REINHOLD ENVIRONMENTAL Ltd.

2013 NOx-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_2, Br, and Br^-) and Chlorine (HCl, Cl_2, Cl, and Cl^-) 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_2** – SO_2 has a negative impact on the ability of the halogens to oxidize Hg.
- **NH_3** – NH_3 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).

$CaBr_2$ Addition to PRB Unit at SCS for Hg Oxidation

- **$CaBr_2$ was added to the coal for Hg oxidation.**

- **During $CaBr_2$ addition, the SCR was**
  - Bypassed
  - In service with no NH_3 injection
  - In service with NH_3 injection

- **The order of Br/Hg ratio (lb/lb) used for >90% Hg oxidation**
  - Bypassed (>3000)>In service with NH_3 injection (>250) >In service with no NH_3 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.**