

U.S. Office of Surface Mining



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The absolute limit to Passive Treatment?

❑ An absolute limit is difficult to define since:

➤ Too many factors to define an “absolute limit” to passive treatment (stock)

❑ So what I’m going to talk about is reducing the risk of failure (what’s failure?)

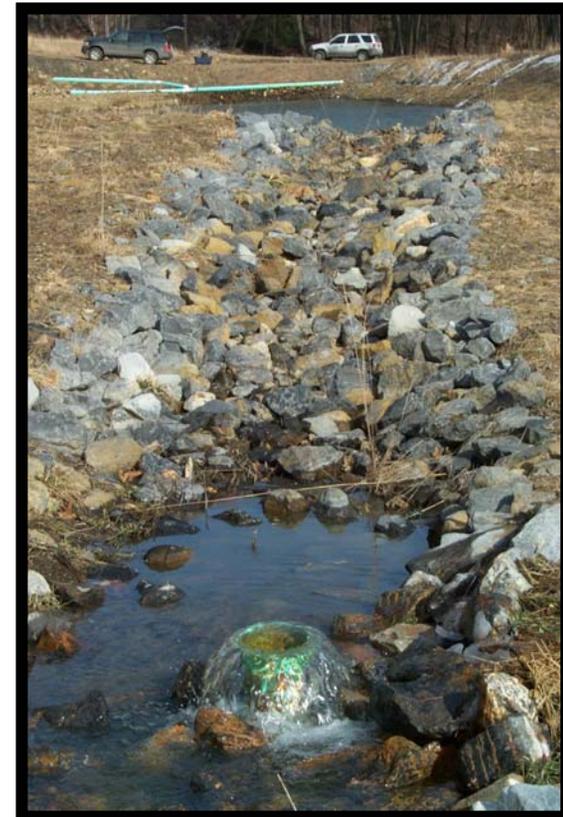
INFLOW

- pH 3.1
- Al ~ 10 mg/L
- Acidity of 80mg/L
- Flow ~95 gpm
- 1,800 tons LS

What's going On?

OUTFLOW

- pH 4.7
- Al ~ 7



INFLOW

What's going On?

OUTFLOW

- ☐ pH 3.1
- ☐ Al ~ 10 mg/L
- ☐ Fe ~ 220 mg/L
- ☐ Acidity of 520 mg/L
- ☐ 3,000 tons LS
- ☐ Flow ~50 gpm

- ☐ pH 6.3, $P_{\text{CO}_2} = 10^{-0.63}$
- ☐ Alkalinity = 380 mg/L



The Treatment Risk Scale



**Low metal
Loading/treatment
area**

Aluminum

**High metal
Loading/treat
ment area**

**Treatment
Chemical**



**Passive
Treatment**

Work with the Chemistry

- Low Maintenance
- Decreased Monitoring
- High Likelihood of Long-Term Success

Fight the Chemistry through Engineering

- High Maintenance
- Increased Monitoring
- Lower Likelihood of Long-Term Success

10 Causes of passive treatment failure and ways to reduce risk of failure!

1. Plugging (too much metal loading on too small of area)

- ❖ Plugging leads to either short circuiting or rise in water level (vertical flow)
- ❖ I believe flushing prevents effluent pipes from plugging not the system from plugging

2. Short circuiting due to poor design or poor construction

- ❖ Need to install effluent piping layouts that allow to adjust retention time

What's causing passive treatment systems to fail?

3. Install inlet flow control structures

- ❖ Limit the inflow quantity of water to the design flow, then calibrate system
- ❖ Not doing so leads to premature plugging or physical damage during storms
- ❖ Too many people blame inadequate pre design sampling or drought data as the cause for an undersized treatment system (control inflow)
- ❖ Let the "available" area determine design flow, not historical monitoring data.

4. Eliminate unnecessary settling ponds

- ❖ Never sacrifice treatment space for settling space (your asking for trouble)
- ❖ Consider settling ponds on high ferrous discharges or net alkaline iron discharges ONLY

What's causing passive treatment systems to fail?

5. Design systems for easy maintenance

Don't sell the 20 yr lifespan to the public

- ❖ Keep designs simple and keep precipitate away from piping.
- ❖ You can replace a lot of limestone or remove a lot of precipitate for the cost of miles of piping



Ways to reduce risk of failure



6. Hire designers that specialize in AMD treatment

- ❖ These systems are more complex than “just digging a hole in the ground”
- ❖ Ask for WQ from previously designed systems

7. Strengthen design review process and start monitoring

- ❖ OSM is just starting to perform a technical review (caught 2 net acidic)
- ❖ Monitoring can be cheap (most just require pH and alkalinity)
- ❖ Catch performance issues way before complete failure (main current system



2005 Mine Water Treatment Conference

OSM

TOPICS: Passive, Active Treatment and Resource Recovery

- **WHEN: August 16-18, 2005**
- **WHERE: Pittsburgh, Pa**
- **INFO: www.treatminewater.com OR bmeans@osmre.gov**
- **Presentation abstracts are due NOW**