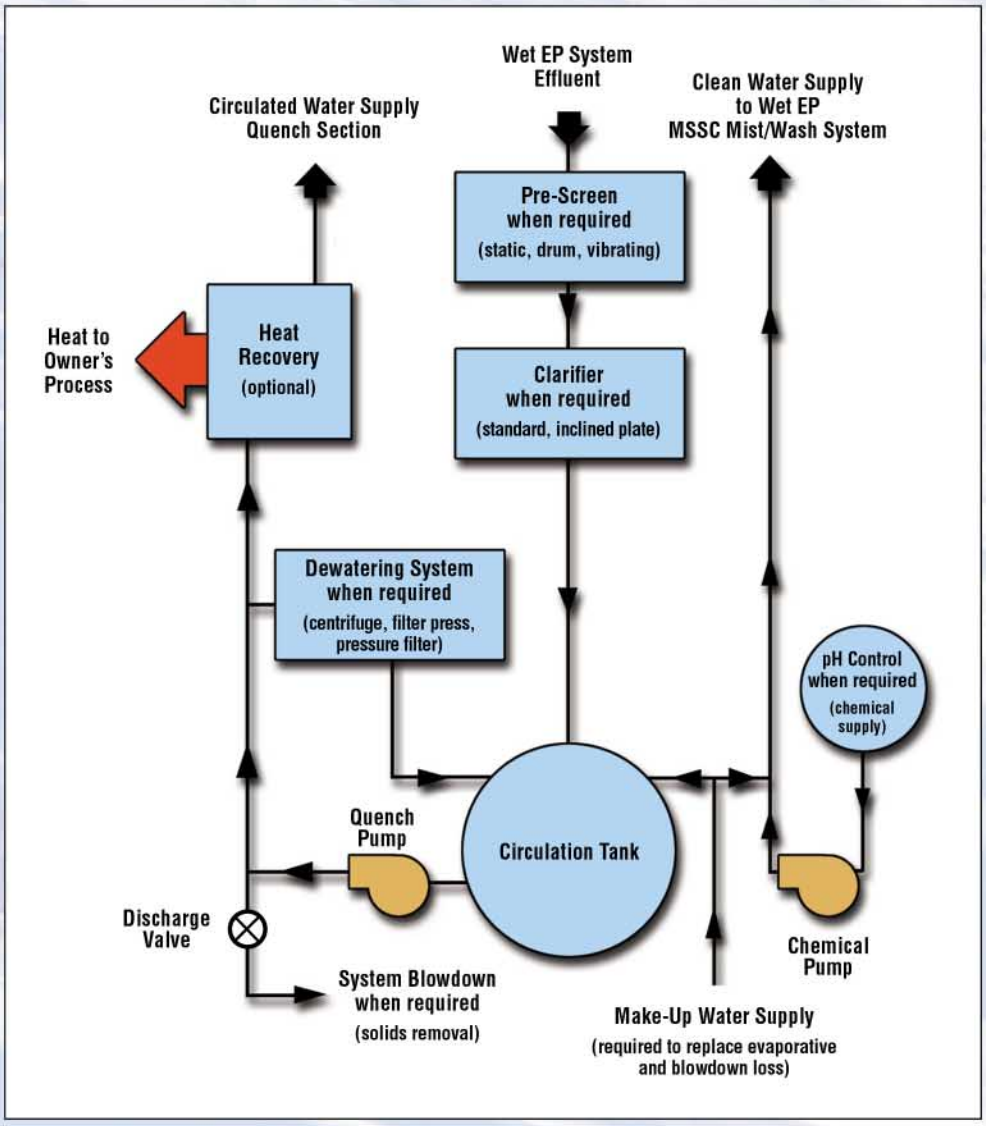
McGill AirClean's needle/plate collection electrode design uses energy much more efficiently, enabling our wet EPs to operate at relatively low levels of voltage and current. By consuming as much as 70 percent less power than conventional wet EPs, our units can save users tens of thousands of dollars per year in electricity costs.

