



**pennsylvania**

DEPARTMENT OF ENVIRONMENTAL PROTECTION

**Bureau Of District Mining Operations  
Moshannon Office**



# Implementing TMDLs in AMD-impaired waters: Pennsylvania's approach.

**EPA Region 3  
2014 States Meeting  
Seven Springs PA  
November 17-19 2014**

## Typical impairments:

- pH (net alkalinity)
- Fe (1.5 mg/l)
- Mn (1.0 mg/l)
- Al (0.75 mg/l)
- TDS, Monongahela River (500mg/l)
- Sediment (reference watershed)

# Determining waste load allocation by operational area:

- Typical surface mine operational area includes 10 acres of pit and ungraded spoil and 30 acres of regraded spoil not revegetated to Stage II bond release standards.
- 10 acres x 41.1 inches ann. precip @95% = 21.0 gpm
- 30 acres x 41.4 inches ann. Precip @15% = 9.9 gpm.
- 30.9 gpm average total flow.

Determining WLAs for a surface mine  
with precipitation-induced, non-  
continuous discharge, with 40-acre  
operational area:

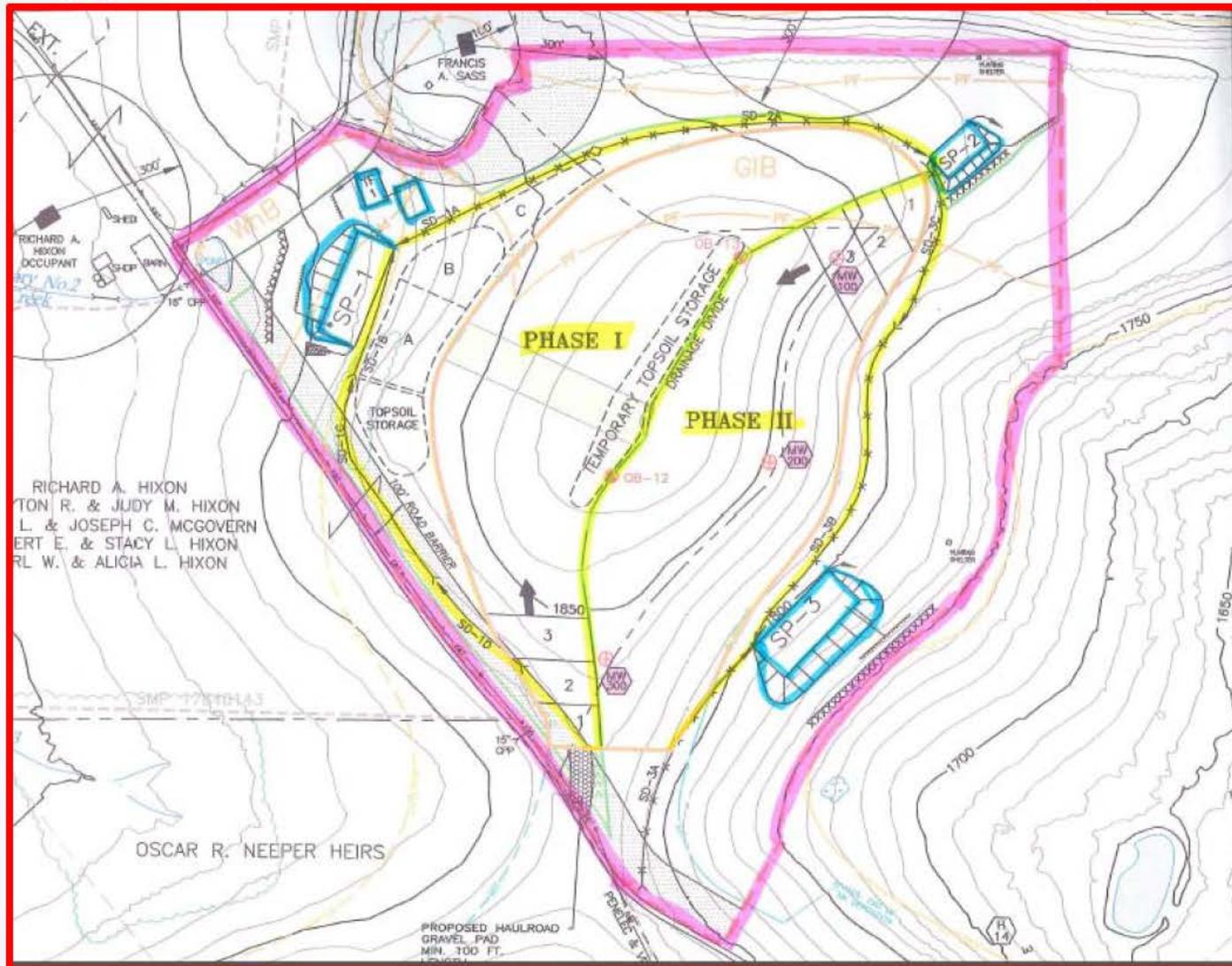
### **Allowable Waste Load Allocations**

**Fe:  $30.9 \text{ gpm} \times 3.0 \text{ mg/l} \times 0.01202 = 1.1 \text{ lbs/day}$**

**Mn:  $30.9 \text{ gpm} \times 2.0 \text{ mg/l} \times 0.01202 = 0.7 \text{ lbs/day}$**

**Al:  $30.9 \text{ gpm} \times 2.0 \text{ mg/l} \times 0.01202 = 0.7 \text{ lbs/day}$**

## Typical example of a small surface mine layout:



- Phase 1 = 25 acres. One WLA required.

