Scrubber O&M Hot Topics

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How do we get in trouble?

- We ignore the basics
- We have to cut costs to stay in budget
- We ignore the basics
- We have longer runs between outages
- We ignore the basics
- We have to cut staffing
- We ignore the basics
- We search for the “magic cure-all”
- We ignore the basics

I have seen major improvements in scrubber efficiency and reliability and major reductions of operating and maintenance costs just because the scrubber operators put a renewed emphasis on the basic design parameters of their system.

pH (limestone system)

- The higher the pH, the better the SO_2 removal
- The lower the pH, the better the limestone will be utilized
- The point where these two lines intersect is around pH 5.4
- pH instruments need daily reference checks and frequent maintenance

pH (lime system)

- The higher the pH, the better the SO_2 removal so these systems typically operate around pH 6.0
- Since the pH scale is logarithmic, small deviations in pH values can cause large increases in lime consumption and cost
- pH instruments need daily reference checks and frequent maintenance

Chlorides

- Chlorides cause pitting of stainless steel
- The amount of chloride that can be tolerated is a function of the lowest grade alloy in the system
- A test for chloride levels should be run at least weekly
- If you can stand additional blowdown to control chlorides you can minimize corrosion potentials

Solids

- It has been my experience that systems operate better with solids in the 15% - 20% range
- Solids should be measured manually at least once per shift or a continuous solids monitor should be installed

Oxidation

- If you are above 95% oxidation you will make gypsum crystals
- If you are below 18% oxidation you will make calcium sulfite crystals
- If you are between these two ranges you will make co-precipitate crystals and have all kinds of scaling and settling problems

Limestone Blinding

- This typically happens after a period of low unit load followed by a rapid load increase (such as Monday morning)
- The SO_2 removal is decreasing while the limestone feed rate is at the maximum and the pH stays about the same
- To break the cycle, stop feeding limestone while the pH remains steady
- Once the pH starts to drop, resume limestone feed

Limestone Grinding

- 200 mesh doesn't work well, 325 mesh is the target
- There is a huge difference between 80% thru 325 mesh vs. 90% thru 325 mesh
  - Bond Work Index
  - Example of 40 TPH ballmill

$$W = \frac{10\ W_i}{\sqrt{D_P}} - \frac{10\ W_i}{\sqrt{D_F}}$$

W = power in kWh/t of product

W_i = bond work index in kWh $(\text{micron})^{1/2}$/t

D_P = diameter in microns for which 80% of product is finer

D_F = diameter in microns for which 80% of feed is finer

Limestone Grinding (cont.)

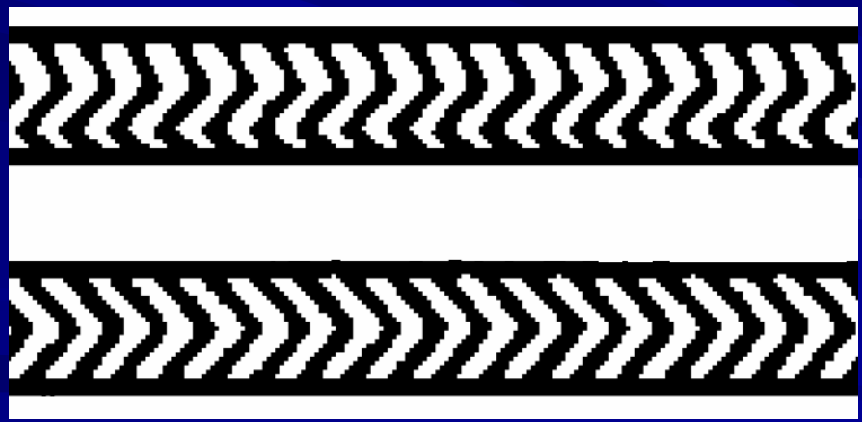
- A plugged hydroclone can instantly change the grind
- An on-line particle size monitor can pay for itself
- Whenever the amps drop on the ballmill motor, it’s time to add mill balls (this can be a weekly task)

Lime Slakers

- Temperature is an important parameter in a slaker's performance
- Most often the water to the slaker needs to be heated
  - Example of high pH gypsum

Mist Eliminators

- A dirty three pass mist eliminator will let more liquid droplets thru than a clean two pass mist eliminator



Data Acquisition Systems

- The new software makes it very easy to set up graphs that can help you identify operational and maintenance problems
  - pH trends
  - Two pumps on one header
  - Pumps on multiple headers
  - Mist eliminator flow “saw tooth”

Trash

- Often floor sumps pump back into the process
- Wire, cable ties, plastic, etc. will plug spray nozzles
- Chunks of scale from tower or mist eliminator cleanings will chew up pump internals and plug spray nozzles
- Don’t wash trash on the floor into sumps