

MERCURY CONTROL

INTEGRATED SOLUTIONS FROM THE INDUSTRY LEADER



RENEWABLE | ENVIRONMENTAL | THERMAL



B&W provides customized mercury mitigation solutions depending upon specific variables such as the fuel and the existing environmental equipment at the plant.

BABCOCK & WILCOX (B&W) HAS BEEN ACTIVELY INVOLVED IN RESEARCH AND DEVELOPMENT, DEMONSTRATION PROGRAMS AND IMPLEMENTATION OF MERCURY CONTROL SOLUTIONS SINCE THE EARLY 1990s.

WE CAN TAILOR A MULTI-FACETED APPROACH THAT CONSIDERS MANY VARIABLES SUCH AS THE EXISTING AIR QUALITY CONTROL SYSTEM, FUEL, FLUE GAS COMPOSITION, FLYASH CHARACTERISTICS, STACK MERCURY LIMITS, AND MANY OTHER OPERATIONAL FACTORS. YOU CAN TRUST THE INDUSTRY LEADER IN POWER PLANT AIR EMISSIONS CONTROL TECHNOLOGY TO PROVIDE COST-EFFECTIVE MERCURY CONTROL SOLUTIONS THAT ARE INTEGRATED INTO YOUR POWER PLANT.

UNIQUE CHALLENGES

The control of mercury emissions presents several unique challenges. Variables such as mercury speciation, mercury re-emission, and SO_2 to SO_3 conversion will all have an impact on the chosen mercury reduction solution depending upon the fuel being fired and the existing emissions control equipment installed at the plant.

Mercury speciation

The concentration of mercury in the coal is primarily dependant on the coal type. Bituminous and lignite coals have the highest concentration of mercury, while subbituminous coal contains less. The form of mercury present in the flue gas (oxidized and elemental), commonly referred to as speciation, is a key factor in the development of emissions control strategies. Capturing oxidized mercury is easier than capturing elemental mercury. Coal chlorine is the dominant factor in oxidizing mercury. In general, Eastern bituminous coals contain higher levels of chlorine while Western subbituminous and lignite coals contain very low levels of chlorine. Therefore, the flue gas exiting a boiler firing Eastern coals typically contains a significantly higher level of oxidized mercury than the flue gas from Western subbituminous and Powder River Basin (PRB) coals. **To enhance mercury capture for power plants firing these low chlorine coals, B&W provides the MercPlus™ (Hg+) system, a chemical injection system to promote the oxidation of mercury.**

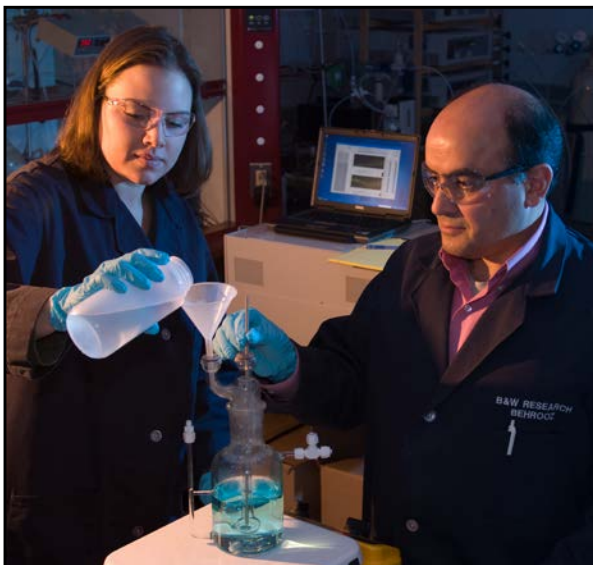
Re-emission

Understanding the fundamental chemistry of coal combustion has helped B&W develop technologies to optimize the mercury speciation to achieve high levels of mercury capture and retention in the existing environmental equipment. In the late 1990s, B&W was one of the first companies to identify mercury re-emission. Re-emission occurs when captured oxidized mercury reverts back to elemental mercury in a wet flue gas desulfurization (FGD) system and is released back into the flue gas. **In 1999, B&W developed a patented system for preventing mercury re-emission and increasing the total amount of mercury removal by wet FGD.** The Absorption Plus (Hg)[™] system has been proven at numerous full-scale field tests. A number of commercial systems have been sold as part of new wet FGD or as stand-alone systems for existing installations.

Sulfur trioxide

Another unique challenge is powdered activated carbon (PAC) poisoning by SO_3 . When burning medium to high sulfur coal, SO_2 to SO_3 conversion (up to 2%) occurs in the boiler and across the selective catalytic reduction (SCR) system. PAC consumption increases as SO_3 concentration increases above 5 ppm. At greater than 15 ppm, the PAC is much less effective in removing mercury. **To mitigate this SO_3 impact, B&W offers dry sorbent injection systems that remove SO_3 before the point of PAC injection.**

B&W has been actively involved in mercury research, testing and technology development since the early 1990s.



