

Worldwide Pollution Control Association

WPCA/LG&E and KU

Coal-fired APC Environmental Seminar

May 23-24, 2017



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WPCA/LG&E and KU APC Seminar
May 23, 2017

Evolution of FGD Chemistry

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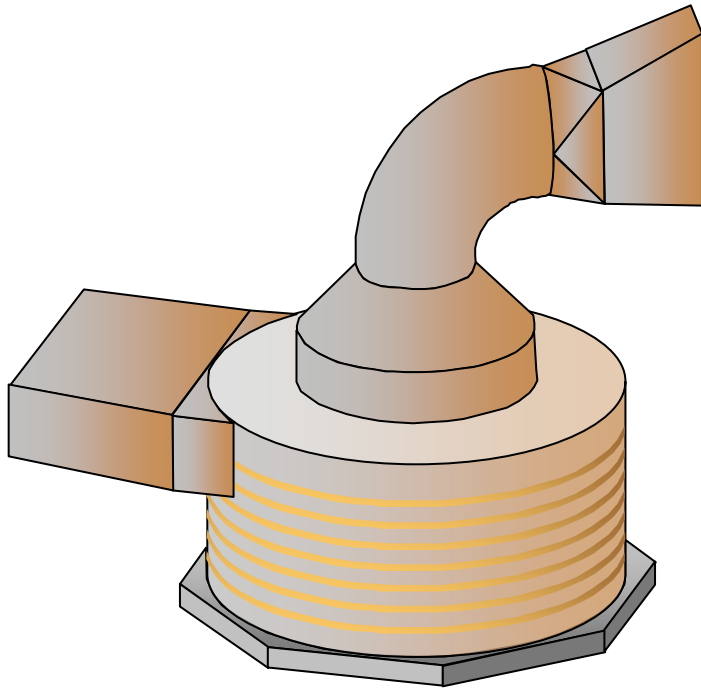
FGD Chemistry Challenges

- In the beginning, it was CAIR, NAAQS (SO₂).
- Now, it's MATS (gas phase Hg) & Units cycling
- Soon it will be ELG (Hg, As, Se and Nitrates)
- Minimize commodity usage (cost)
- Other utilities are already tackling all of the above.

SoCo's Flue Gas Desulfurization (FGD)

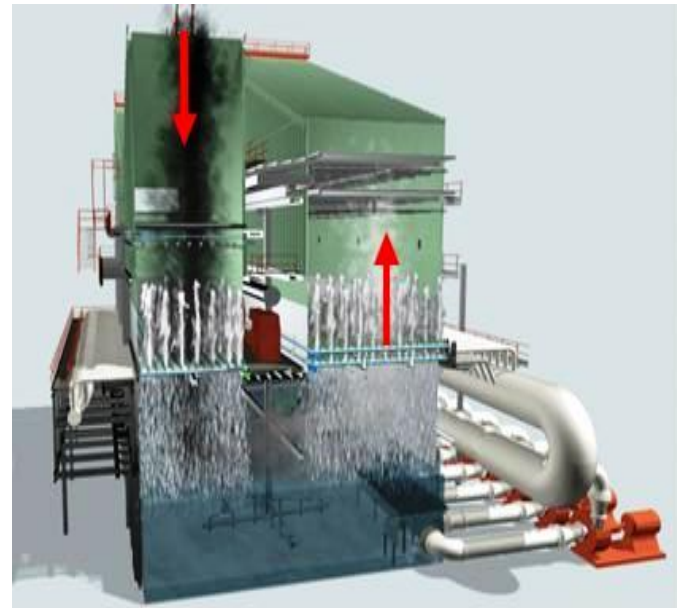
Sparged Absorber

Chiyoda JBR (Jet Bubbling Reactor)

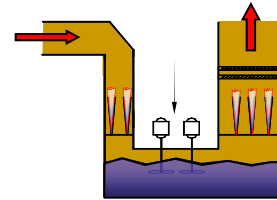
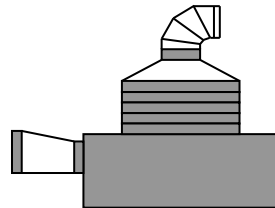


