



**F l u e   G a s   D e a c i d i f i c a t i o n**



**Wheelabrator Air Pollution Control Inc.**

## Wheelabrator Has The Right Clean Air Technology For You

When you're looking for proven, economical solutions for flue gas deacidification, look to a company that has been a pioneer and leader in air pollution control technology for almost a century. Wheelabrator offers all three major technologies used today for flue gas deacidification — wet scrubbers for the most difficult removal measures, spray

dryer absorbers to meet less stringent removal requirements, and dry injection systems for lower emission levels.

Whether the application is removing SO<sub>2</sub>, HCl, SO<sub>3</sub>, or HF from coal-fired or municipal solid waste-fired boilers, incinerators, coke calciners, aluminum smelting or other industrial processes, Wheelabrator

technology responds to your specific air pollution control needs. As an experienced, single source for all major flue gas deacidification technologies, we'll analyze your specific air pollution control problem, then recommend and deliver the right system to solve it.

Our capabilities don't stop there. As a world leader in the

design and supply of electrostatic precipitators, fabric filters and SNCR deNO<sub>x</sub> systems, we can supply a complete clean air package for your plant. This makes us the only source you'll need for everything from designing, modeling, and supplying the equipment through erection, start-up and compliance testing — and beyond.

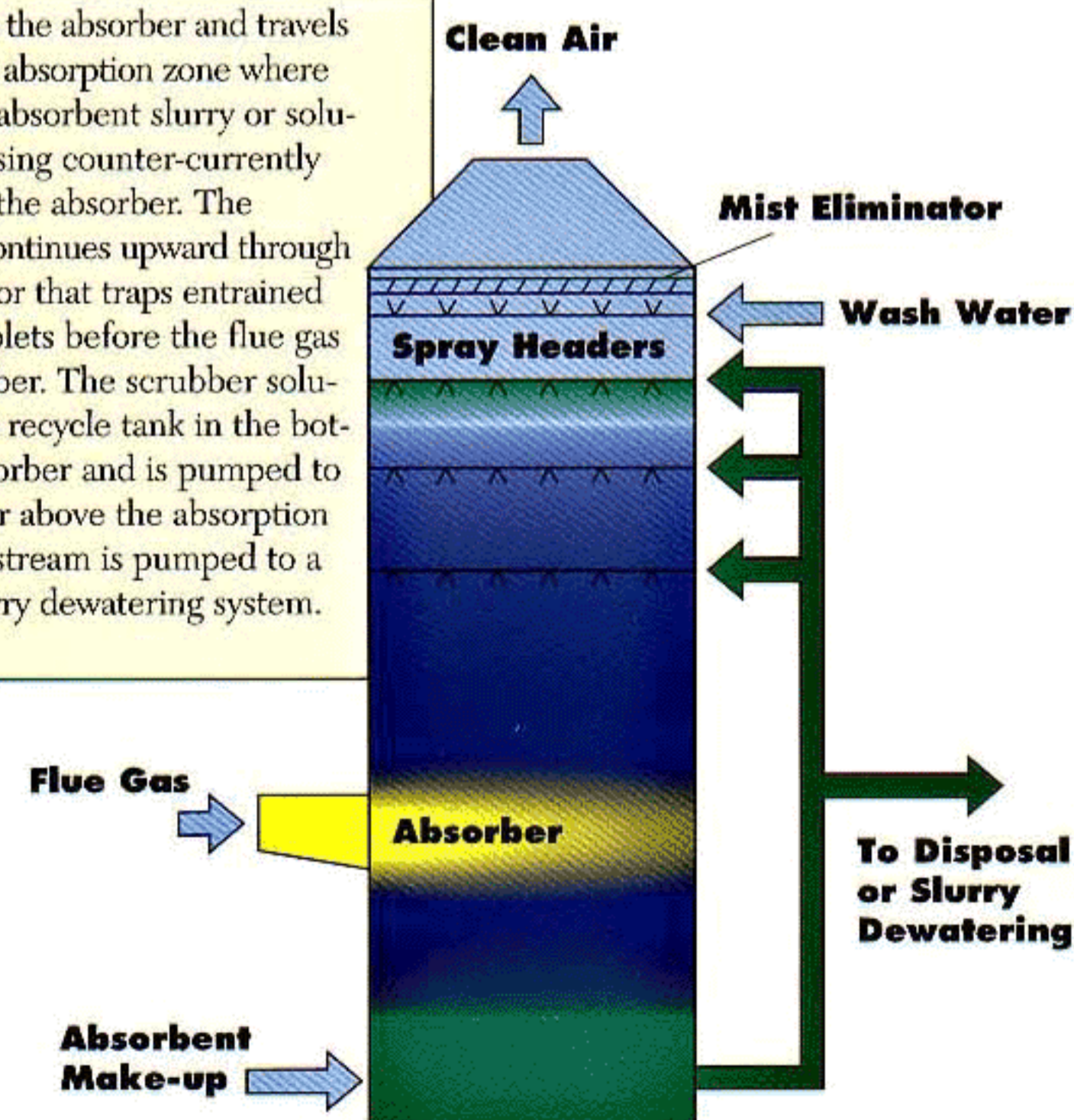
To keep our equipment in continuous, reliable operation, Wheelabrator's Aftermarket Services Department offers replacement parts, inspection services, upgrading/rebuilding services and on-site training programs for your operators so our equipment will operate to your best advantage.