The collection surfaces in a McGill AirClean needle/plate wet EP consist of parallel rows of high-voltage and grounded collection plates arranged in alternating order.

E-frame—In some applications the particulate to be collected requires the electrode geometry inside the McGill AirClean wet EP to be configured for very high recirculated water flow rates. When that is the design criterion, we will recommend our E-frame design. The E-frame design utilizes greater spacing between the high voltage electrode and grounded collection plates and therefore substantially higher operating voltage. The high voltage electrodes have precision-cut sharp points (not needles) and are rigidly supported in heavy pipe frames. This design also utilizes the heavy, entirely flat, grounded collection plates that are essential to proper wet EP design.

Manifolds incorporating quick-disconnect nozzles assure sufficient washdown while using the least amount of water possible.

Artist's rendering of a McGill AirClean wet EP module equipped with an optional traveling spray header which may be incorporated when extremely sticky materials must be washed from the collection plates.



Schematic of a typical McGill AirClean water treatment system.

Plate Washing Systems

In some applications, the continuously wetted collection surfaces are periodically scrubbed with either stationary headers or our patented traveling spray header (TSH) system.

In some applications, a chemical wash system may also be included. The most common type uses a concentrated spray of sodium hydroxide directly on the collection surface through dedicated headers. This system can also control the pH levels.

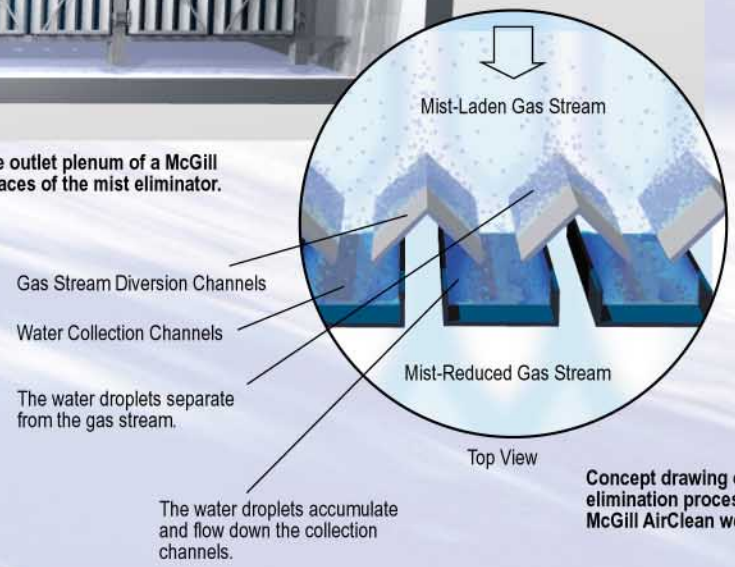
Water Treatment Systems

Water treatment systems are an integral part of a wet EP. Each application must be evaluated independently to provide the most cost-effective solution to the user's process and needs. The challenge is to design a water treatment system with little to no polluted water discharge and minimal make-up water requirements. All pollutants collected by the wet EP must eventually be removed to keep it in equilibrium.

McGill AirClean has incorporated many conventional filters into its water treatment systems for suspended solids, such as inclined screens, rotating screens, filter presses, centrifuges, and cartridge filters. We select the filtration system best suited for the specific application.

Dissolved solids also require control to keep the system in balance. Systems can be designed to remove dissolved solids, but often the most cost-effective solution is to remove fluid that contains dissolved solids. It is often possible to recirculate this fluid at relatively high dissolved solids concentrations, thereby reducing the quantity of fluid to be disposed of to keep the water treatment system in balance.

Drawing of a McGill AirClean mist elimination device installed in the outlet plenum of a McGill wet EP. Note the hinged sections that provide access to all the surfaces of the mist eliminator.