Spray Tower

MHI-Advatech Single/ Twin Tower



FGD Technology within Southern Company



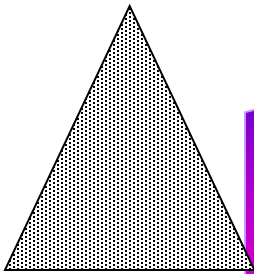
JBR	Advatech
Barry	Daniel
Bowen	Gorgas*
Crist	Hammond*
Gaston	Miller
Wansley	Scherer

*DCFS Twin Tower

Basic Chemistry



Air



LIMESTONE

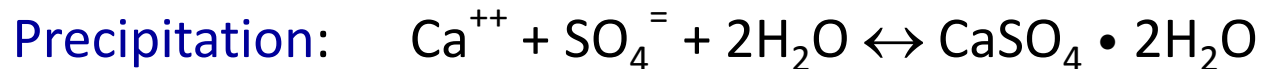
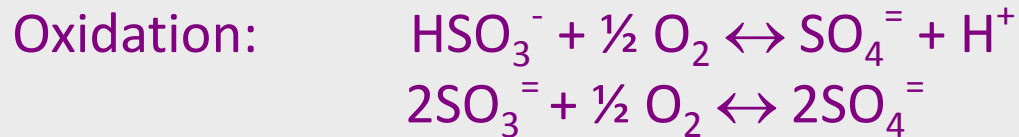
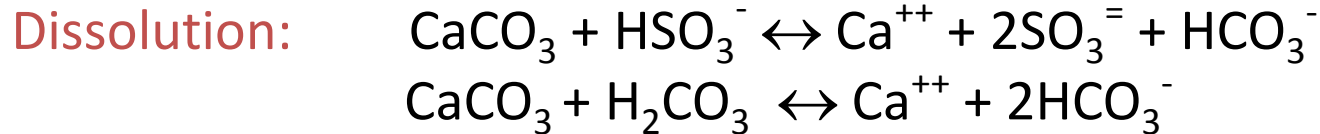
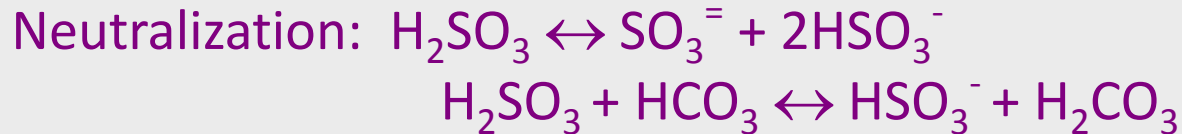
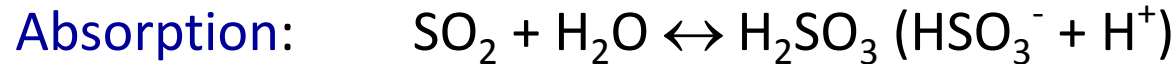
Flue Gas

Water

Gypsum

All reactions take place in the aqueous phase.