This is why an investment

in Wheelabrator flue gas deacidification technology represents far more than an equipment purchase. It represents an investment in the experience, depth, and scope of an industry leader — the ultimate assurance of long-term good returns.

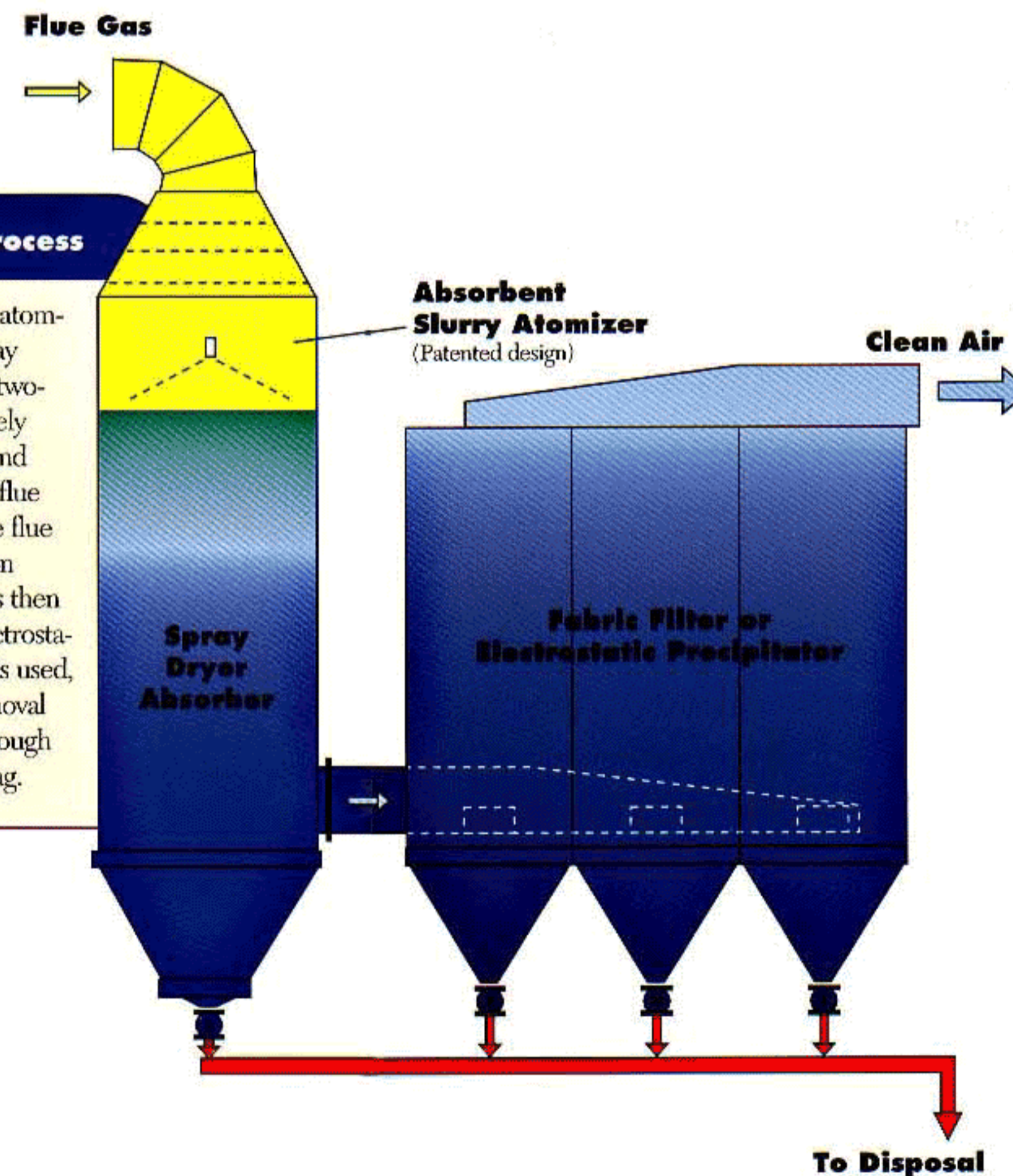
### Typical Wet Scrubbing Process

Flue gas enters the absorber and travels up through the absorption zone where it contacts the absorbent slurry or solution that is passing counter-currently down through the absorber. The scrubbed gas continues upward through a mist eliminator that traps entrained absorbent droplets before the flue gas exits the scrubber. The scrubber solution falls into a recycle tank in the bottom of the absorber and is pumped to a nozzle header above the absorption zone. A bleed stream is pumped to a disposal or slurry dewatering system.