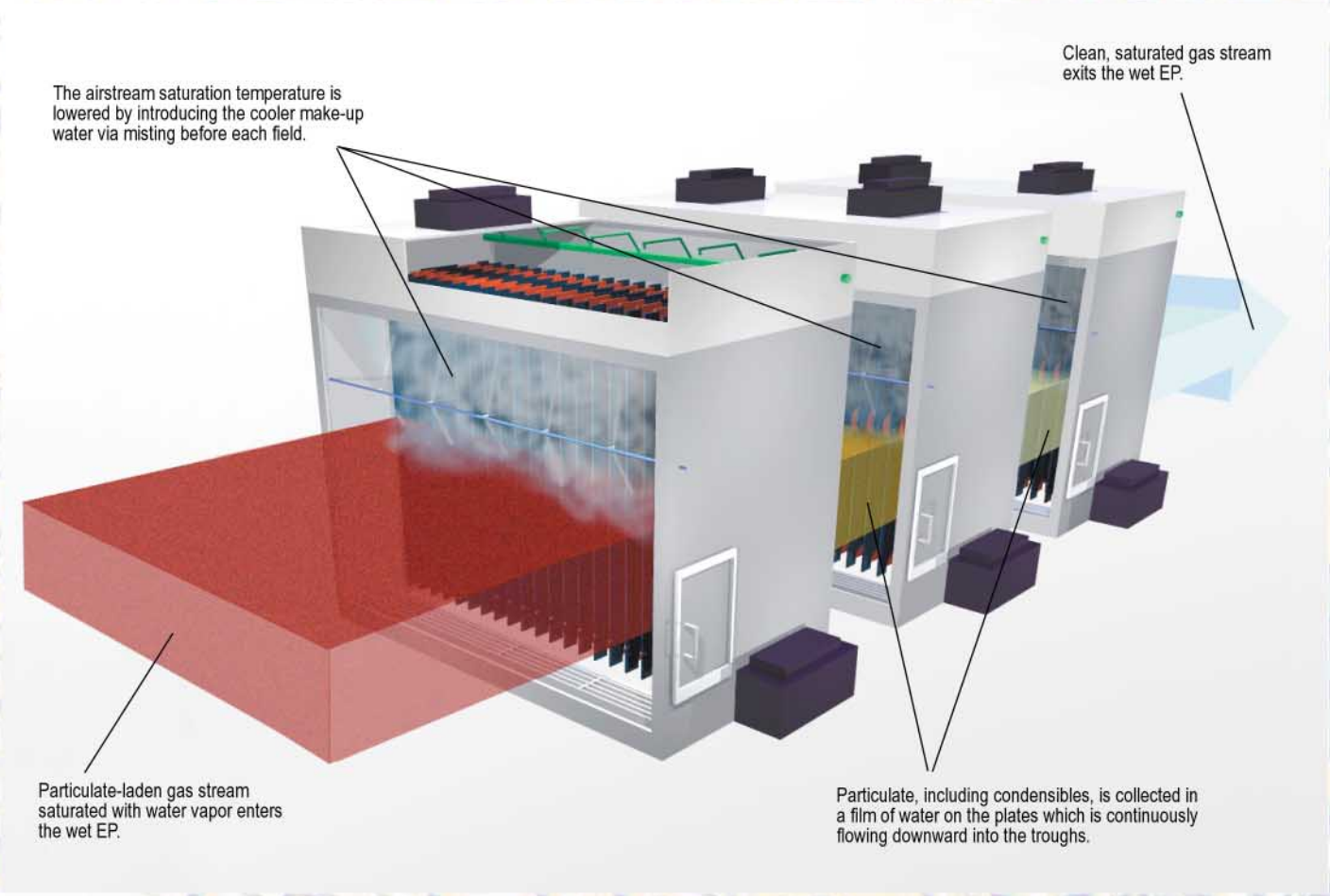
Concept drawing of the mist elimination process in the McGill AirClean wet EP.