Scrubber Chemistry



Chemistry Focus

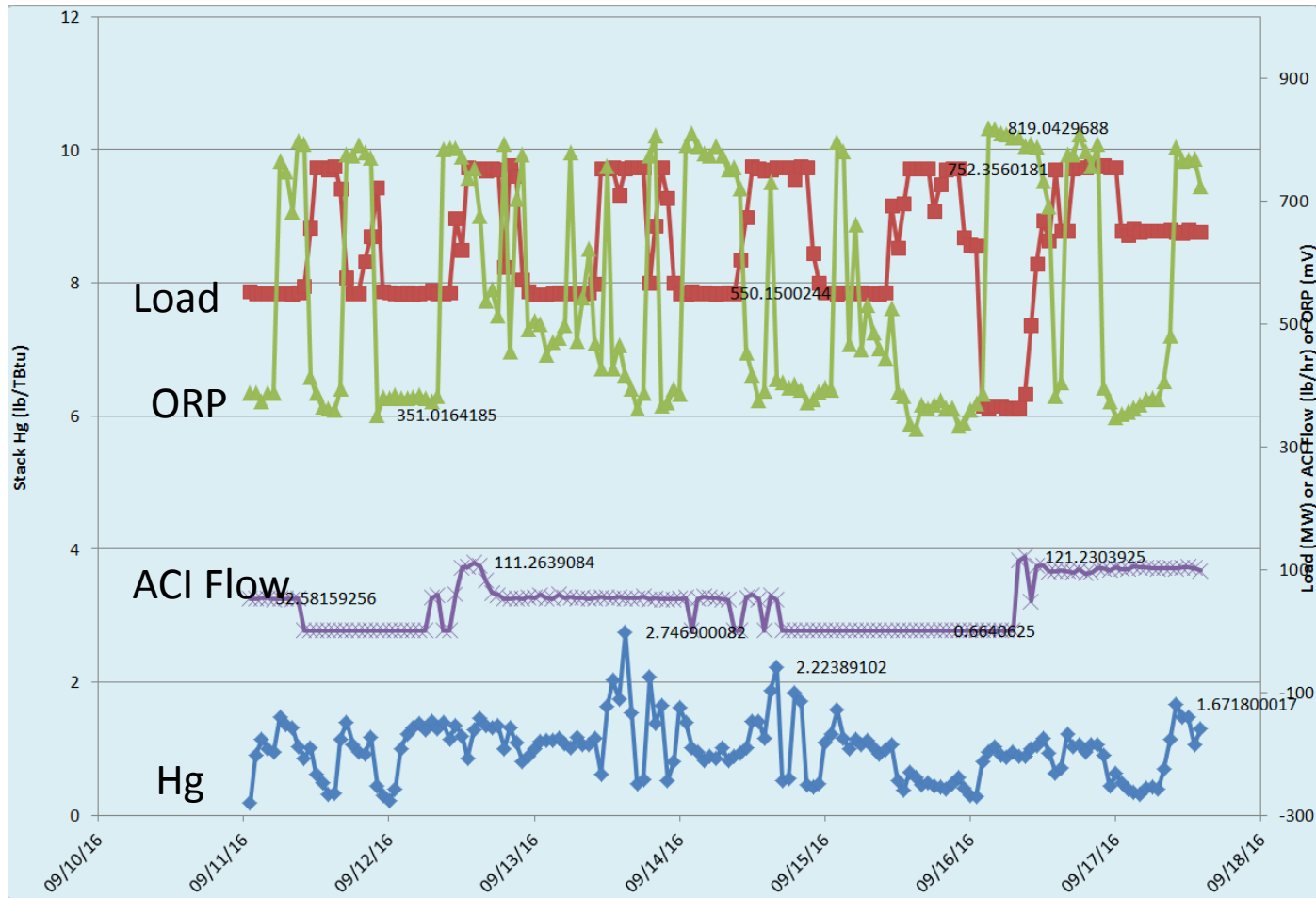
In the Beginning (2008)

- pH
- Level or # of recycle pumps in service
- Aluminum Fluoride Blinding
- Chlorides

