Mercury Control for Coal-fired Power Plants – Interaction of Other Technologies

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Overview

- Introduction & Background
- Regulations
- Mechanisms of Mercury Control
- Mercury Control Technologies & Interactions
- Technology Logistics
- Conclusion
Regulations

- MATS
  - Mercury
  - PM, filterable (for non-mercury metals)
  - HCl, SO_2 (for acid gas emissions)
- CSAPR – NO_x & SO_2 (Vacated; CAIR – Reinstated; EPA to reissue 3/2013)
- Regional Haze
- NSPS – PM, NO_x & SO_2
- NAAQS – PM_{2.5}
Mechanisms of Mercury Control

- **Adsorption**
  - Powdered Activated Carbon
    - Temperature dependent
    - Effective with halogen present for oxidation
  - Other – e.g. Silicates
- **WFGD Capture**
  - Oxidized mercury is soluble & easily captured
  - Problem of re-emission due to chemical reduction
- **MAXIMIZE OXIDIZED MERCURY**
  - Both mechanisms most effective with oxidized mercury
Control Technologies & Interactions

- **Coal Additives (Br based)**
  - Developed to advance Hg oxidation – halogen-poor coals
  - Know your fuel supply – Hg, S, Cl
  - Impact on downstream equipment – corrosion potential

- **Sodium Solution Injection**
  - Controls $SO_3$ enhancing PAC utilization
  - Upstream of AH
  - Avoids AH problems
Control Technologies & Interactions

- **SCR Catalyst**
  - Some inherent oxidation of Hg
  - Specialized formulation for Hg oxidation
  - Specialized formulation to minimize SO₃ production

- **Sorbent Injection for Hg Capture**
  - PAC - proven & common technology, halogenated options
  - Temperature sensitive – Varies with various factors
  - SO₃ hinders effectiveness
Control Technologies & Interactions

- **Dry Sorbent Injection for SO₃ Control**
  - Upstream of Hg sorbent injection, generally AH outlet
  - Use of lime or sodium compounds

- **Particulate Collection**
  - Must follow sorbent injection
  - ESP enhancements available
  - PJFF – cake effective for Hg capture
  - PM₂.₅ – Push to PJFF with membrane
    - Maintain cake
    - Optimize cleaning

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Control Technologies & Interactions

FGD

- **Dry FGD**
  - Spray dryer or CFB type – generally followed by PJFF
  - Downstream PJFF effective for Hg
  - Controls SO$_3$

- **Wet FGD**
  - Oxidized Hg soluble
  - Often effective w/o other technologies
  - Re-emission can be overcome

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Technology Logistics

- Typical AQCS Equipment - WFGD
Technology Logistics

- Typical AQCS Equipment - DFGD
Conclusions

- **Existing Capabilities**
  - Know your equipment potentials + and -
  - Test for Hg and related species as required

- **Understand Interactions for New Technologies**
  - Invest time for planning
  - Investigate & be aware of new technologies
Mercury Control

Questions?