## Options when no WLA is available:

- Obtain WLA from a completed operation or reduced operational area.
- Use a non-discharge alternative.
- Discharge at TMDL end point (1.5 mg/l Fe, 1.0 mg/l Mn, 0.75 mg/l Al).
- Treatment offsets.

Non discharge  
alternatives:

Quarry with  
infiltration galleries





Distribution manifold allows effluent pre-treated to BAT to infiltrate into leaf litter of the forest floor or pastureland.



## Sediment Ponds:

- Most TMDLs do not include WLAs for sediment ponds.
- Sediment ponds rarely discharge except for very large storm events (at non-critical flows).
- Sediment ponds with dry weather discharge are considered a treatment pond and require a WLA.

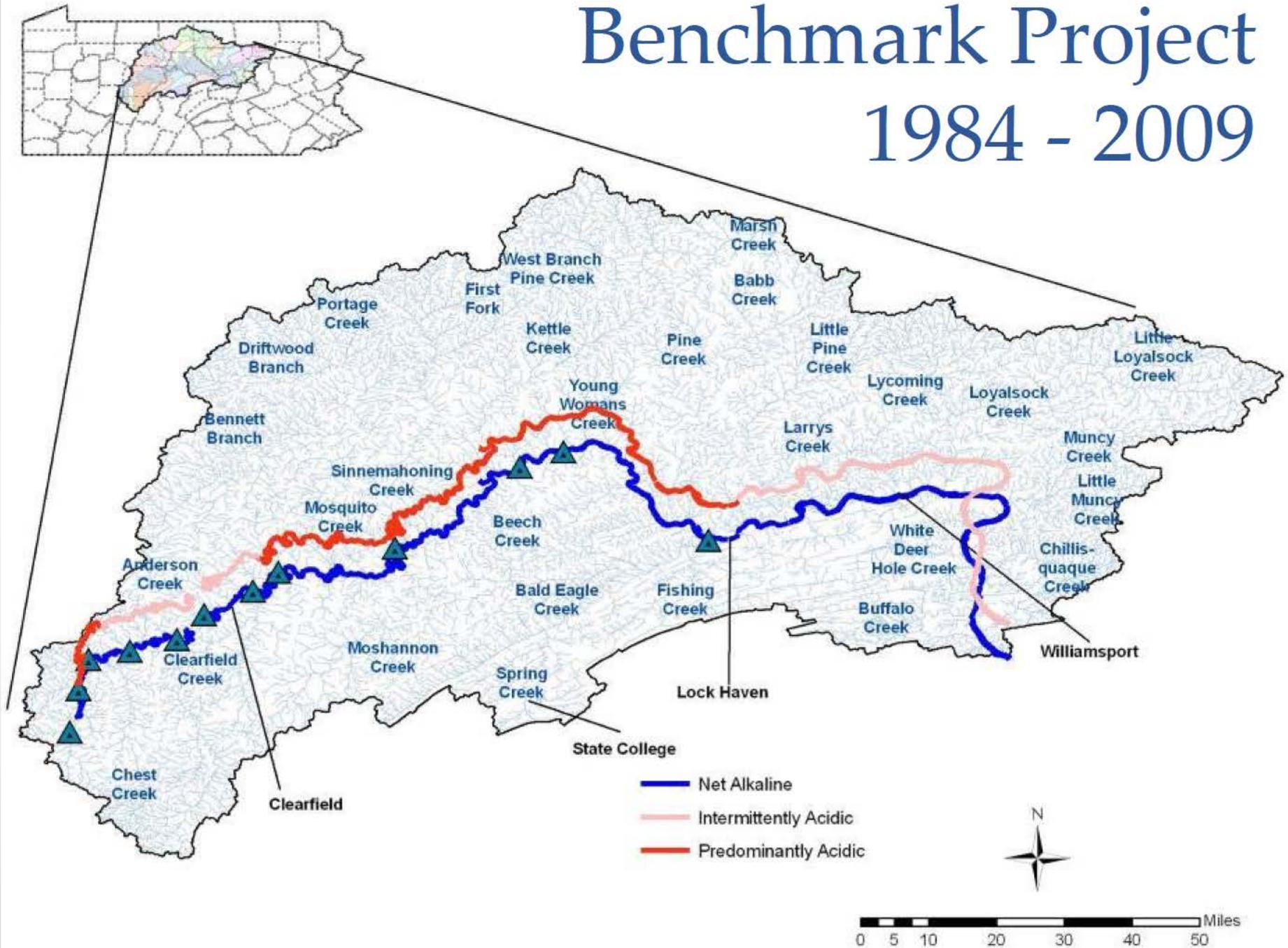
Remining is an important component of most TMDL restoration strategies.



