

REINHOLD ENVIRONMENTAL Ltd.



**2013 NO<sub>x</sub>-Combustion Round Table  
& Expo Presentations**

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# Mercury Oxidation Across SCR

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# Hg Oxidation

- Hg is oxidized by halogens.
- Important halogens for Hg oxidation – chlorine and bromine.
- Bromine (HBr, Br<sub>2</sub>, Br, and Br<sup>-</sup>) and Chlorine (HCl, Cl<sub>2</sub>, Cl, and Cl<sup>-</sup>) species oxidize Hg.
- Bromine species are more effective in oxidizing Hg when compared to chlorine species.
- Heterogeneous Hg oxidation using SCR is faster than the gas-phase homogeneous Hg oxidation.
- Native heterogeneous Hg oxidation by fly ash and unburned carbon can also occur.

# Factors Influencing Hg Oxidation in SCR

## □ SCR design

- **Space velocity** – Lower space velocity favors Hg oxidation.
- **Catalyst Pitch** – Smaller pitch favors Hg oxidation. However, it results in higher pressure drop.
- **Catalyst Activity ( $K/K_0$ )** – Higher catalyst activity favors Hg oxidation.
- **Catalyst Formulation** – Compounds that favor Hg oxidation such as vanadium.

# Factors Influencing Hg Oxidation in SCR

- **Temperature** – Lower temperature favors Hg oxidation.
- **SO<sub>2</sub>** – SO<sub>2</sub> has a negative impact on the ability of the halogens to oxidize Hg.
- **NH<sub>3</sub>** – NH<sub>3</sub> has a negative impact on the ability of the halogens to oxidize Hg.
- **Coal** – High halogen coal (eastern bituminous) favors higher Hg oxidation when compared to low halogen coal (PRB).

# CaBr<sub>2</sub> Addition to PRB Unit at SCS for Hg Oxidation

- **CaBr<sub>2</sub> was added to the coal for Hg oxidation.**
- **During CaBr<sub>2</sub> addition, the SCR was**
  - Bypassed
  - In service with no NH<sub>3</sub> injection
  - In service with NH<sub>3</sub> injection
- **The order of Br/Hg ratio (lb/lb) used for >90% Hg oxidation**
  - Bypassed (>3000) > In service with NH<sub>3</sub> injection (>250) > In service with no NH<sub>3</sub> injection.
- **Br/Hg ratio optimization for Hg oxidation is critical.**
- **When capturing oxidized Hg in the wFGD, Hg re-emission in the scrubber should be considered.**