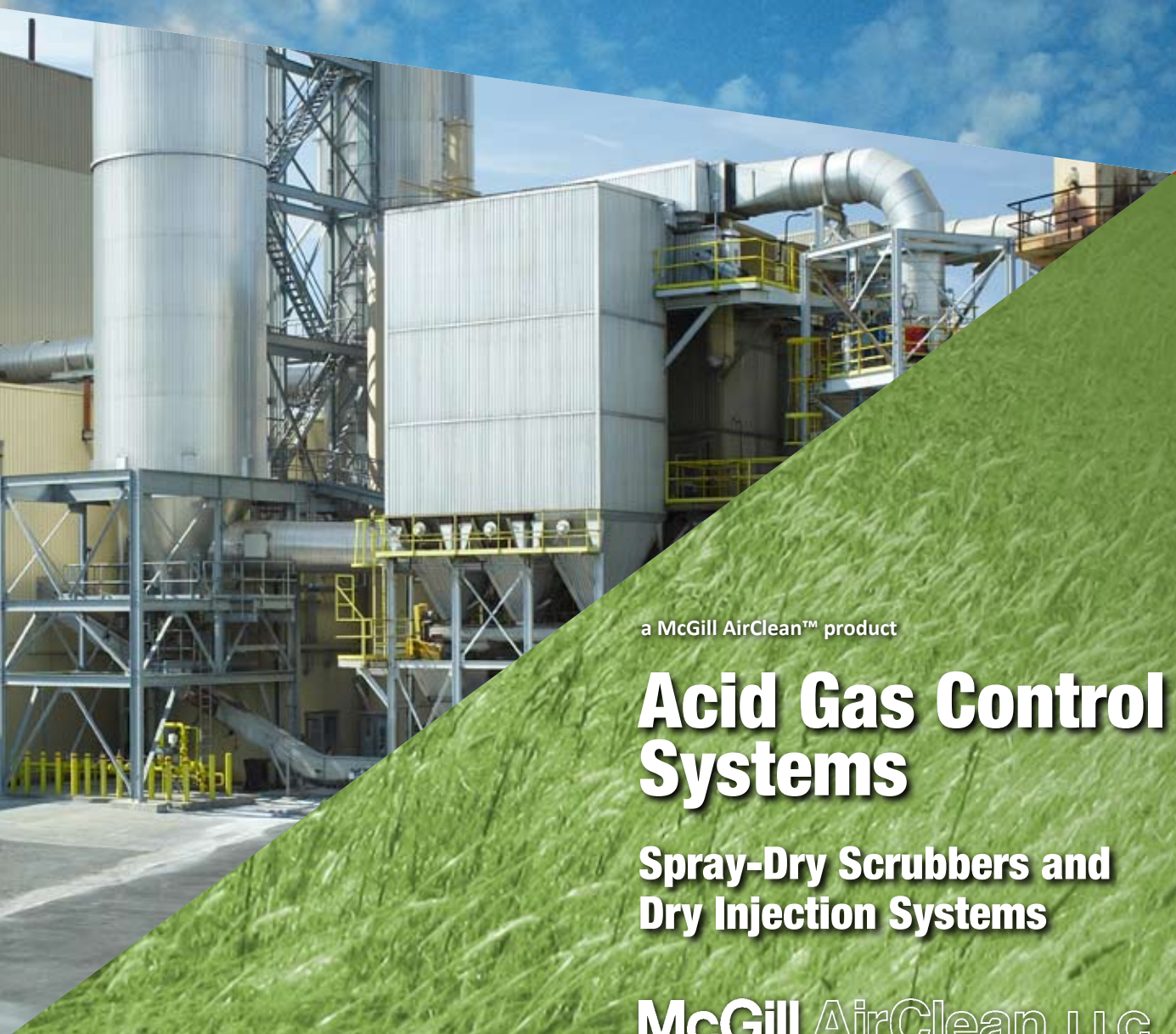
United McGill™ products



a McGill AirClean™ product

Acid Gas Control Systems

Spray-Dry Scrubbers and Dry Injection Systems

McGill AirClean LLC

An enterprise of United McGill Corporation –
Family owned and operated since 1951

McGill supplied this Trona-dry scrubber and dry electrostatic precipitator system to control SO_2 and particulate from a container glass furnace.