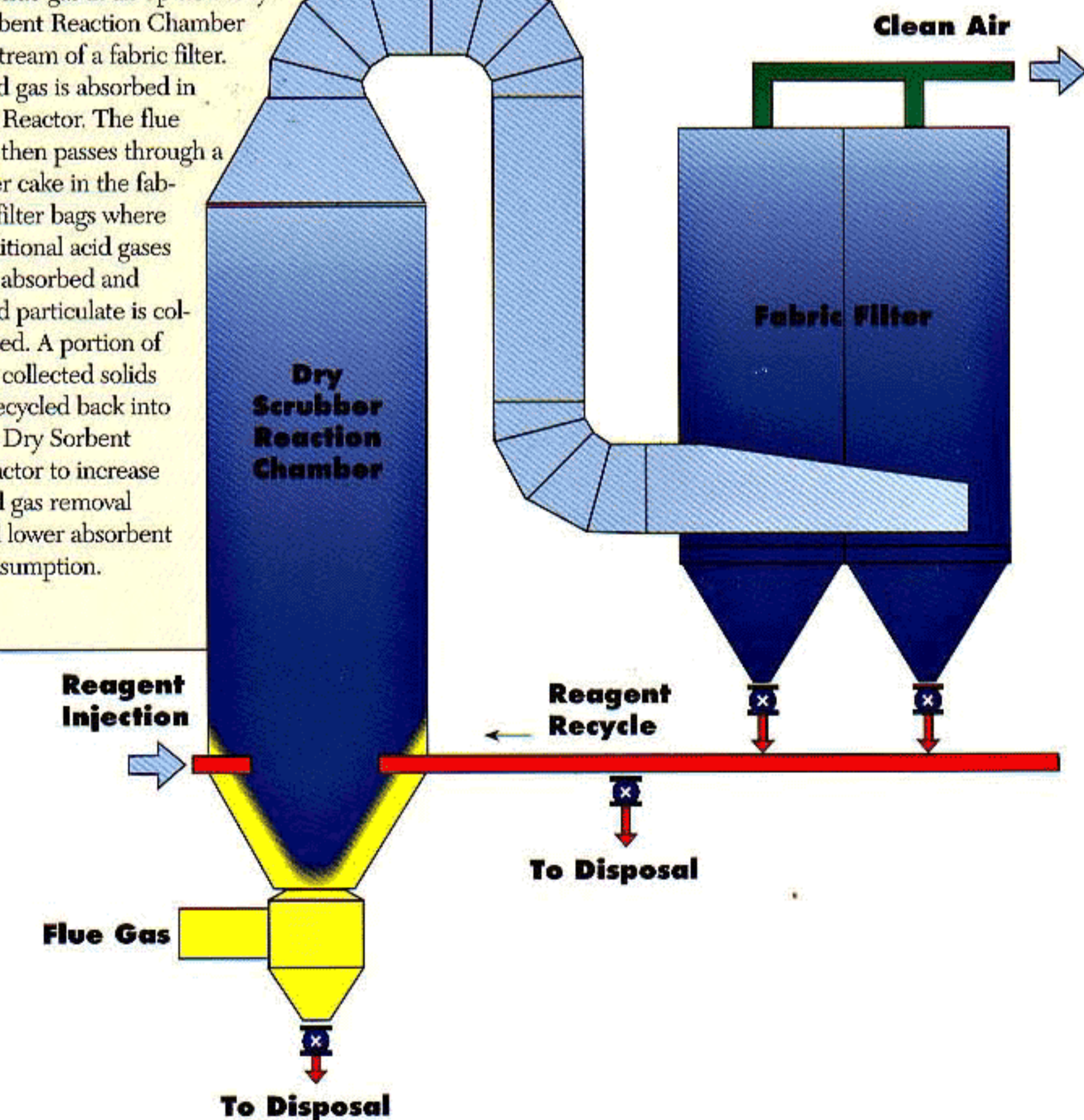
### Typical Spray Dryer Process

An alkaline slurry or solution is atomized into the flue gas in the spray dryer absorber, using patented two-fluid nozzle technology. The finely atomized droplets absorb SO<sub>2</sub> and acid gases while the heat of the flue gas evaporates the droplets. The flue gas, along with the dried reaction products and solid particulate, is then collected in a fabric filter or electrostatic precipitator. If a fabric filter is used, additional SO<sub>2</sub> and acid gas removal occurs as the flue gas passes through the built up filter cake on the bag.



### Typical Dry Sorbent Reactor Process

A dry absorbent is injected into the flue gas in an up-flow Dry Sorbent Reaction Chamber upstream of a fabric filter. Acid gas is absorbed in the Reactor. The flue gas then passes through a filter cake in the fabric filter bags where additional acid gases are absorbed and solid particulate is collected. A portion of the collected solids is recycled back into the Dry Sorbent Reactor to increase acid gas removal and lower absorbent consumption.