B&W's SOLUTIONS

Our solutions are focused on integrating a variety of mercury control technologies with other air quality control systems that may already exist at a power plant. In doing so, B&W achieves maximum co-benefits of using SCR systems, both wet and dry FGD systems, electrostatic precipitators (ESP), and fabric filters (FF) that result in optimizing mercury capture at the lowest cost.

Based on the specific application requirements, B&W can design and supply an integrated system for mercury control which incorporates PAC injection, coal additives to promote mercury oxidation, and/or wet FGD additives to prevent re-emission of elemental mercury. In addition, the entire air quality control system can be evaluated to determine the co-benefits for mercury capture to provide the lowest overall lifecycle cost.

Depending upon your current situation and future requirements, a variety of stand-alone or integrated solutions are available from B&W. The illustration below and

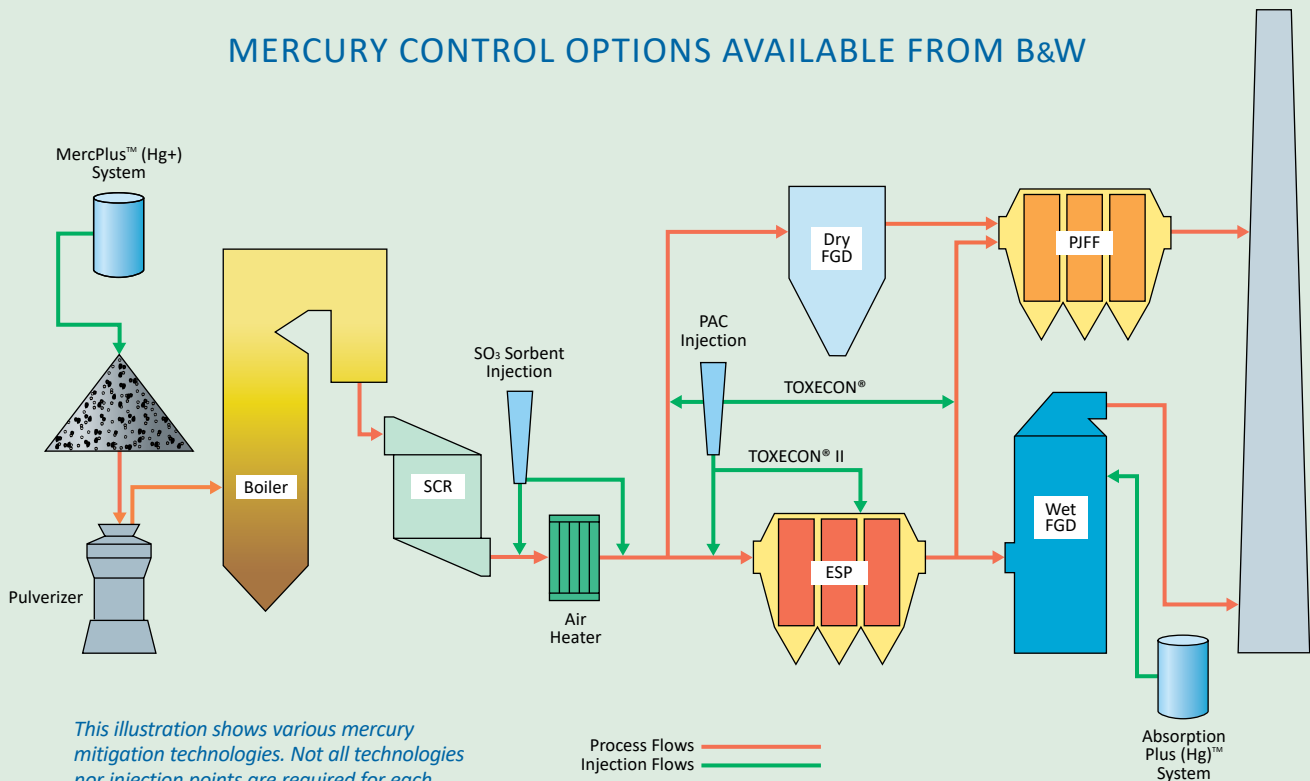


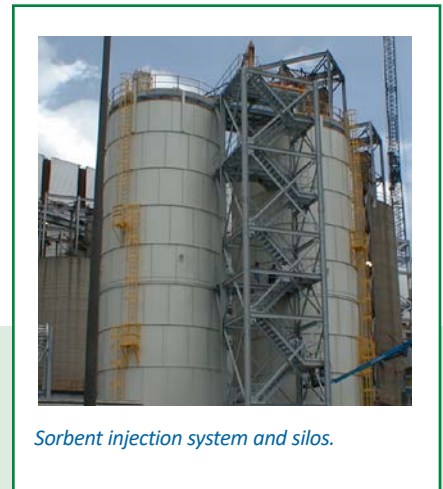
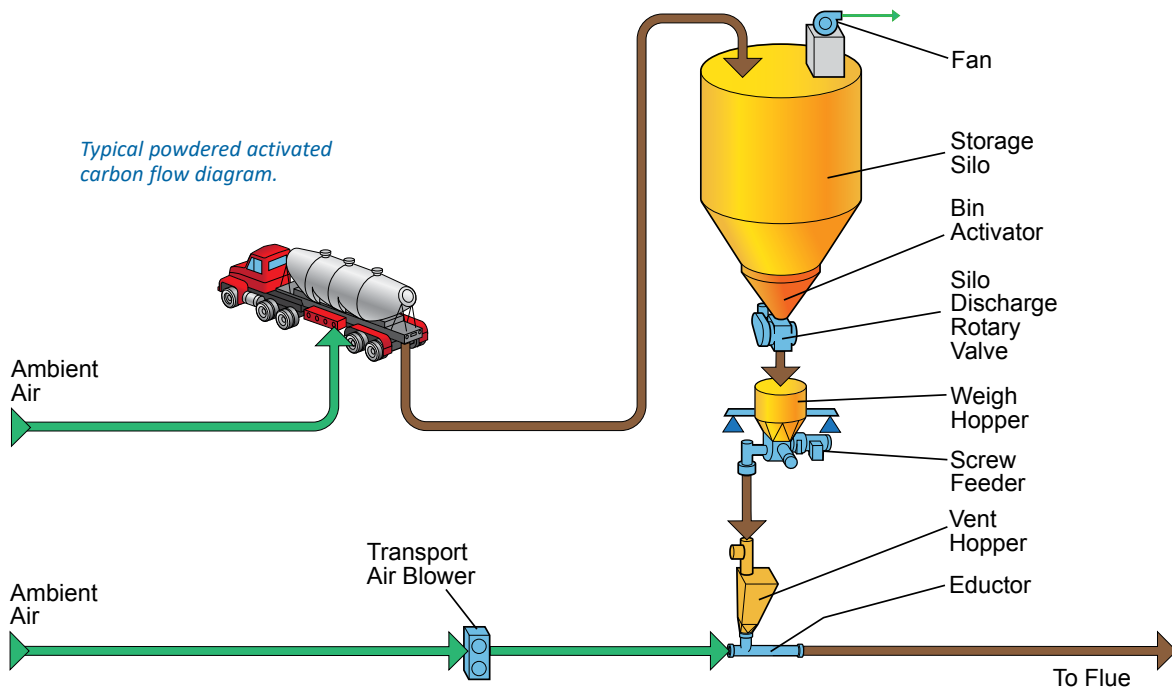
The Absorption Plus (Hg)[™] system utilizes chemical injection into a wet FGD recirculation pipe.

the table shown on the next page present the various options, features, benefits and applications for several mercury reduction technologies.

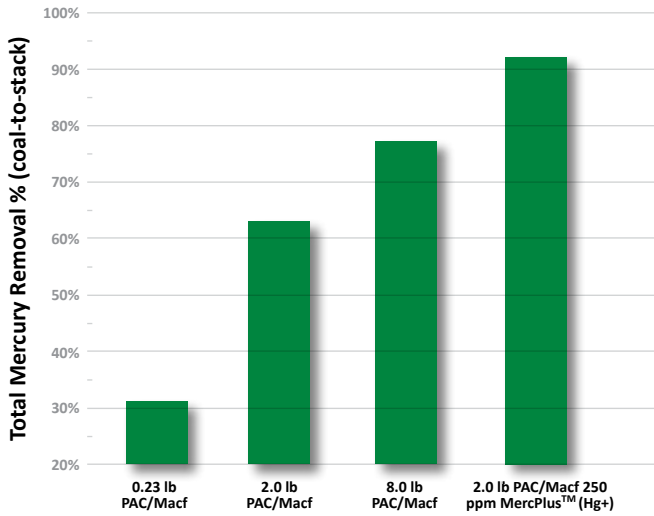
By understanding the interrelationship between various control technologies as well as the co-benefits achieved with existing air quality control systems, B&W provides solutions for mercury control that can save significant cost during the life of the plant.

