The Implementation of Reasonable Potential Analysis

Ohler Strip
Lower Turkeyfoot Township
Somerset County
Cambria DMO

- Daniel Sammarco, PE – District Mining Manager
- Rock Martin, PG – Technical Section Chief
- Permitting Staff
  - Greg Aaron, GIT
  - Jerry Kinback, PG
  - Jeff Miller, PG
  - Tom Nalisknick, PE
  - Chad Paronish
  - Tom Pongrac, PG
  - Mike Schirato, PG
Geographic Characteristics

Kiski – Conemaugh TMDL

Surface Coal Mining of the Conemaugh and Allegheny Groups

Freeport and Kittanning Coals

Ankeny Mine
Jenner Township
Somerset County
Reasonable Potential Analysis (RPA)

- Used to determine whether a WQBEL is required.

- Used to determine whether a discharge(s) has the potential to cause or contribute to an excursion above an applicable water quality standard.

  - *EPA NPDES Permit Writers Manual, September 2010*
Implementation of RPA at the Cambria DMO

- **When?**
  - In non-TMDL watersheds.
  - In TMDL watersheds where a WLA is not available.

- **3 Step RPA process.**
  - RP (RPA screening).
    - *PADEP TGD 563-2112-115, June 2013*
  - RPA determination using mass balance equation.
    - *PADEP TGD 563-2112-115, June 2013*
    - *EPA NPDES Permit Writers’ Manual, September 2010*
  - Development of effluent limits using WQSS or PENTOXSD.
RP (RPA Screening)

- For coal SMPs: Typically Iron, Manganese, Total Suspended Solids effluent limits are required.

- The concentration of other parameters is compared to the state water quality criterion.
  - PA Code Chapter 93

- Contaminant Concentration < State Water Quality Criterion.
  - No potential for excursion, RPA finished.

- Contaminant Concentration > State Water Quality Criterion.
  - Possible potential for excursion, RPA continues to step 2.
  - PADEP TGD 563-2112-115, June 2013
RPA Step 2

- Mass Balance Equation

- $$Q_s C_s + Q_d C_d = Q_r C_r$$
  - Where:
    - $$Q_s$$ = stream flow above point of discharge
    - $$C_s$$ = background concentration
    - $$Q_d$$ = discharge effluent flow
    - $$C_d$$ = effluent contaminant concentration
    - $$Q_r$$ = resultant in-stream flow, after discharge
    - $$C_r$$ = resultant in-stream contaminant concentration

- PADEP TGD 563-2112-115, June 2013
- EPA NPDES Permit Writers Manual, September 2010
Choosing Variables

- **Flow**
  - **Discharge**
    - New permit applications
      - Average flow rate
    - Permit renewal applications
      - 95th percentile low flow rate
  - **Stream**
    - \( Q_{7-10} \) flow rate

- **Concentration**
  - **Average Concentration**
    - Utilized for the vast majority (> 95%) of RPA calculations.
  - **Maximum Concentration**
    - Can be utilized in special circumstances for emphasis.
      - Sensitive watersheds.
Typical RPA Parameters

- Sulfate
- Osmotic Pressure
- Aluminum

- Effluent Characterization Data
  - Appendix D of 40 CFR 122
    - PADEP TGD 563-2112-115, June 2013
RPA Step 3

- Development of effluent limits using WQSS or PENTOXSD.
  - Effluent limit will always be somewhere between BAT and in-stream criteria.
    - BAT (monthly average)
      - Fe 3.0 mg/L
      - Mn 2.0 mg/L
      - Al 2.0 mg/L (guideline, not BAT limit)
    - In-stream criteria (monthly average)
      - Fe 1.5 mg/L
      - Mn 1.0 mg/L
      - Al 0.75 mg/L
      - Osmotic Pressure 50 mOsm/kg
  - WQBELs calculated using WQSS or PENTOXSD may be used if they are more stringent than BAT, but less stringent than in-stream criteria.
    - PADEP TGD 563-2112-115, June 2013
    - PA Code Chapter 93
Why we Conduct RPA this way?

- Assume rapid and complete mixing.
  - Vast majority (> 95%) of mine sites in the Cambria district discharge to headwater streams, where mixing is rapid and complete.

- RPA conducted according to PADEP and EPA guidance.
  - Pre-screening conducted according to PADEP guidance.
    - *PADEP TGD 563-2112-115, June 2013*
  - RPA conducted according to PADEP and EPA guidance.
    - *PADEP TGD 563-2112-115, June 2013*
    - *Chapter 6.3.2 Conducting a Reasonable Potential Analysis Using Data.*
      - *EPA NPDES Permit Writers’ Manual, September 2010.*
Rock Martin, PG
Technical Services Section Chief
Pennsylvania Department of Environmental Protection
Cambria Office
Bureau of District Mining Operations
286 Industrial Park Road
Ebensburg, PA 15931
Phone 814-472-1891
Fax 814-472-1898
martin@pa.gov