## Wet Scrubbing Systems



*Wet open-spray-tower absorbers and electrostatic precipitators control SO<sub>2</sub> and particulate emissions from two coal-fired boilers at a 440 megawatt power plant in Owensboro, Kentucky.*

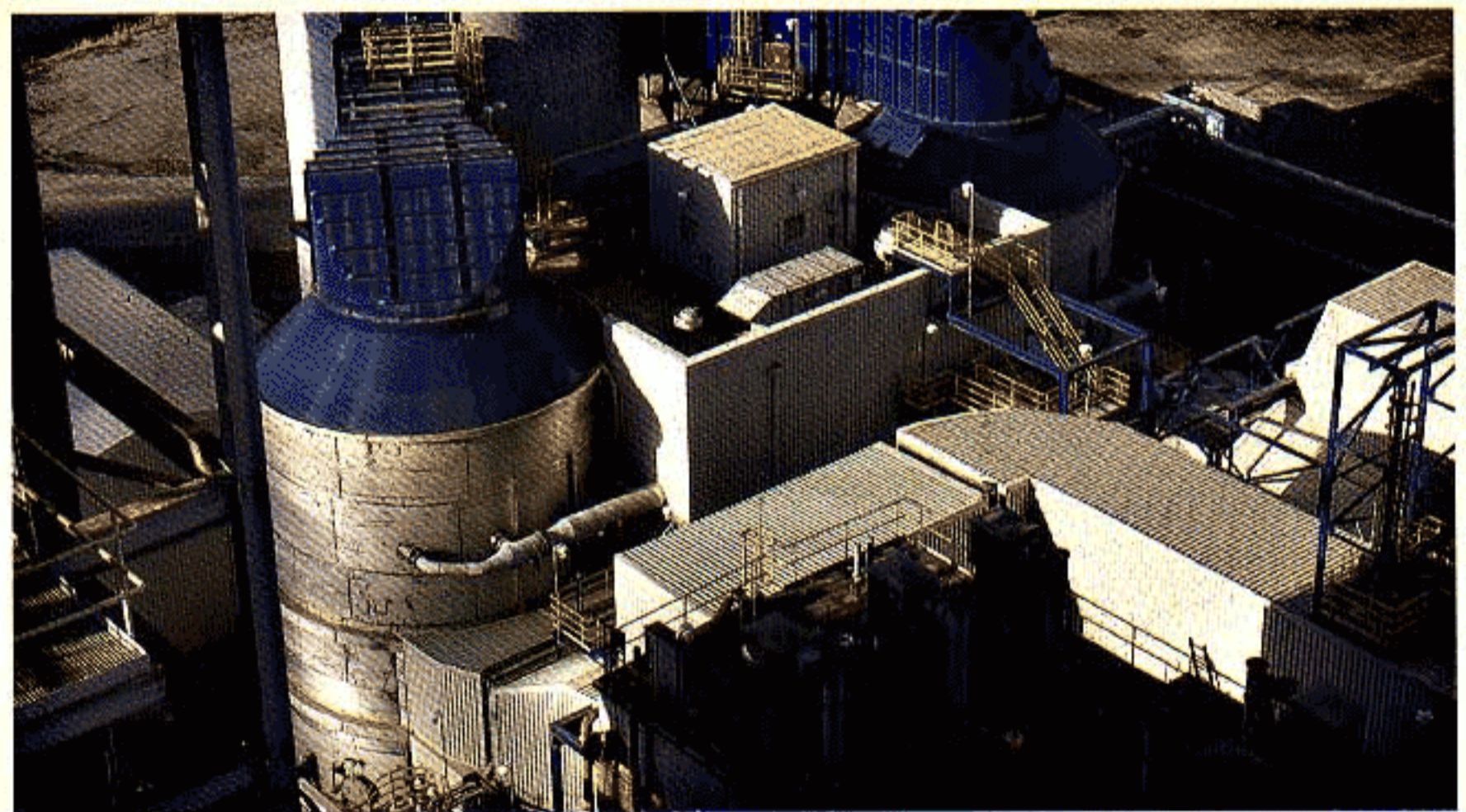
Wheelabrator and its acquired companies have been supplying wet scrubbing systems for more than 50 years to the power generation, pulp and paper, and chemical industries -- including all major absorber designs and absorbents for sulfur dioxide and acid gas control.

Wheelabrator wet scrubber technology includes open spray tower (single and double loop), as well as Dual Flow Tray designs. The open spray tower design, with fewer scrubber internals,

means lower maintenance requirements. The Dual Flow Tray design provides better gas/liquid contact and acid gas removal efficiency than an open

