

# **Ground Water Geochemistry Effects**

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**Robert S. Evans, Hydrologist**

**Office of Surface Mining  
Reclamation & Enforcement  
Appalachian Regional Coordinating Center  
3 Parkway Center  
Pittsburgh, PA**

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# Techniques Used to Predict Postmining Water Quality

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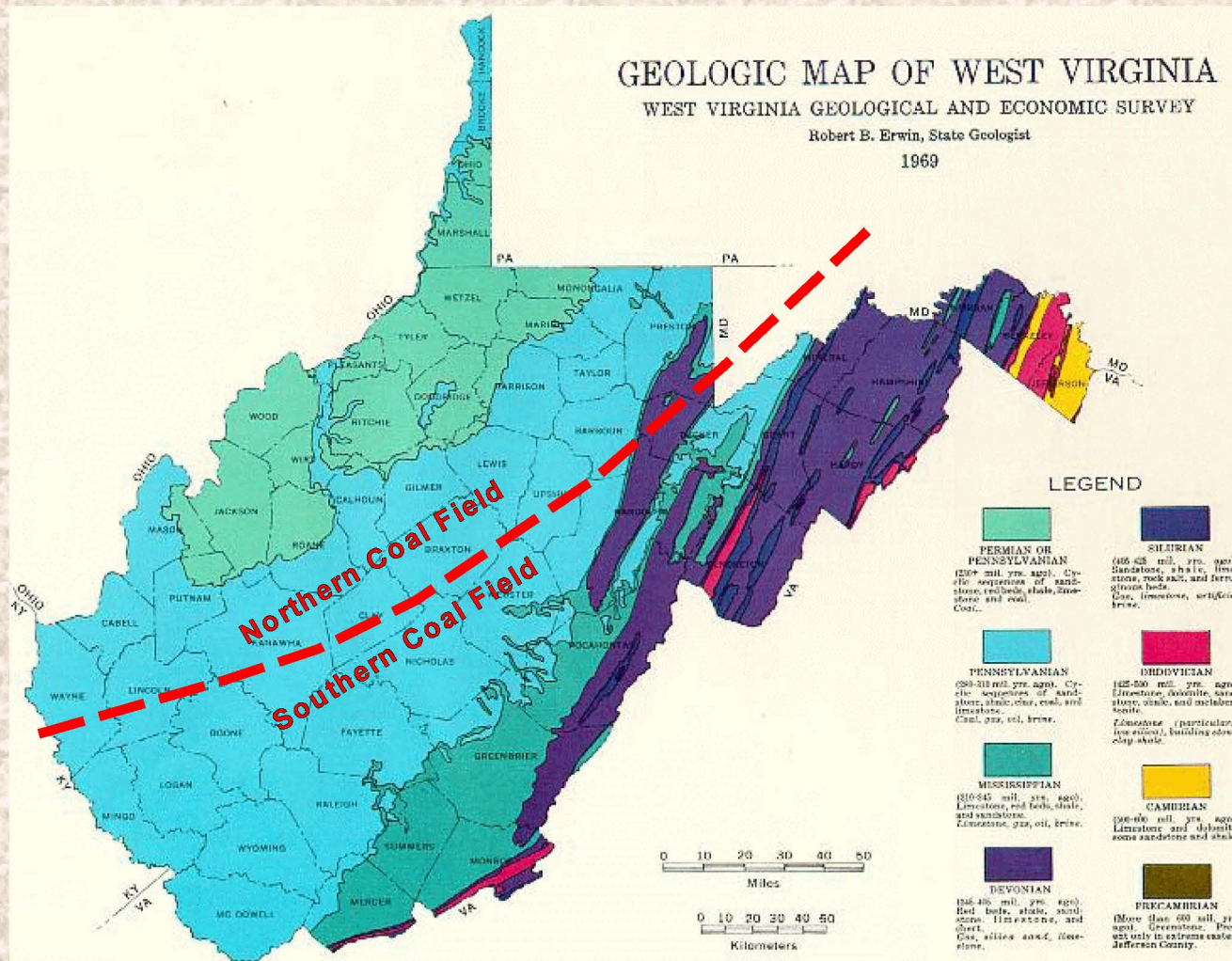
- ▶ **Acid Base Accounting**
  - Volume Weighted
  - Siderite Modified Testing
- ▶ **Recharge to the fill areas**
  - Quality and quantity of the ground water recharge to the fill areas
- ▶ **Adjacent Existing Mining Operations**
  - Water quality from backfills and valley fills
  - Requires demonstration that operations are similar in topography, geology, hydrology, mining methods and age, etc.