PA Remining Study (2002): Statewide survey of over 100 remining sites found that on average, remining reduces pollution loading from most pre-existing discharges.

Parameter	Average load reduction (%)
Acidity	61.0
Fe	34.8
Mn	12.6
Al	43.1
Sulfate	29.6
Flow	23.7

# Benchmark Project 1984 - 2009



The Susquehanna West Branch  
now an outstanding recreational  
resource!

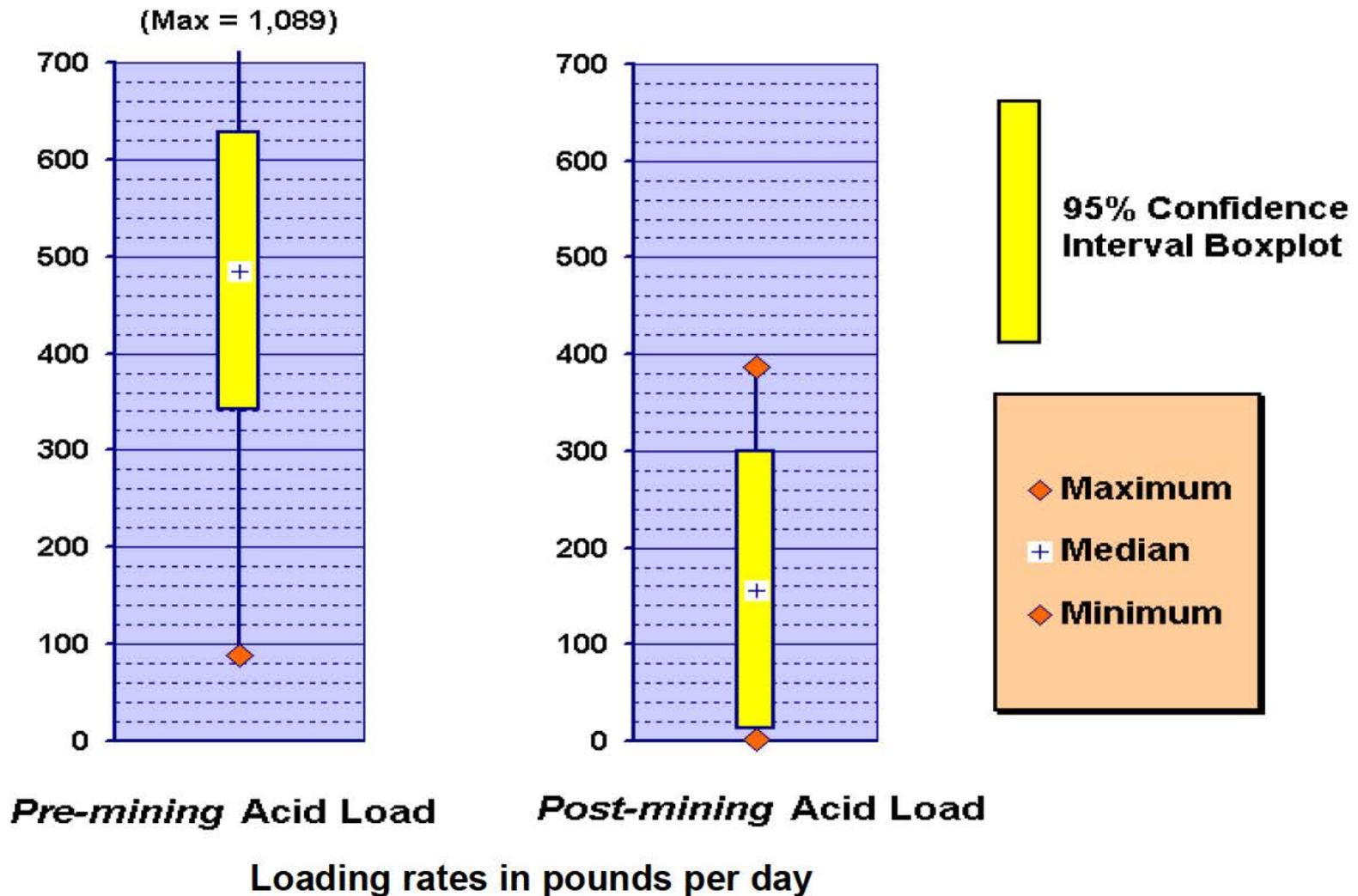


# West Branch @ Karthaus

	pH	Iron (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)
Spring - 1984	3.9	1.9	1.7	140
Summer - 1984	4.1	0.73	3	300
Spring - 2009	6.4	0.53	0.65	123
Summer - 2009	6.2	0.24	0.38	214
% Reduction - Spring		72%	62%	12%
% Reduction - Summer		67%	87%	29%

**Red indicates value is outside of DEP water quality criteria levels. Appx. 56% of improvement due to remining, treatment of existing discharges and mining alkaline overburden.**

Treatment required only if triggered by exceeding baseline.



If treatment is triggered (approximately 2% of remaining permits):

Effluent limit is baseline (no additional waste load).