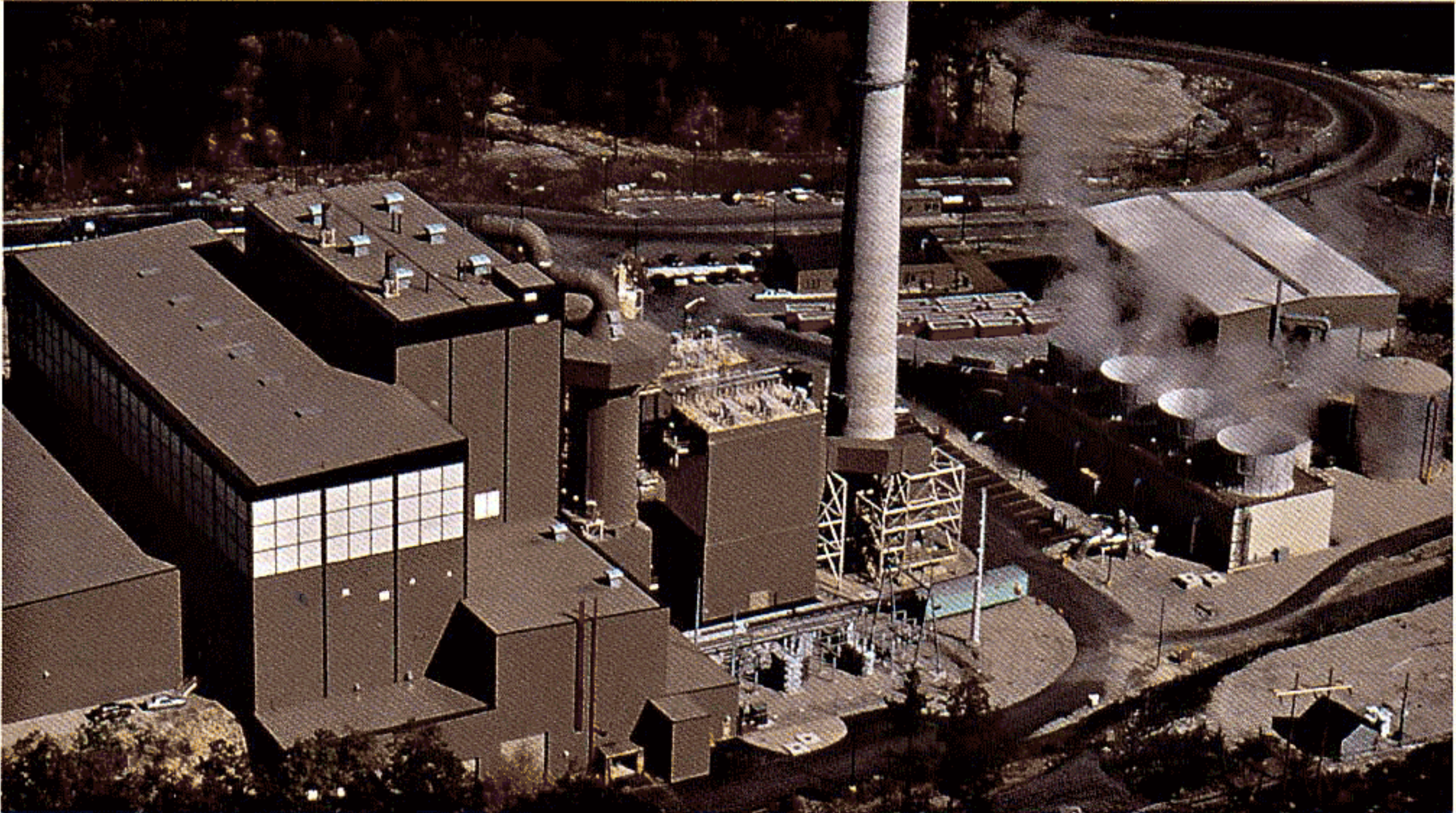
tower, with fewer absorber internal components that require maintenance. The Dual Flow Tray has the added advantage of higher solid particulate removal.

We're also experienced in the use of all major absorber liquors -- lime and limestone slurries, soda ash, and waste soda liquor for coal-fired boilers and other processes, as well as the use of different bleach liquors in the pulp and paper industry. And we supply slurry dewatering systems to treat the waste stream from the absorbers, including production of commercial grade gypsum.



*A wet Dual Flow Tray system uses magnesium lime as a reagent to control SO<sub>2</sub> from a 350 megawatt Henderson, Kentucky power plant.*

## Spray Dryer Systems



*Our spray dryer scrubbers, in combination with our electrostatic precipitator technology, clean emissions from two municipal solid waste fired boilers that dispose up to 1,500 tons-per-day of refuse from central Massachusetts.*

Wheelabrator was part of the team that supplied the first spray dryer scrubbing system on a utility coal-fired boiler, a system that has been successfully controlling emissions since 1981.

