

**Exhibit Number:**

9

---

**This exhibit exceeds front to back 5-page maximum; therefore only a small portion of the exhibit is scanned for your research. The original exhibit is on file at the Montana Historical Society and may be viewed there**

Presented at the Combined Power Plant Air Pollutant Control Mega Symposium  
 Washington, DC, Aug. 30 – Sept. 2, 2004. (Updated.)

## Accumulated Power-Plant Mercury-Removal Experience with Brominated PAC Injection

**Sid Nelson Jr., Ronald Landreth, Ph.D., Qunhui Zhou, Ph.D., and Jon Miller**  
 Sorbent Technologies Corporation, 1664 E. Highland Rd., Twinsburg, OH 44087

### ABSTRACT

The injection of brominated powdered activated carbon (B-PAC™) into power-plant flue gases for mercury removal has now been tested at seven different power plants. These plants have burned bituminous, subbituminous, lignite coals, and blends and include testing with cold-side ESPs, hot-side ESPs, spray dryers, and fabric filters. Mercury-removal performance at these sites has varied between 70% and 98% at sorbent consumption costs of approximately \$2,000 to \$20,000 per-lb-of-mercury-removed, considerably less than previous technologies.

### INTRODUCTION

The mercury-removal performance of plain powdered activated carbons (PACs) and iodine-impregnated PACs have proved to be highly variable at power plants, depending on the particular coal burned and the plant's existing air pollution control equipment configuration. So far, however, Sorbent Technologies Corporation's brominated mercury sorbents (B-PAC™) have consistently demonstrated high mercury removal rates at relatively low injection levels across a wide variety of coals and configurations. See Table 1 below.

**Table 1.** B-PAC results to date indicate applicability across all coals and plant configurations

<u>Coal</u>	<u>PM Unit</u>	<u>Hg Removal</u>	<u>@lb/MMacf</u>	<u>@ Plant</u>	<u>Scale</u>	<u>Data</u>
Bitum. Low-S	FF	94%	0.5	Valley	Slipstream	Apogee
Bitum. High-S	CS-ESP	70%	4.0	Lausche	Full-Scale	SorbTech
Bitum. Low-S	HS ESP	>80%*	6.4	Cliffside	Full-Scale	SorbTech
Subbitum.Blend	CS-ESP	90%	3.0	St. Clair	Full-Scale	SorbTech
Subbituminous	CS-ESP	90+%	3.0	St. Clair	Full-Scale	SorbTech
Subbituminous	CS-ESP	89%	4.9	Pleasant Prairie	Slipstream	Apogee
Subbituminous	FF	87%	0.5	Pleasant Prairie	Slipstream	Apogee
Subbituminous	SD/FF	82%**	<1.8	Holcomb	Slipstream	ADA-ES
Lignite	SD/FF	95%	1.5	Stanton 10	Full-Scale	EERC
Lignite	CS-ESP	70%***	1.5	Stanton 10	Full-Scale	EERC

\* when under low-load conditions. STC will return in the fall for additional runs.  
 \*\* on-fabric removal only, with no in-flight opportunity and the effective "injection rate" could have been significantly lower.  
 \*\*\* actually the in-flight Hg removal across the spray dryer, with an injection rate of only 1.5 lb/MMacf.