# **Overburden Geochemistry and Postmining Water Quality**

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- ▶ **WV broken into two coal coalfields based on coal quality**
  - **Northern coalfield overall has higher potential acidity (sulfur) and frequently higher neutralization potential (more limestones).**
  - **Southern coalfield overall has lower potential acidity (sulfur) and lower neutralization potential (more sandstones).**
  - **Acid Base Accounting studies conducted in hydrologic and geologic conditions representative of the Northern coalfield and provides relationship between mining methods, overburden geochemistry, and post mining water quality.**

# West Virginia Coalfields



# **Characterization of Ground Water Quality Impacts**

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- ▶ **Northern coalfields-generally understood that sites with higher sulfur levels that have acid discharges can have severe acid drainage problems unless substantial alkaline material exists on site.**
- ▶ **Southern coalfields-generally thought that sites with lower sulfur levels would likely have alkaline discharges; but without significant alkaline material can result in acidic discharges.**
- ▶ **Sulfates, total dissolved solids, specific conductance, and metals frequently increase as a result of mining.**
- ▶ **Recharge to stress relief systems frequently changed spoil water storage and discharges.**

# **Ground Water Impacts- Watersheds**

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- ▶ **Recharge of spoil water to streams frequently increase sulfate, total dissolved solids, specific conductance in receiving streams especially during low flow as a result of increased base flow.**
- ▶ **Metals may increase in the receiving stream but frequently decline after mining and reclamation are completed.**

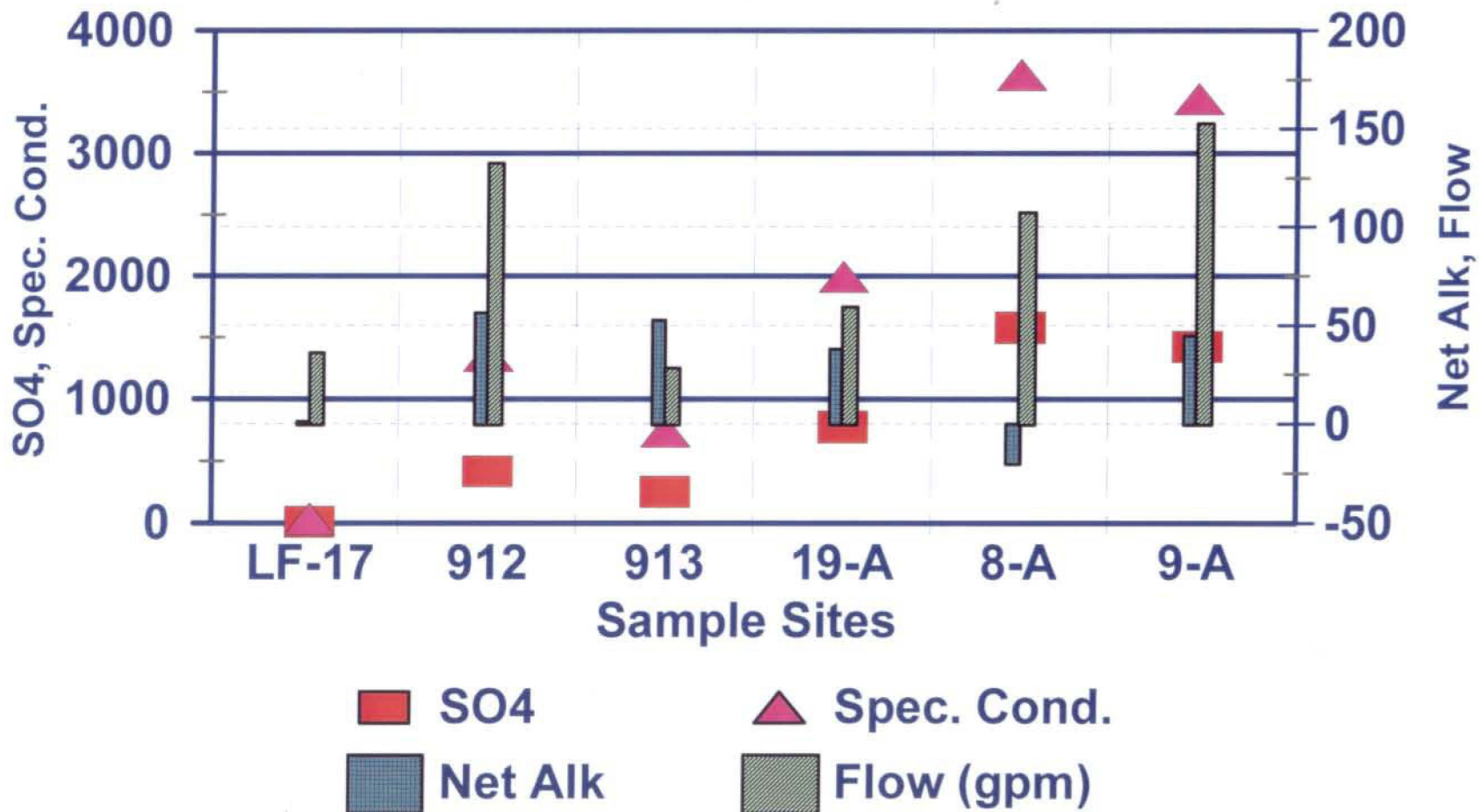
## **Conceivable Actions to Reduce the Uncertainty**