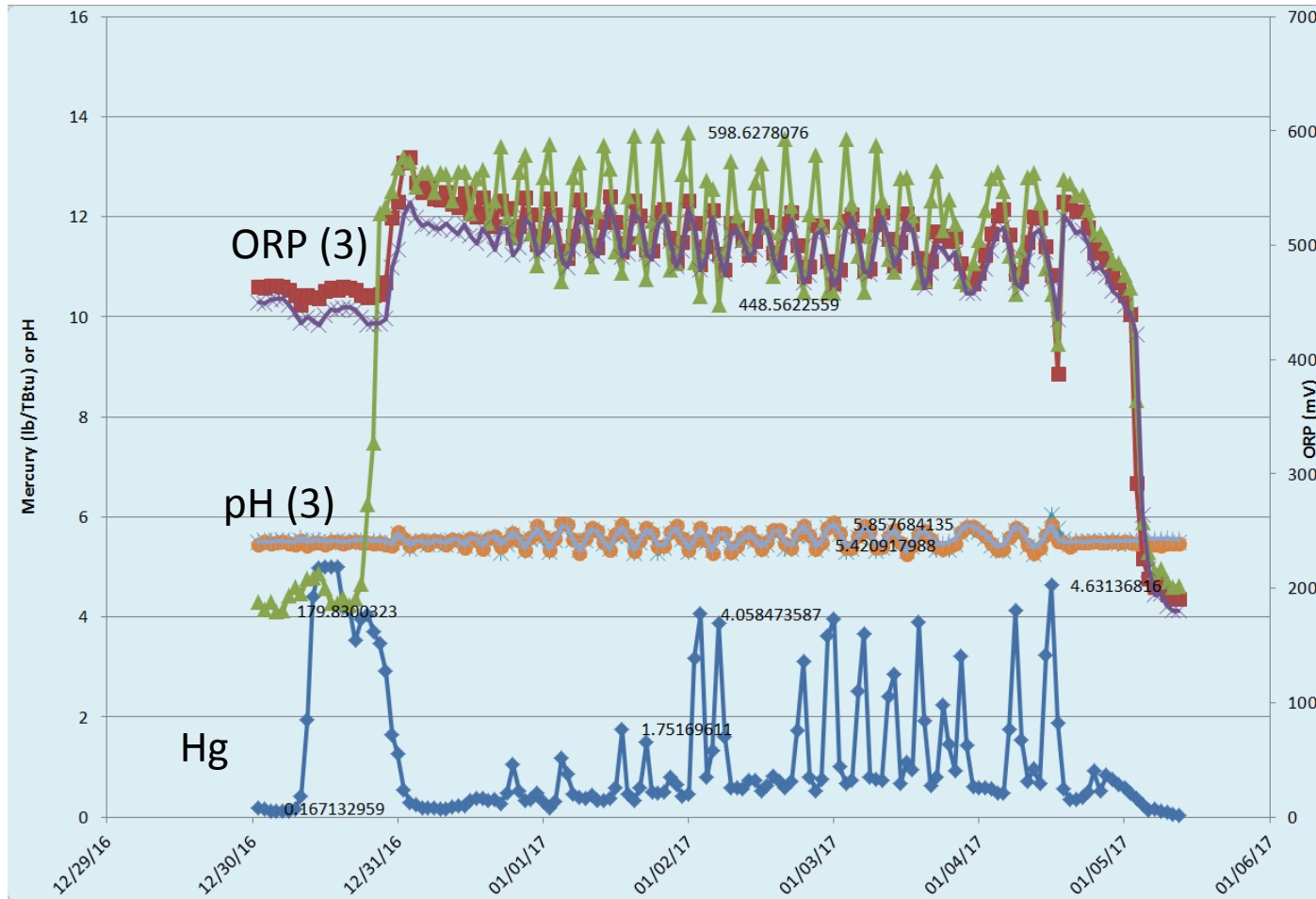
Now

- pH (Advatech)
- ORP (Chiyoda)
- Sulfites (GE sulfite probe)
- Hg conc. in slurry

ORP - Cycling Loads (Chiyoda)



pH – Hg (Advatech)



What Caused the Event?



Dirty pH probes

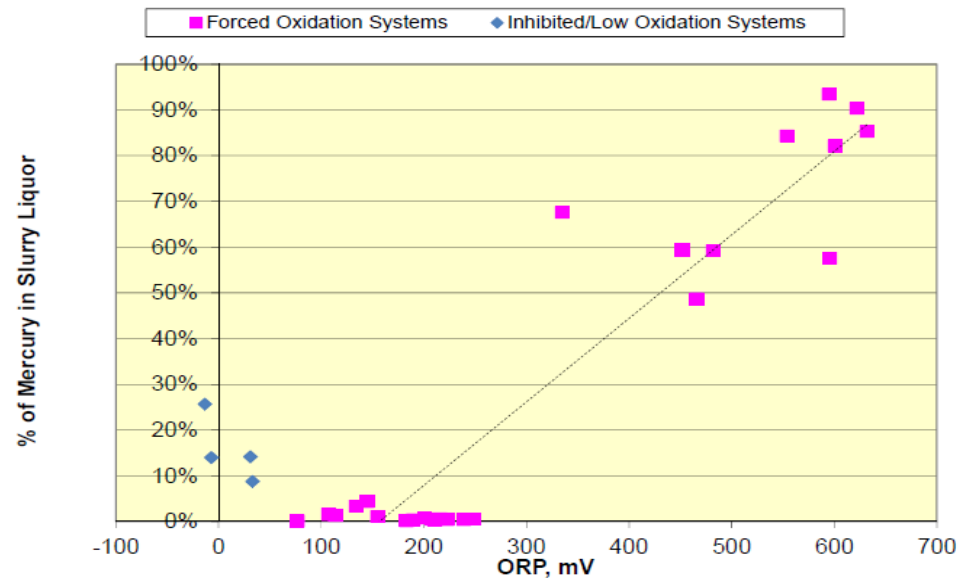
Why ORP is Important?