A McGill evaporative cooler and dry lime injection system controlling HCl and SO_2 on a university's coal-fired boiler.

McGill AirClean supplies complete systems for controlling acid gas emissions. By offering many combinations of air pollution control equipment, we can provide the best solution for your acid gas emissions problem.

Benefits of McGill Acid Gas Control Systems

Spray-dry reagent scrubbing benefits

- high-efficiency acid gas removal
- low reagent use

Dry reagent injection system benefits

- low capital costs
- simple operation

Benefits of both dry systems compared to wet scrubbers

- dry particulate dust discharge
- no sludge
- no dewatering
- reduced corrosion potential

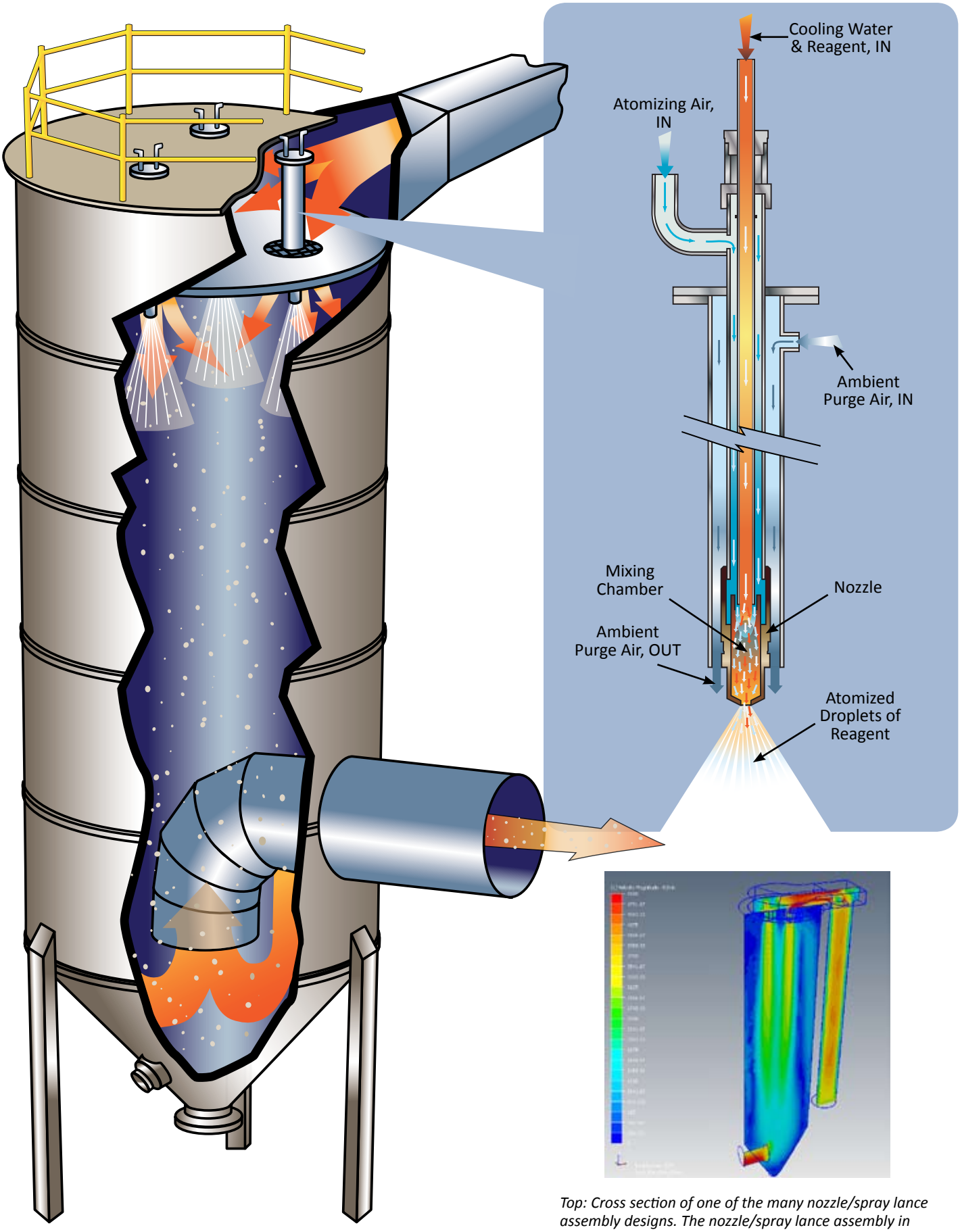
Two spray-dry scrubbers and fabric filter systems controlling SO_2, HCl, Hg, and particulate from four coal-fired boilers.