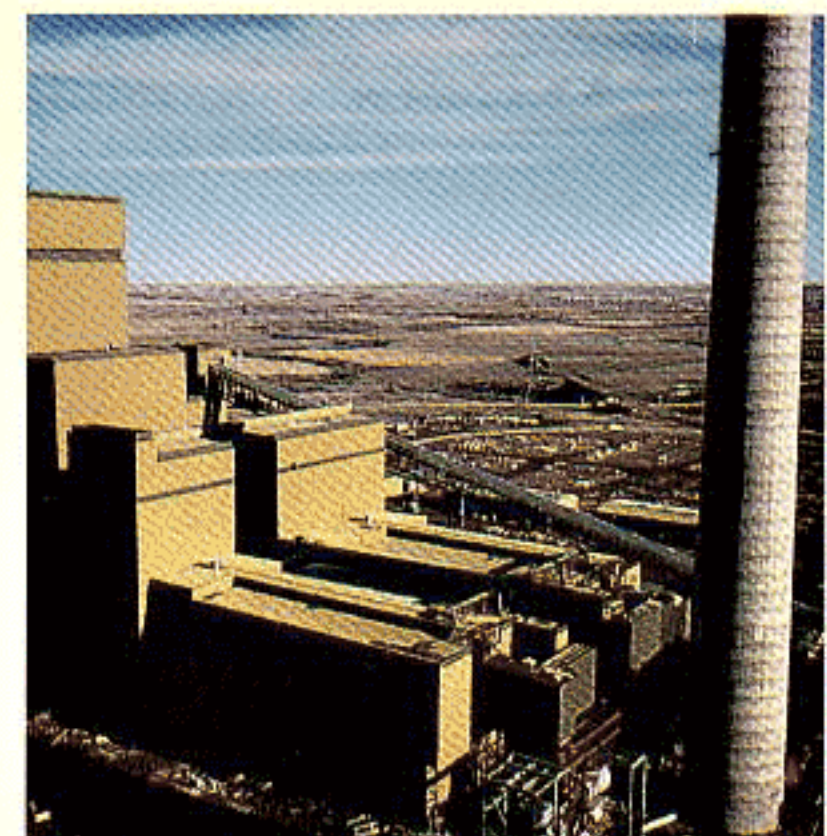
We are the co-holder of the "Sequential Removal of Sulfur Oxides from Hot Gases" process patent.

We also hold the domestic lead in, and patents for, the development and application of

two-fluid nozzle spray dryer scrubber technology, supplying systems for industrial coal-fired boilers, municipal solid waste-fired boilers, and hazardous waste incinerators for SO<sub>2</sub> and acid gas control. These processes benefit from our proprietary two-fluid nozzle design that makes efficient use of reagents and energy while providing a highly reliable atomizing system.

Designed for comparatively

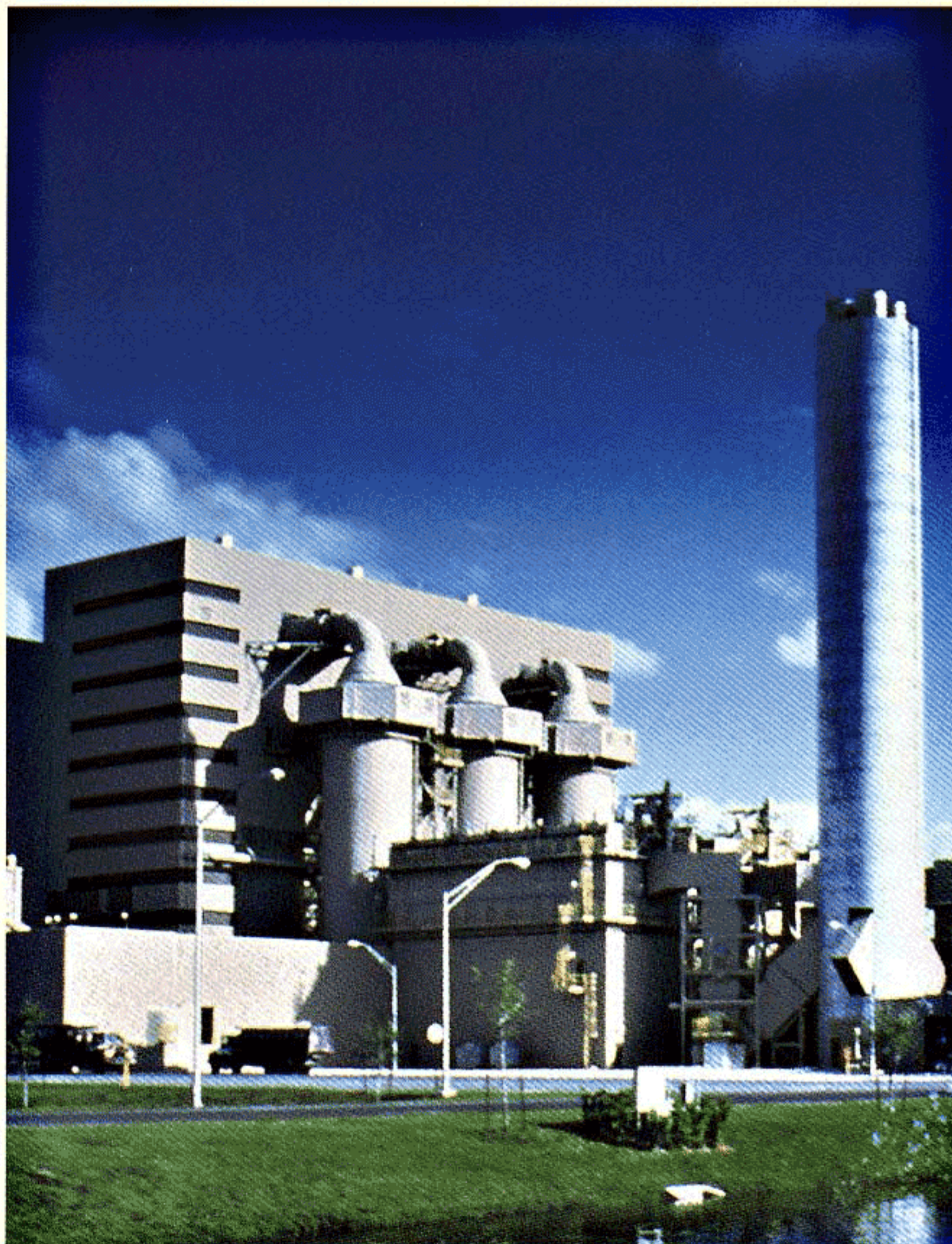
simple and economical operation, this system can be easily inspected and maintained without taking