- Oxidation Reduction Potential (ORP) = the tendency of a chemical species to acquire electrons and thereby be reduced.
- Mercury (Solids vs Liquids)
- Selenium Speciation

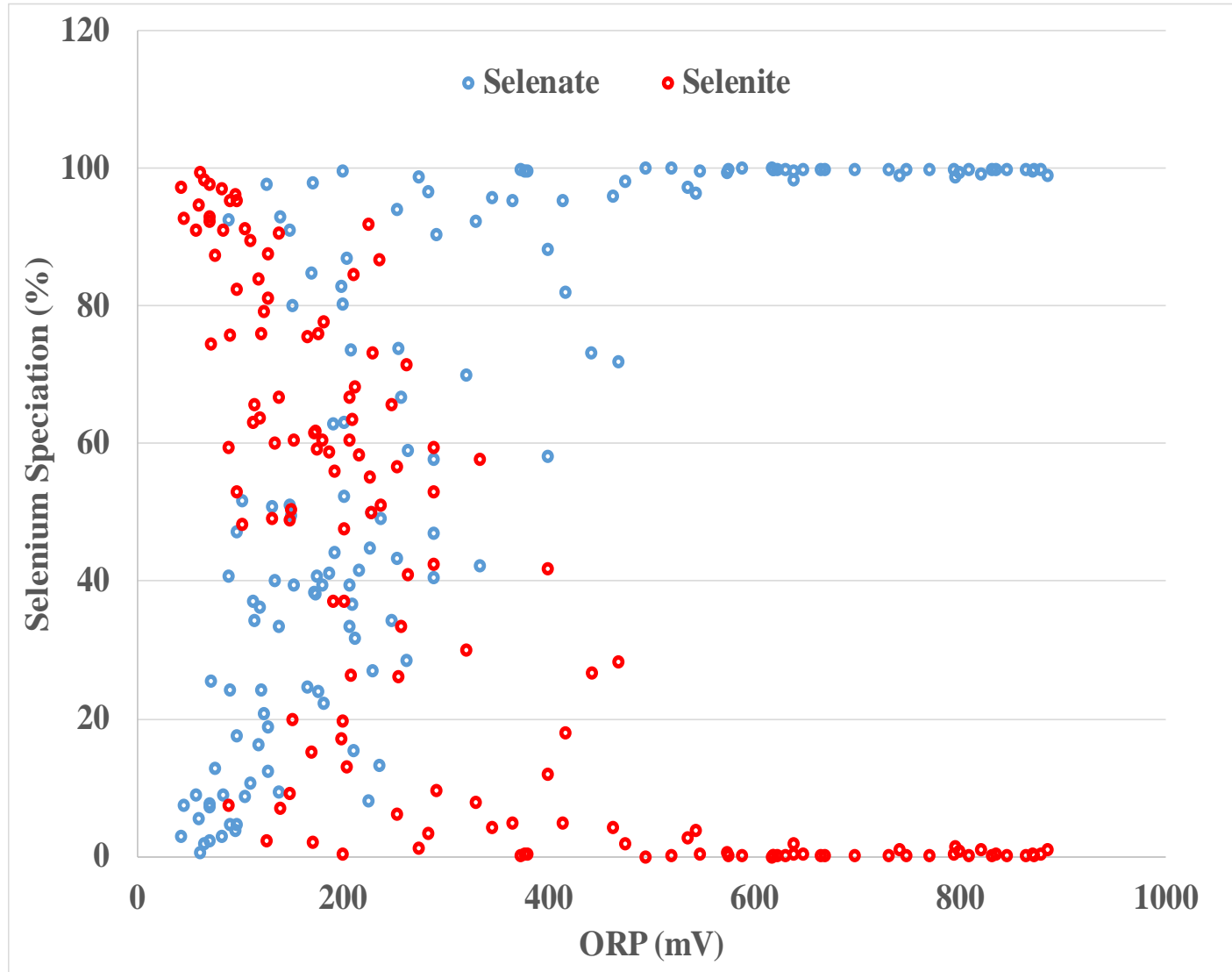
Potential of Hg reemission event

ORP Affects Dissolved Hg

- ▶ Fraction of Hg in the liquid phase of scrubber slurry related to ORP
- ▶ LESS Hg in liquid phase means
 - ▶ Less potential for Hg re-emission during upsets
 - ▶ Less burden on WWT system