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- ▶ **Field studies of existing mining operations to relate geochemistry to postmining water quality.**
- ▶ **Better establish the ground water flow paths through mine backfills and valley fills.**

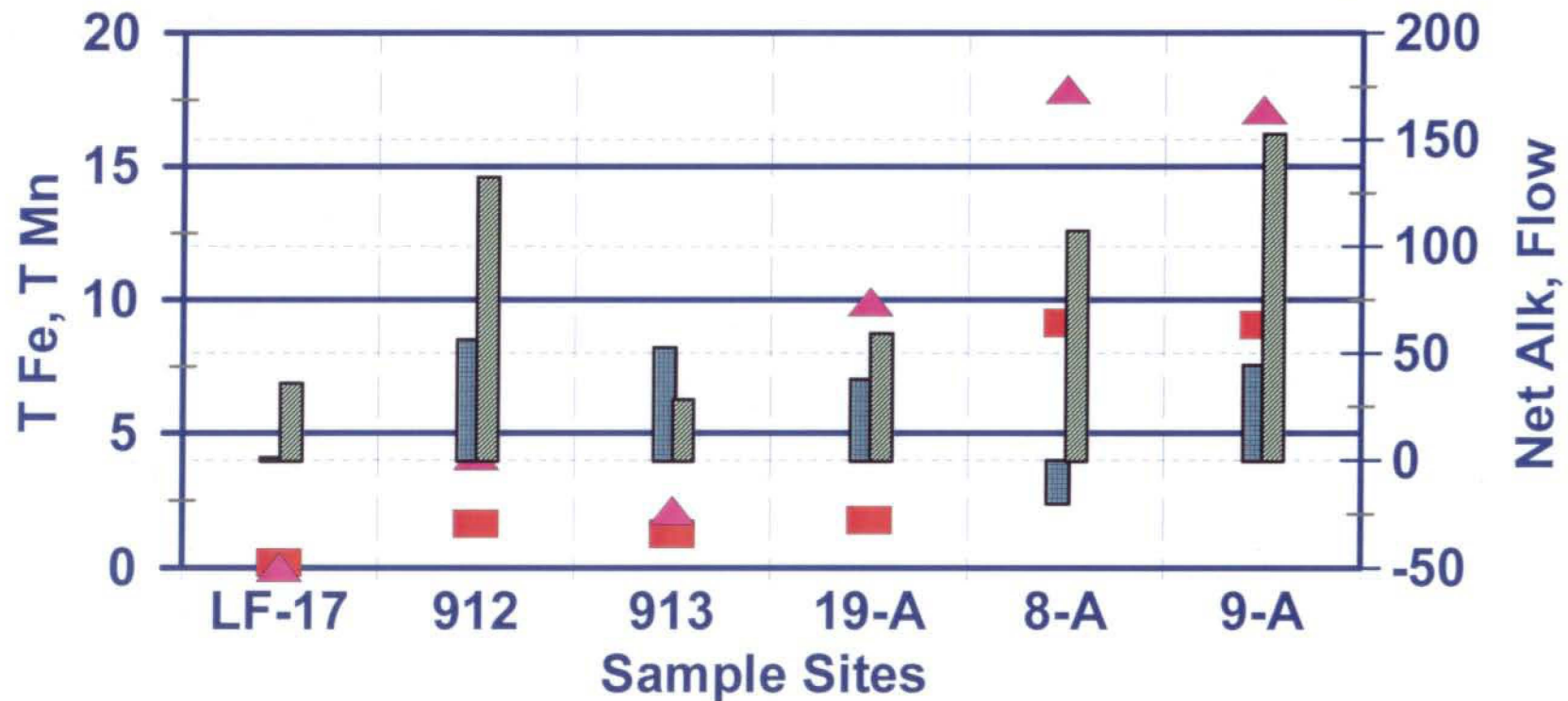
# Example Ground Water Chemistry: Aquifers

## Valley Fill Water Quality



# Example Ground Water Chemistry: Aquifers

## Valley Fill Water Quality



■ T Fe

▲ T Mn

■ Net Alk

■ Flow (gpm)