Mist Elimination

A wet EP is an extremely efficient mist elimination device and is often used for that specific purpose. The McGill AirClean wet EP has two important design features that make it superior to other wet EPs at mist elimination:

Horizontal flow—Gas flows through the unit horizontally providing natural mist elimination as the heavier water droplets are aided by gravity to separate from the gas stream.

Multiple fields—The downstream field with its independent power supply remains on-line a greater portion of time, thereby acting as a very effective mist eliminator. In addition, a mechanical mist eliminator is offered after the last wet EP field. Unlike other mist eliminator designs, McGill AirClean's has hinged sections that provide the operator access to all surfaces of the mist eliminator.

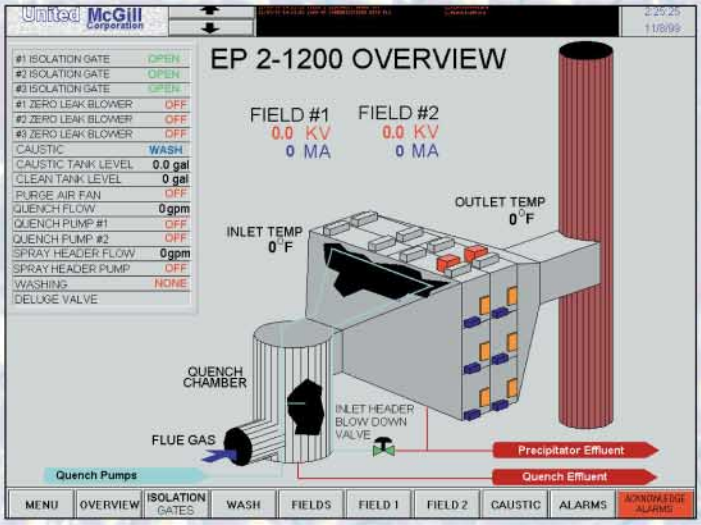


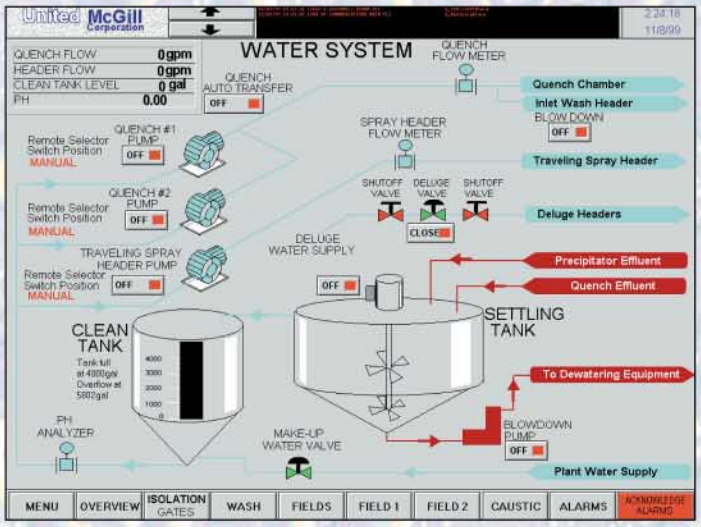
This illustration pictures the multi-stage (multi-field) cooling process used in the McGill AirClean wet EP.

Saturation/Sub-cooling

For optimum efficiency, it is important that the gas stream to be cleaned is brought to its saturation point prior to entering the first field of the wet EP. McGill AirClean will design a saturation system specific to your application that usually utilizes recirculated water.

In addition to saturation, McGill AirClean's multiple-stage (multiple-field) designs often allow the opportunity to cool the saturated gas stream to a lower saturation temperature, therefore wringing even more condensibles out of the gas stream and creating a layer of water on all internal surfaces to help assure a continuous flow of material from the internal surfaces and avoid particulate accumulation. This is accomplished by misting before each field with the much cooler makeup water, therefore reducing the saturation temperature. Because of sub-cooling, much of the make-up water can be reclaimed from the gas stream, reducing overall water usage.