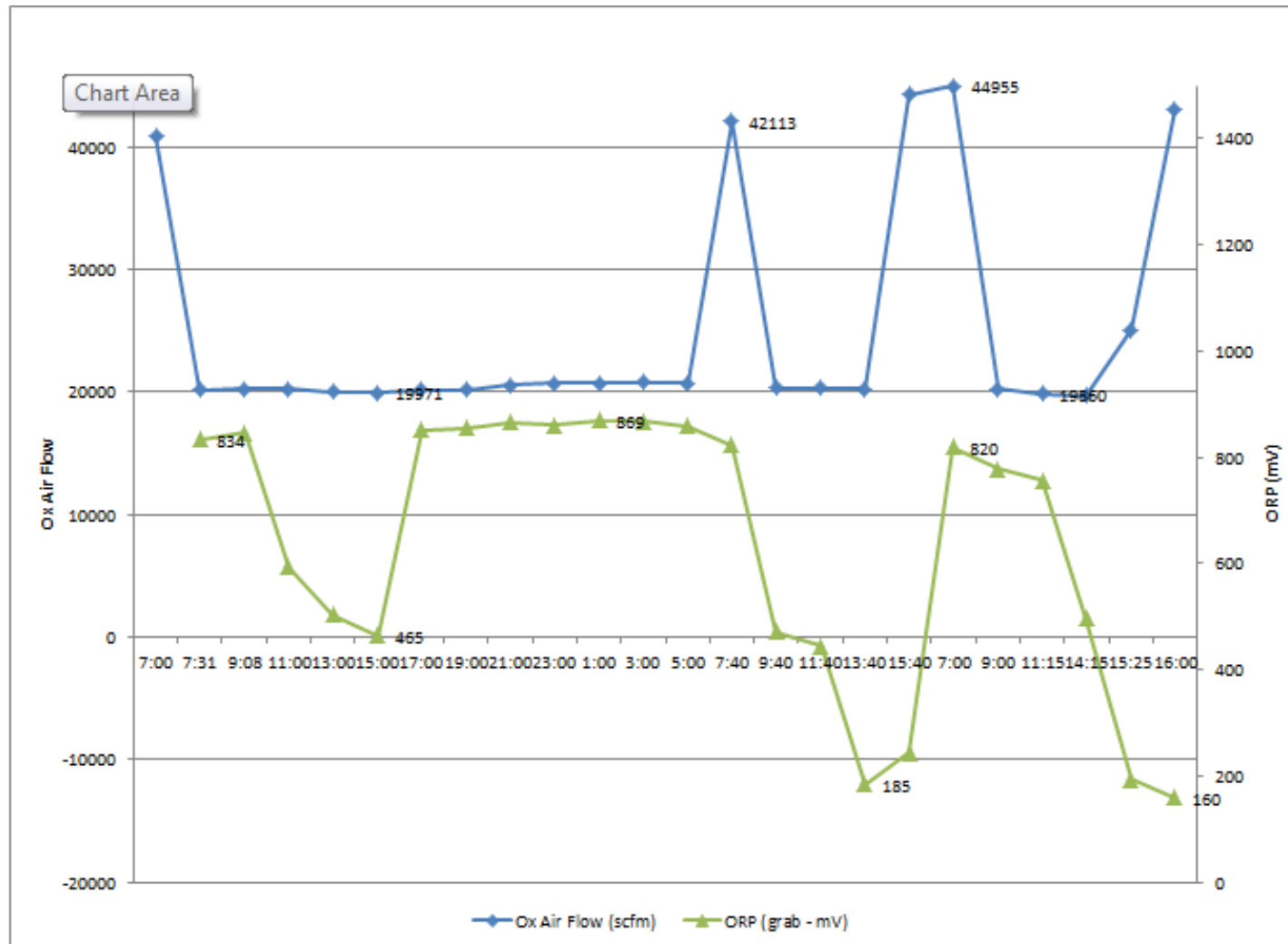
Selenium Speciation in FGD



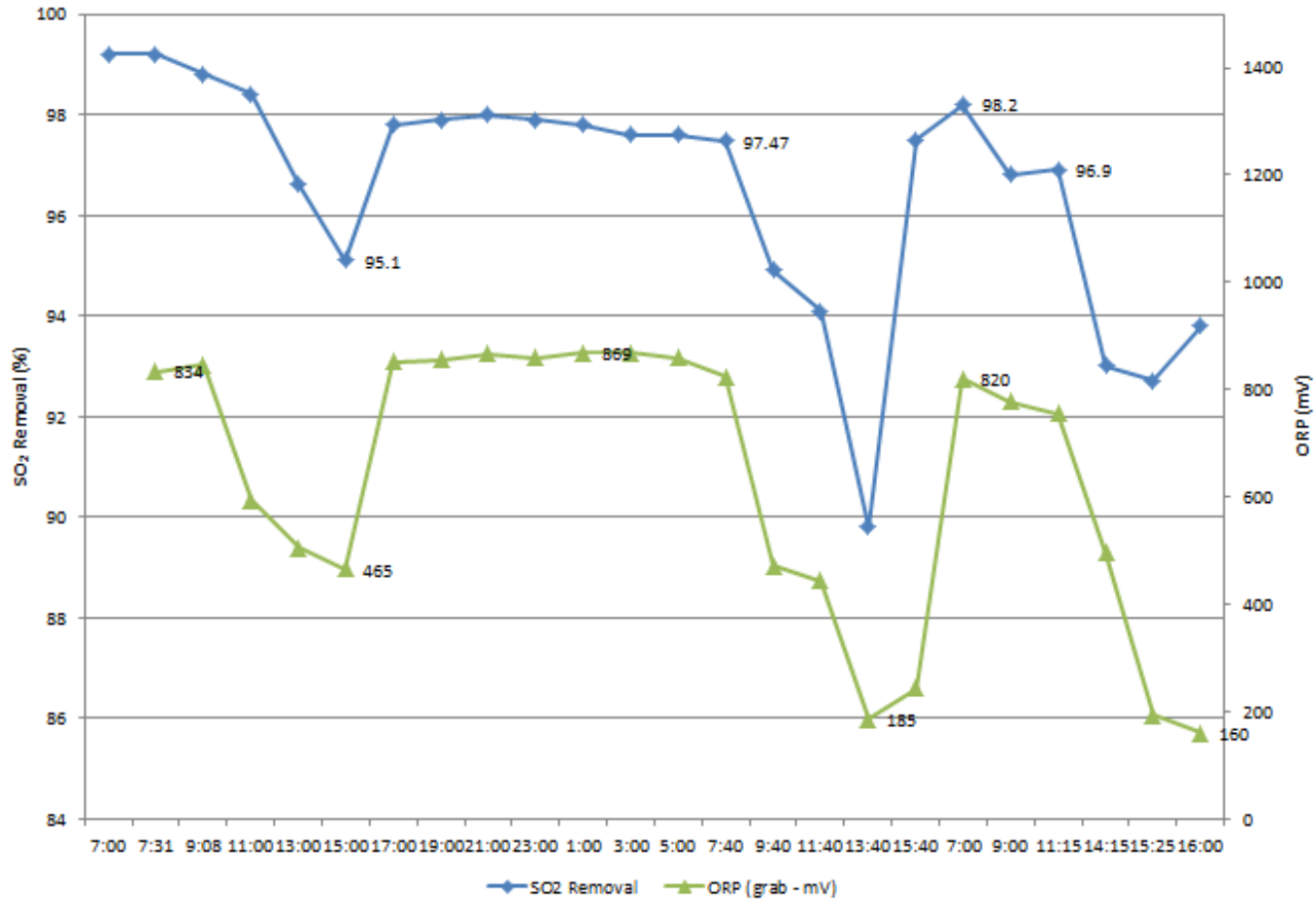
Our Efforts to Reduce ORP