How McGill Acid Gas Control Systems Work

Spray-Dry Scrubbers

Flue gas from your process enters the spray-dry scrubber where it mixes with a finely atomized spray of cooling water and alkali. The cooling water flow rate is controlled by the scrubber outlet temperature set point, which is established by the acid removal requirements and flue gas moisture content. The slurry/solution droplets evaporate and the remaining alkali reacts with the acid gas to form salts. The salts and other solid particulate are ducted from the dry scrubber to particulate control equipment and are collected. As the collected particulate falls into a hopper for disposal, the cleaned flue gas exits through a stack.

McGill's systems use dual fluid nozzles to spray the water/alkali mixture into the spray-dry scrubber. The nozzles evenly distribute the alkali across the scrubbing chamber to optimize its reaction with the acid gas.



An artist's rendering of a down flow spray-dry scrubber depicting flow distribution and the atomizing nozzle arrangements.

Top: Cross section of one of the many nozzle/spray lance assembly designs. The nozzle/spray lance assembly in McGill spray-dry scrubbers are designed to be easily removed for maintenance or replacement.

Below: McGill CFD models are key elements in the design of each acid gas control system.

McGill supplied this large (27-feet OD) spray-dry scrubber and eight compartment fabric filter system on a manure-fired BFB boiler to control HCl, SO_2, and particulate.

Dry Reagent Injection

Dry reagent injection takes place inside the ductwork that connects your process to the particulate control equipment or specifically designed reaction chambers upstream of the particulate control equipment. A pneumatic or gravity feed system injects dry alkali into the duct where the acid gases react with the alkali to form salts. The mixture flows downstream where the salts and other solid particulate are collected. As the collected particulate falls into a hopper for disposal, the cleaned flue gas exits through a stack. McGill systems are designed and modeled to distribute the alkali so that it reacts with as much of the acid gas as possible.

Powdered Activated Carbon (PAC) Injection

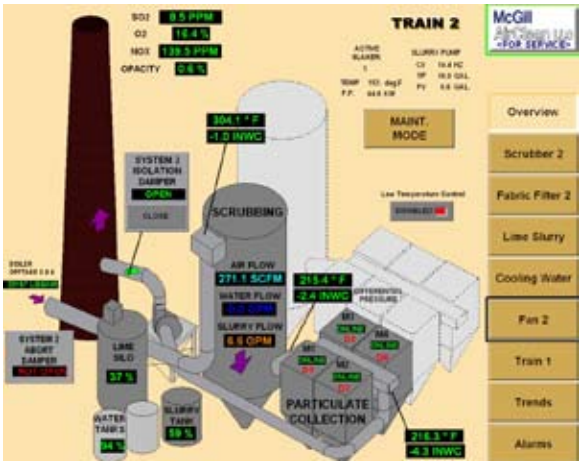
McGill has extensive experience supplying PAC systems, either as a stand-alone unit or in combination with acid gas control systems, for the control of metals (mercury) and dioxins and furans. The PAC adsorbent is injected dry into the process duct or mixed with the alkali slurry/solution and injected in the spray-dry scrubber. The pollutants bind to the porous PAC adsorbent and collect in a downstream particulate collection device. McGill engineers can properly select the optimal PAC adsorbent based on the flue gas constituents and pollutant forms (i.e., Hg_o, Hg_+, Hg_p) for removal in excess of 90 percent.