*The first utility-scale spray dryer scrubber and fabric filter system in operation was supplied by Wheelabrator/Rockwell for this 410 megawatt North Dakota power plant.*

the scrubber off line. The parallel, downward gas flow minimizes wall build-up, eliminating the need for wall cleaning devices. The separate solids discharge provides for the dropout of larger,

heavier particles up-stream of the particulate collection equipment. Individual nozzles may be removed from the spray dryer without affecting on-line availability. The nozzle/lance assembly



*Wheelabrator spray dryer scrubbers and fabric filters control emissions from three municipal solid waste-fired boilers at a 2,250 tons per-day refuse-to-energy facility in Broward County, Florida.*



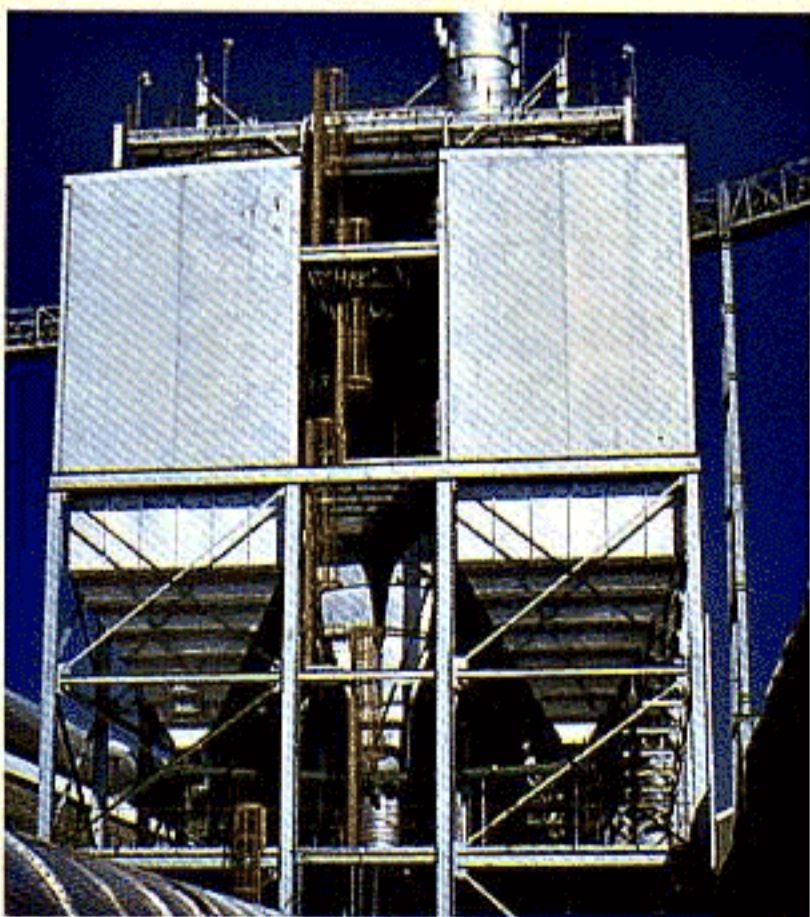
*SO<sub>2</sub> and fly ash emissions from the 250,000 lbs./hr. pulverized coal fired boiler at this paper board plant are controlled by Wheelabrator spray dryer scrubbing and JET® III fabric filter technology.*

is specially designed to minimize external fly ash deposition, a major source of nozzle spray dryer maintenance. The downward gas flow design further minimizes the effects of external deposition, further reducing maintenance requirements.

