

# The Economics of using AMD, is it feasible?

Bob Hedin

Hedin Environmental

# What gives mine water value to shale gas company?

- Proximity to operations
- Volume
- Reliable availability
- Chemical suitability for fracking or use in flowback treatment operations
- Cost

# Proximity Considerations

- Each mile of trucking costs \$0.50 - \$1.00 per 1000 gallons

# Volume Considerations: 4.5 Million Gallons

- Mine Drainage Discharges
  - Most surface mine discharges are less than 100 gpm
    - 100 gpm = 144,000 gallons per day
    - 31 days to produce 4.5 million gallons
  - Dozens of deep mine discharges that are > 1,000 gpm
    - 1,000 gpm = 1.4 million gallons per day
    - 3 days to produce 4.5 million gallons
- Mine Pools
  - One acre of flooded deep mine complex holds about 450,000 gallons of water (5 ft seam, 70% recovery 40% porosity)

# Reliable Availability

- Flow rate of most surface mine discharges decreases greatly during drought
- Deep mines discharges can be more reliable during droughts
- Deep mine pools can be huge resource in droughts

# Mine Drainage Chemistry and Fracking

- Sulfate Concerns
  - $\text{Ba}^{2+} + \text{SO}_4^{2-} \rightarrow \text{BaSO}_4 (s)$
- Uncertainty about critical sulfate concentration for fracking
- Sulfate concentrations are variable

# Water Sales by AMD Treatment Plants: Expectations

- Existing Plants that were justified without expectation of income from water sales
  - Unexpected occasional income
  - Water sales commitments that cover defined periods of plant operation
  - Commitments to take over operation responsibilities
- New Plants whose financing and/or operation is dependent on income from water sales
  - Completely finance construction and all long-term operations
  - Partially finance construction and all long-term operations

# Levels of Involvement

- Full responsibility for system's installation and operation
- Option to purchase water structured to cover annual O&M
- Sale of water so that major maintenance is covered

# Conflicts between AMD Treatment and AMD use

- Effective stream restoration requires continuous treatment over long time periods.
- Cost-effective utilization of AMD would use a limited amount of water over short time periods.

# Things for Watershed Association to Know

- Flow rates, especially during drought
- Chemistry, especially sulfate
- Proximity to drilling locations
- Alternative water sources