Experience

McGill AirClean has more than 40 years of experience solving acid gas emission problems. We are an industry leader with over 150 full-scale acid gas treatment projects that have provided effective control of the major types of acid gas emissions, including hydrogen chloride (HCl), sulfur dioxides (SO_X), hydrogen fluoride (HF), and boric acid (H_3BO_3).

We can help you select the most effective and economical alkaline reagent for the acid gas emissions from your process. Our engineers have experience with a variety of reagents that include lime (CaO, $Ca(OH)_2$) and sodium (NaOH, Na_2CO_3, $NaHCO_3$, Trona) reagents. They can also select the best temperature and reaction time for your process and removal requirements.

Three McGill reaction chambers with lime injection systems control HCl and SO_2 from three MSW incinerators.



Our computerized control systems with full-color, easy-to-follow screens make it easy to monitor and control all the operations of your acid gas control system.

Table 1 - McGill AirClean typical alkali preparations and injection methods for acid gas types

Reagent	Injection Method	Common Use
Lime slurry	Atomized lance	SO_x, HCl, HF
Sodium-based solution	Atomized lance	SO_x, HCl, H_3BO_3, HF
Dry hydrated lime	Blower	SO_x, HCl, HF
Trona	Blower	SO_x, HCl, HF
Sodium bicarbonate	Blower	SO_x, HCl, HF

This turnkey system uses evaporative cooling, dry reagent injection, and a fabric filter to control acid gas and particulate emissions from a regional medical waste incinerator. The unique and proprietary cooler inlet duct arrangement was determined by flow modeling to avoid using gas distribution devices in the 2,400°F environment.

Complete System Solutions

McGill has helped customers comply with air pollution control regulations for many types of incinerators, furnaces, and boilers. Effective acid gas control is a two-stage process that involves scrubbing equipment to convert the gases to solids and collection equipment to remove those solids from the flue gas stream. We provide complete systems for controlling both acid gas and particulate emissions. We can handle your entire project, from design through start-up, supplying the following equipment.

Acid Gas Control
- Reagent storage
- Reagent preparation
- Reagent transport
- Spray-dry scrubbers
- Reaction chambers

Heavy Metal Control
- PAC injection systems

Particulate Collection
- Electrostatic precipitators (dry and wet)
- Fabric filters
- Ceramic filters

VOC Control
- Regenerative thermal oxidizers (RTOs)

NO_x Control
- DeNO_x SCR reactors
- Ceramic filters (with catalyst)

Heat Transfer
- Evaporative coolers (up or down flow and in duct)

Auxiliary Equipment
- Recycling systems
- Disposal systems
- Flue gas systems
- Control systems

We will work with you to make sure your process meets emission standards, now and in the future.

Right: Two spray-dry scrubbers and PAC injection systems controlling SO_2, HCl, and Hg for two municipal solid waste (MSW) incinerators.

Below: This McGill soda ash spray-dry scrubber and dry electrostatic precipitator system controls SO_2 and particulate from a container glass furnace.

Products depicted in this brochure were current at the time of publication. As a quality-conscious manufacturer, McGill AirClean is continually seeking ways to improve its products to better serve its customers. Therefore all designs, specifications, and product features are subject to change without notice.

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