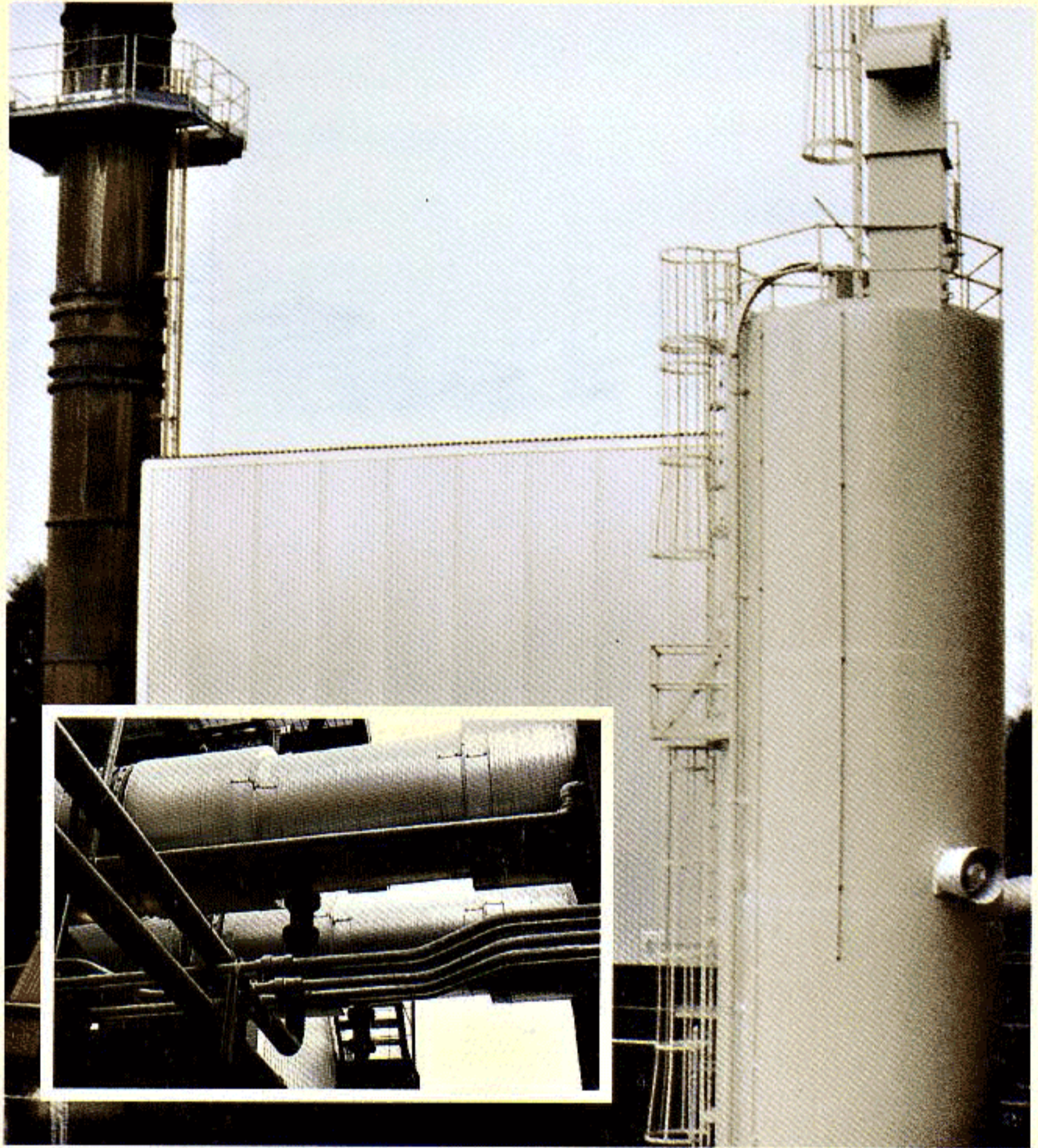
## Dry Injection Systems

Wheelabrator dry injection systems are an economical, reliable choice for applications requiring lower levels of SO<sub>2</sub> and acid gas emission control. Their simplicity of design and consequent lower capital and maintenance costs offer a cost-effective advantage over other designs.

Gas stream injection techniques vary depending on the material to be collected and the absorbent utilized. Calcium hydroxide is injected in an upstream Venturi Reactor or Dry Scrubber Reactor to control SO<sub>2</sub> and HCl from municipal refuse-fired boilers.



*A Wheelabrator dry injection scrubber and Pulse Jet ventilate aluminum potline and carbon baking furnaces, controlling HF and particulate emissions and recycling collected materials to the smelting process.*



*Wheelabrator dry injection system controls acid gas and solid particulate emissions from two 100 tons-per-day municipal solid waste boilers. (Inset) Sorbent injection point upstream of the fabric filter.*

Alumina is injected into individual fabric filter compartments for aluminum pot line HF control, and the reaction products can be recycled in the smelting process. To collect condensable particulate from coke oven pushing operations and for acid gas removal in secondary metals processing, a separate, ambi-

ent air-fluidized pre-coat system is used to pre-coat the fabric.

Wheelabrator pioneered the use of dry injection technology in the municipal solid waste, aluminum and coke calcining industries and has been successfully serving industry with this technology for more than 30 years.

# F l u e   G a s   D e a c i d i f i c a t i o n   T e c h n o l o g y

Wet System	Spray Dryer System	Dry Injection System
Coal-fired utility and industrial boilers	Municipal solid waste projects	Small to medium municipal and medical solid waste projects
Hazardous and municipal solid waste projects	Hazardous waste incineration	Coke oven emissions control
		Aluminum anode bake and potline projects for fluoride scrubbing
Refining processes	Industrial and utility coal-fired boilers	Secondary non-ferrous emission control



Our patented two-fluid slurry nozzle.



## **Wheelabrator Air Pollution Control Inc.**

441 Smithfield Street  
Pittsburgh, PA 15222 USA

Phone 412.562.7300  
Fax 412.562.7617