- Wansley Ox Air Flow Test

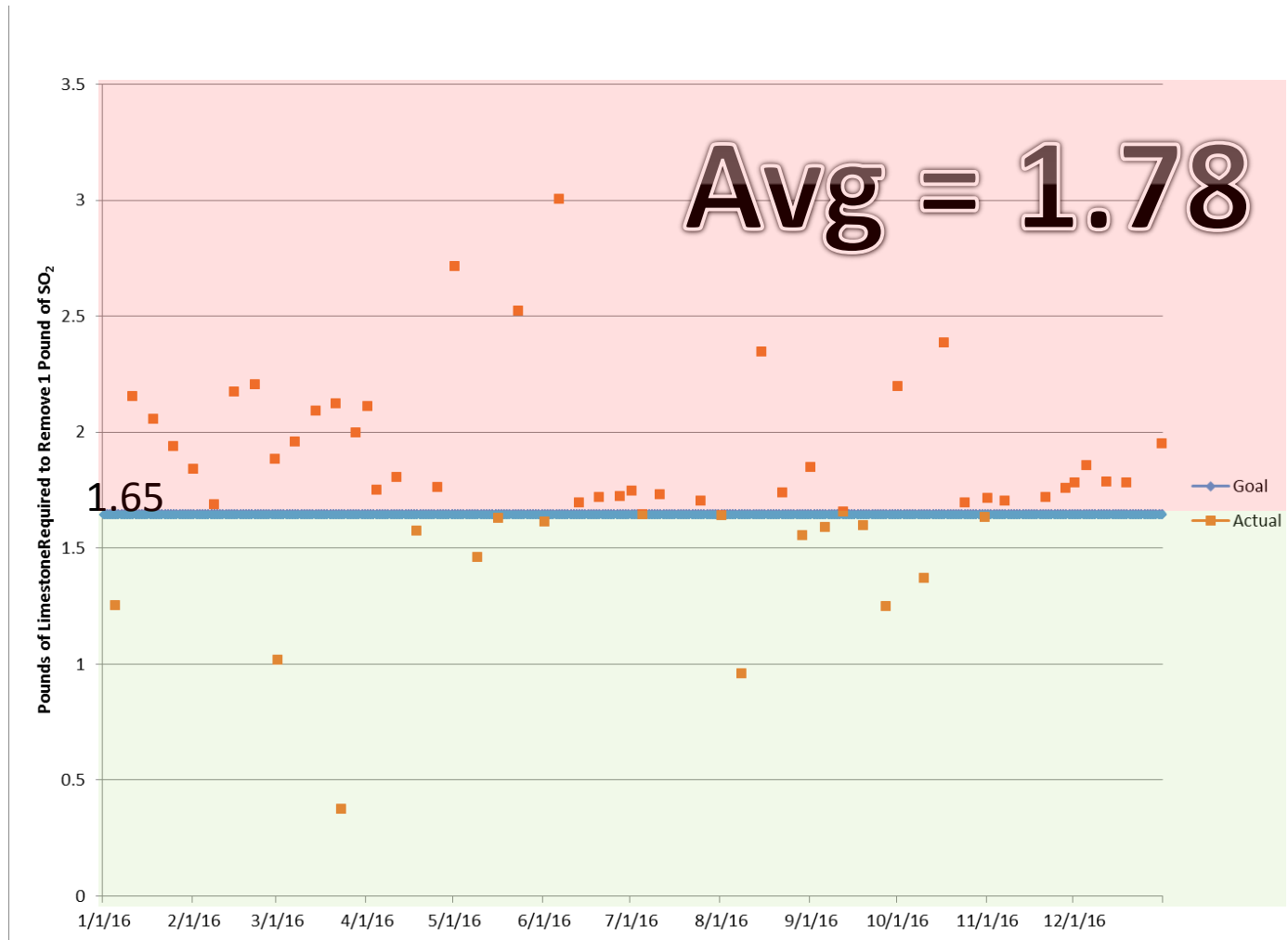
ORP and Ox Air Flow



ORP and SO₂ Removal



LS Usage Vs Required



Conclusion

- Exploring GE Sulfite probes or other means of controlling Ox Air flow
- Continue to learn about FGD effects on MATS
- How do we become more efficient?