MERCURY CONTROL OPTIONS AVAILABLE FROM B&W

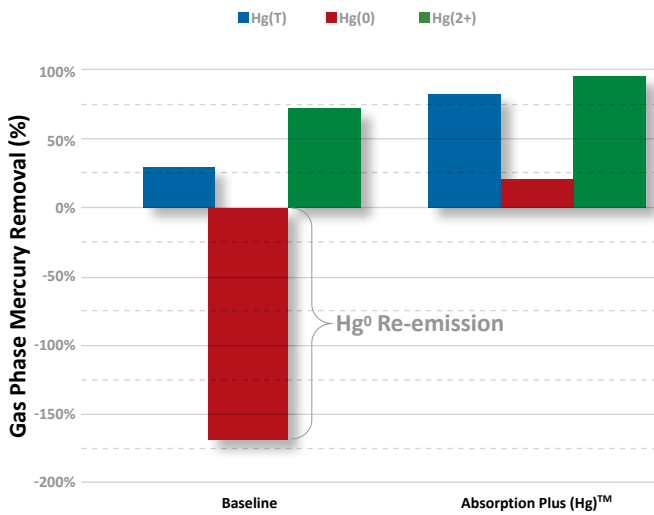




Technology	Description	Benefits	Applications
Absorption Plus (Hg) [™]	Additive injected into the wet FGD system	Inhibits mercury re-emission. Removes essentially all oxidized mercury.	Wet FGD systems
Standard and brominated powdered activated carbon (PAC)	Standard PAC is used for high chlorine coals; brominated PAC is used when burning low chlorine coals	Adsorbs elemental and oxidized mercury. Collected in particulate control device.	Integrated with other technologies to minimize PAC consumption
MercPlus [™] (Hg+)	Halogenated fuel additive for low chlorine coals	Oxidation of elemental mercury for improved mercury removal. Reduces the need for PAC.	PRB and other low chlorine coals
Sorbent injection	SO ₃ mitigation for high sulfur fuels	Increases ability of PAC and native carbon in ash to remove mercury.	All medium to high sulfur coals
TOXECON [®]	Installing a pulse jet FF downstream of the ESP with PAC injection	Allows for separate sale or disposal of ash.	Where ash is currently being sold if economics dictate
TOXECON [®] II	Injecting PAC in front of the last field of an ESP	Allows for separate sale or disposal of ash.	Where ash is currently being sold if economics dictate



For low chlorine coals, the MercPlus™ (Hg+) injection system reduces PAC consumption while improving total mercury removal at lower total cost.



The use of the Absorption Plus (Hg)™ system inhibits mercury re-emission and removes nearly all of the oxidized mercury in a wet FGD system.



Extensive boiler and environmental equipment design expertise allows B&W to take an integrated approach in providing the most effective overall emissions solution.



B&W scientists and engineers conduct extensive environmental research using the latest equipment at our new technical center.



ONGOING RESEARCH AND DEVELOPMENT EFFORTS

B&W was instrumental in early research efforts in the area of mercury control and mitigation. We have worked on mercury control pilot and full-scale demonstration programs since the early 1990s.

Engineers and scientists at our new technical center continue to study the fundamental aspects of mercury emissions control. In addition, B&W works closely with various university and private research organizations to further develop innovative mercury emissions removal processes. Through these ongoing efforts, we are developing the most cost-effective mercury mitigation technologies and solutions for the industry.

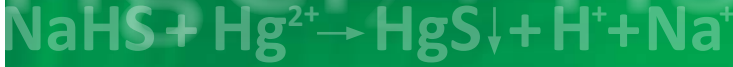
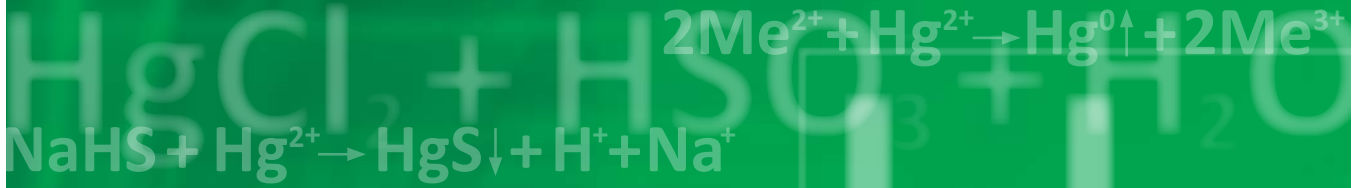
CHOOSE THE INDUSTRY LEADER

B&W is committed to our leadership role in developing advanced environmental solutions to the tough challenges that face the power generation industry. Our proven history of providing products and services to help our customers control emissions is testament to this commitment.

[We know boilers](#)

Many variables can affect the choice and operation of environmental control systems downstream of the boiler. Our expertise in boiler design and our integrated approach to complete environmental systems enable us to analyze various alternatives and provide the best overall solution while considering the overall effect on balance-of-plant operation.





While mercury control may be a complex issue, you can be confident that B&W has the knowledge, experience and capability to provide a cost-effective and integrated solution for your application.

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