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# CONTROL TECHNOLOGIES

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## Dry Sorbent Injection

Dry Sorbent Injection (DSI) is the injection of powdered materials into the flue gas duct to adsorb  $\text{SO}_2$ ,  $\text{SO}_3$  and HCl gases. DSI can also reduce  $\text{NO}_x$  to some extent. The sorbents are typically either sodium or calcium-based. Two sodium-based alternatives are sodium bicarbonate or trona. Both these products can be used for  $\text{SO}_2$  treatment and to enhance Electrostatic Precipitators (ESP) performance. Calcium-based alternatives include limestone, lime and hydrated lime. Calcium-based sorbents will not efficiently react with  $\text{SO}_2$  in DSI applications and may negatively impact ESP performance.

DSI processes are also used for mercury removal.  $\text{SO}_3$  blocks mercury adsorption sites on the fly ash. Treating the flue gas for  $\text{SO}_3$  with SOLVAir Select 200 trona or SOLVAir Select SBC sodium bicarbonate can improve mercury (Hg) removal efficiency. Powdered Activated Carbon (PAC) is a DSI treatment for enhanced mercury removal. DSI for  $\text{SO}_3$  is often done in conjunction with PAC injection to achieve higher mercury removal than PAC injection alone.

## Wet Scrubbing

Wet scrubbing with lime or limestone is the primary choice for  $\text{SO}_2$  removal for large coal fired units. Slurries of these materials are used in a counter current scrubbing tower where removals of better than 90% of the  $\text{SO}_2$  can be achieved. The byproduct calcium sulfate can be landfilled, sold as gypsum or used as a stabilizer for ash disposal. However, these systems are large and may be cost-prohibitive for small boilers.

## Dry Scrubbing

In dry scrubbing, a sorbent is deposited into solution or slurry, which is then injected into the duct. The water evaporates immediately and the dry sorbent reacts with the acid gases in the flue duct. Dry scrubbing is typically used for  $\text{SO}_2$  or  $\text{SO}_3$  control. Soda ash, sodium sulfite or lime can be used in this type of process. The advantage of this kind of process is the large surface area of the small particles generated. The disadvantage of this process is the increased complexity of the system and plugging of nozzles and duct work. These systems typically cost less than wet scrubbers but more than DSI systems.

## Furnace Injection

Magnesium hydroxide or magnesium oxide can be injected into the furnace or onto the coal to react with acid gases including  $\text{SO}_3$ . Magnesium chemicals are costly and since they are added prior to the SCR,  $\text{SO}_3$  formed in the SCR is not removed.