



CIVIL
GOVERNMENT SERVICES
MINING & METALS
OIL, GAS & CHEMICALS
POWER

The McIlvaine Company Hot Topic Hour

Mercury Measurement and Control

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, SO₂ (for acid gas emissions)
- **CSAPR – NO_x & SO₂ (Vacated; CAIR – Reinstated; EPA to reissue 3/2013)**
- **Regional Haze**
- **NSPS – PM, NO_x & SO₂**
- **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 SO₃ 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
 - PM_{2.5} – Push to PJFF with membrane
 - Maintain cake
 - Optimize cleaning



Courtesy Bechtel Power Corp



Control Technologies & Interactions

FGD

- **Dry FGD**
 - **Spray dryer or CFB type – generally followed by PJFF**
 - **Downstream PJFF effective for Hg**
 - **Controls SO₃**

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

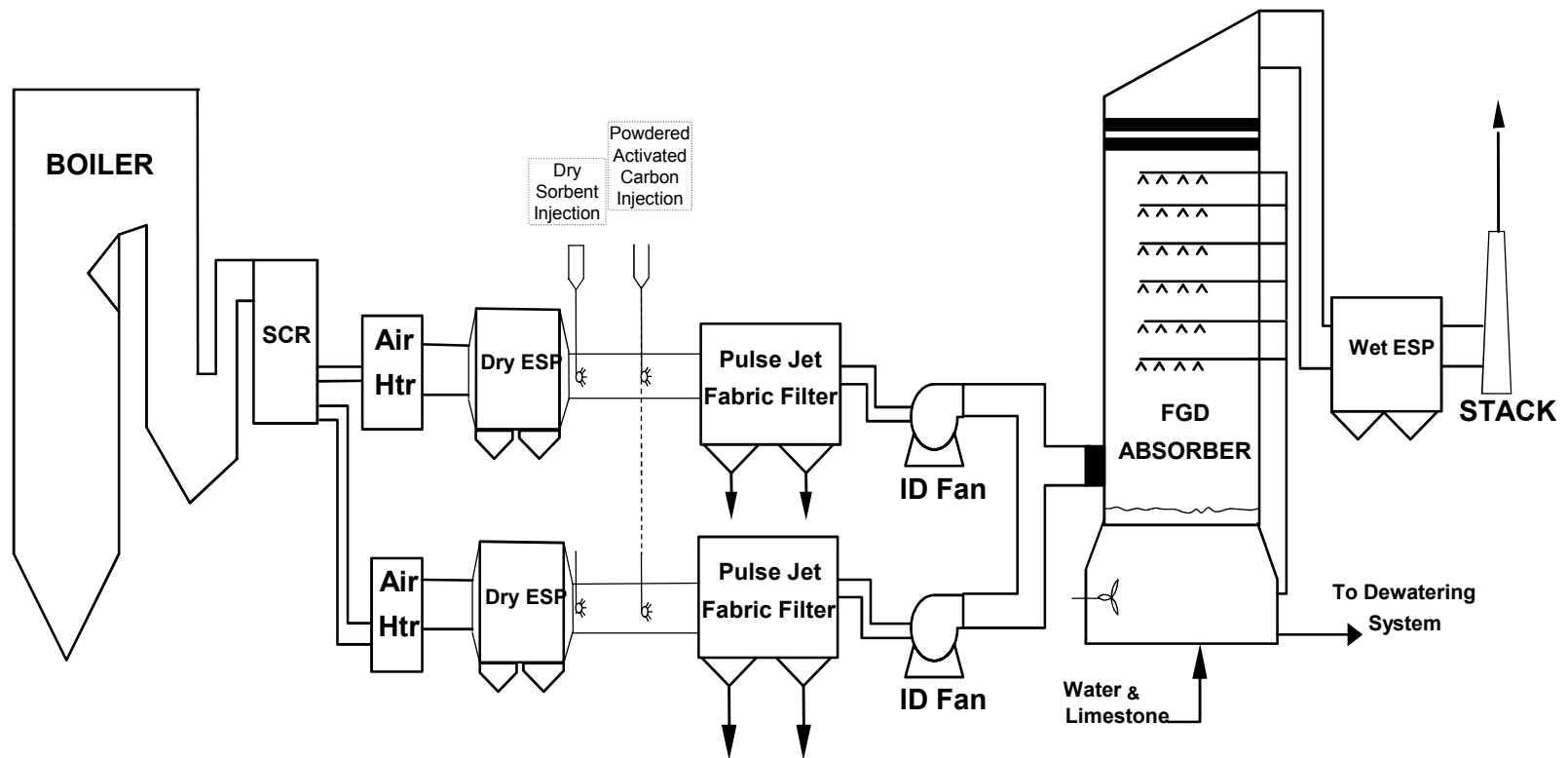


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Technology Logistics

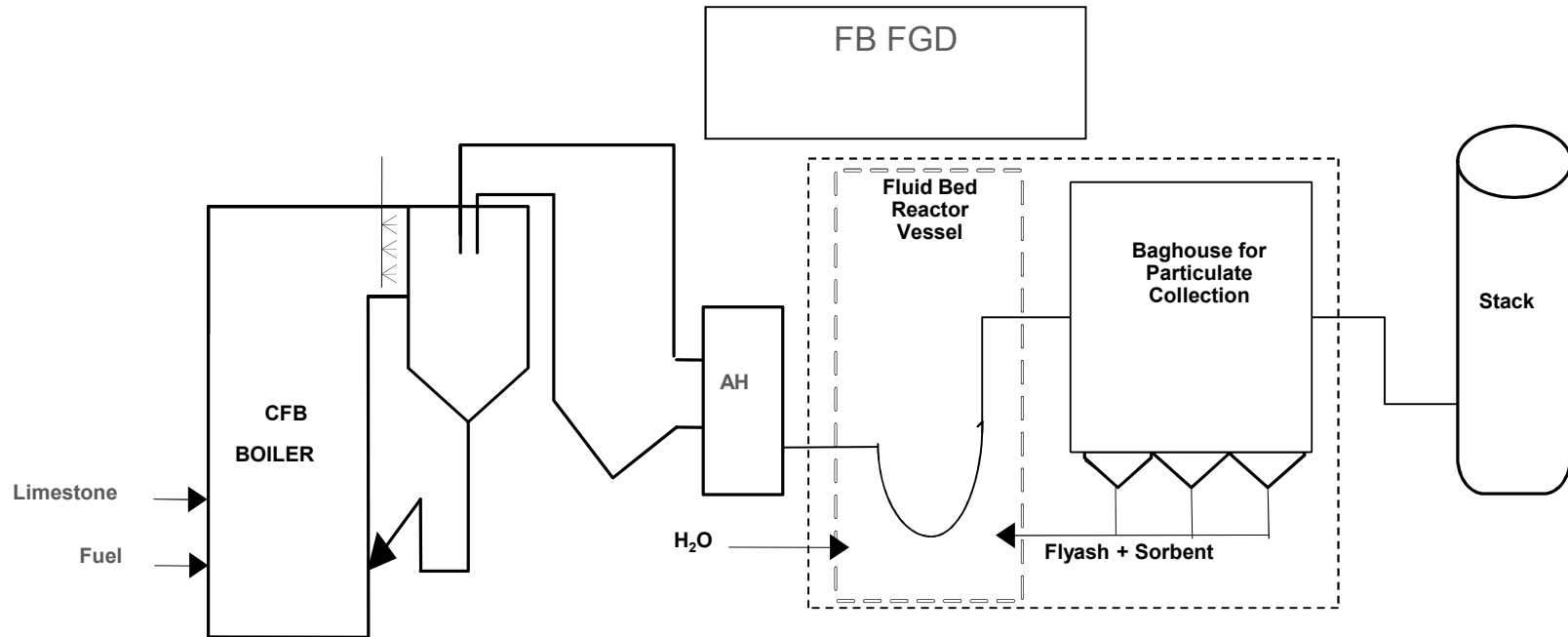
■ Typical AQCS Equipment - WFGD





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 ?



Sammis AQCS Retrofit Project
Photo Courtesy Bechtel Power Corp