Typical computer screens for a McGill AirClean wet EP PLC-based control system.

The McGill AirClean wet EP's heavy-duty construction minimizes maintenance, repairs, and parts replacement.

McGill AirClean has the knowledge and experience to properly select the correct materials of construction to meet the particular demands of an application, greatly extending the operation life of the wet EP. Modules shown in McGill AirClean's steel fabricating plant.

Controls

- PLC-based system
- Integrated water, EP, and flue gas system
- On-line service
- Continuous monitoring

Materials of Construction

Selecting the proper material of construction for each application is a critical part of the application engineering. The material selection must be made with an understanding of the gas chemistry, water quality, active electrical environment within the wet EP, pH control, and cost effectiveness. Many times carbon steels are acceptable in part or all of the wet EP, but systems manufactured entirely of various grades of stainless steel are also very common.

Why a McGill AirClean Wet EP?

Horizontal Flow—Horizontal flow is ideal for wet EP design, as it naturally separates the gas from the contaminated liquid. The gas, having little weight, is easily pulled or pushed horizontally through the wet EP while the heavier liquid cascades to the collection troughs below.

Multiple Field versus Single Field—McGill AirClean's wet EP usually consists of a series of independent fields, which are essential for applications requiring high availability. Some applications require on-line washing with high water flows in an electrostatic field. This periodic high water flow quenches all power to that field. With a single field wet EP, there is no pollution control efficiency during the wash cycle. Environmental authorities generally require tests during the wash cycles to be averaged into the final results. However, with multiple fields, only one of the fields is washed at a time, which causes only a minor, intermittent decrease in efficiency of a few percent.

Internal inspection and maintenance of the EP internals is easily and safely performed through large keyed access doors.

McGill AirClean can perform onsite emission testing with its mobile wet EP and generate the data needed to properly size and design your wet EP system.

McGill AirClean's modular design minimizes field construction because the fabrication is completed in the plant. Completed modules are shipped from McGill AirClean's plant to the jobsite where they can be easily rigged and lifted into place.

Control Equipment	Dry and Wet Electrostatic Precipitators Regenerative Thermal Oxidizers (RTO) Fabric Filters Spray-Dry Scrubbers Dust Suppression Systems
Auxiliary Equipment	Evaporative Coolers Recycling Systems Disposal Systems Ductwork Breeching Stacks Support Structures Platforms and Stairways Control Systems
Services	Manufacturing Onsite Construction and Project Management Mobile Testing — EPs, RTOs, Spray-Dry Scrubbers Maintenance, Repair, Parts

Besides wet and dry EPs, McGill AirClean can provide several other types of control equipment as well as auxiliary equipment and support services.

Redundancy—With multiple fields there is built-in redundancy. Therefore failure of one major component, such as a transformer/rectifier, results in only minor reduction in pollution control efficiency. However, when the entire pollution control system is dependent on one transformer/rectifier and its associated controls, as is common in competing EP designs, failure of any component results in complete failure of the pollution control system.

Flat Plates—Heavy-gauge plates, rather than small diameter tubes, serve as collection surfaces. That allows for quick and easy access to all collection surfaces.

Easy Internal Access—Horizontal flow and flat plates offer the user access to all surfaces inside the wet EP. If reduced downtime is important to the user, the unequaled access provided by the McGill AirClean design is a must.

Heavy-duty Industrial Construction—McGill AirClean's wet EPs are designed and constructed for industrial use, with materials such as stainless steel or heavy carbon plate for long-term industrial use. No commercial light-gauge construction is used.

We Offer Mobile Testing

McGill AirClean has pioneered the application of high-efficiency wet EPs. For more than 25 years, McGill AirClean's mobile wet EP test plants have been used by potential clients to get first-hand information on how effective a wet EP will be on a specific application, what size wet EP will be most cost effective, and what operational, maintenance, or water treatment problems may be present.

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