Strategy for AMD Treatment on Watershed Scales

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The Clean water Act: The Objective

TITLE I--RESEARCH AND RELATED PROGRAMS

SEC. 101 [33 U.S.C. 1251] Declaration of Goals and Policy

(a) The **objective** of this Act is to:

- restore and
- maintain

the chemical, physical, and biological integrity of the Nation's waters.

The Clean water Act: THE STRATEGY:

SEC. 102 [33 U.S.C. 1252] Comprehensive Programs for Water Pollution Control

(a) The Administrator shall develop comprehensive programs for **preventing, reducing, or eliminating the pollution of the navigable waters** and ground waters.

- In the development of such comprehensive programs due regard will be given to improvements which are necessary to conserve such waters for the:
  - protection and propagation of fish and aquatic life and wildlife,
  - recreational purposes,
  - withdrawal of such waters for
    - public water supply,
    - agricultural,
    - industrial, and
    - other purposes
- e.g. Designated uses
- This is what TMDL Implementation Plans are designed to protect

Objectives, Strategy, Tactics
(We Americans are not very good at this)

- Without a clear objective there can be no strategy; without a coherent strategy, tactics are irrelevant
- It is common to ignore objectives and strategy and go directly to tactics, gizmos
- If so, assume that fabulous amounts of time and money will be wasted without achieving any useful objectives
- “Any idiot can spend $1M solving a $100k problem.”

The Objective:
restore streams

Strategy:
- Money
- Planning
- Political will

Tactics:
Treatment methods:
- Active….
- Passive….

Objectives, Strategy, Tactics
"If you can't measure it, you can't manage it"

The Objective:
restore stream miles

- Funds are finite
- Realistic objectives
- ID designated uses
- Metrics: stream miles recovered
- Pass/fail: e.g. fishery or no fishery

Strategy:
- Money
- Planning
- Political will

- Develop a strategy that supports the objective
- Build alliances
- Find funding/support including CapX, OpX

Tactics:
Treatment methods:
- Active….
- Passive….

- ID treatment options
- Cost/Benefit analysis
- Implement plan
- Measure results
- Assess performance

Objectives, Strategy, Tactics
To state the obvious:

The Objective:
restore stream miles

- The project will fail if:
- No clear objective
- Multiple, conflicting objectives

Strategy:
- Money
- Planning
- Political will

- The project will fail if:
- The strategy does not support the objective
- Supporters smell failure

Tactics:
Treatment methods:
- Active….
- Passive….

- The project will fail if:
- Tactics (methods) do not support the strategy
- Performance metrics are not met

Impediments:

- Jurisdictional boundaries
  - AML (Pre SMCRA 1977) vs.
  - Bond Forfeiture (Post SMCRA 1977)
  - CapX vs. OpX-set aside
  - Active permits
- Regulatory compliance
  - Point source NPDES
  - TMDL pollutant load reduction
  - Might mean ratcheting down the NPDES discharge limits and calling it a day
  - Stream is still dead

Summary: Problems with the point-source strategy

- Sustainability
  - Declining coal production
  - Less revenue to the Bond Pool (water trust fund)
  - Permit holders spend money treating AMD while leaving little to no useful infrastructure behind
  - DEP invariably needs to rebuild the AMD treatment facility
  - Expenditures rarely lead to stream recovery
  - Permit liabilities default to the Bond Pool

Case Study: The Muddy Ck Project

- Muddy Ck was responsible for about 50% of the acid load to the Cheat River
- Three of its main tributaries:
  - Fickey Run
  - Martin Ck
  - Glade Run

  Were severely polluted

  The Cheat River downstream of Muddy Ck was dead as was Cheat Lake

The Muddy Ck Project

- In West Virginia alone, we operate under a Federally imposed decision (Keeley 2009) under which
- WVDEP is obliged to treat AMD on Bond Forfeiture sites and obtain NPDES permits

The Muddy Ck Project

- So, to comply with the Keeley decision, WVDEP installed many point source AMD treatment units on Bond Forfeited sites
- This proved expensive and did not result in stream recovery
- The Muddy Ck project was allowed to move forward because EPA granted an in-stream NPDES permit
- The results have been spectacular

This Allowed Parties interested in Restoring the Cheat River to Proceed on a Logical Basis:

The Objective:
restore stream miles

- Funds are finite
- Realistic objectives
- ID designated uses
- Metrics: stream miles recovered
- Pass/fail: e.g. fishery or no fishery

Strategy:

- Money
- Planning
- Political will

- Develop a strategy that supports the objective
- Build alliances
- Find funding/support

Tactics:
Treatment methods:

- Active….
- Passive….

- ID treatment options
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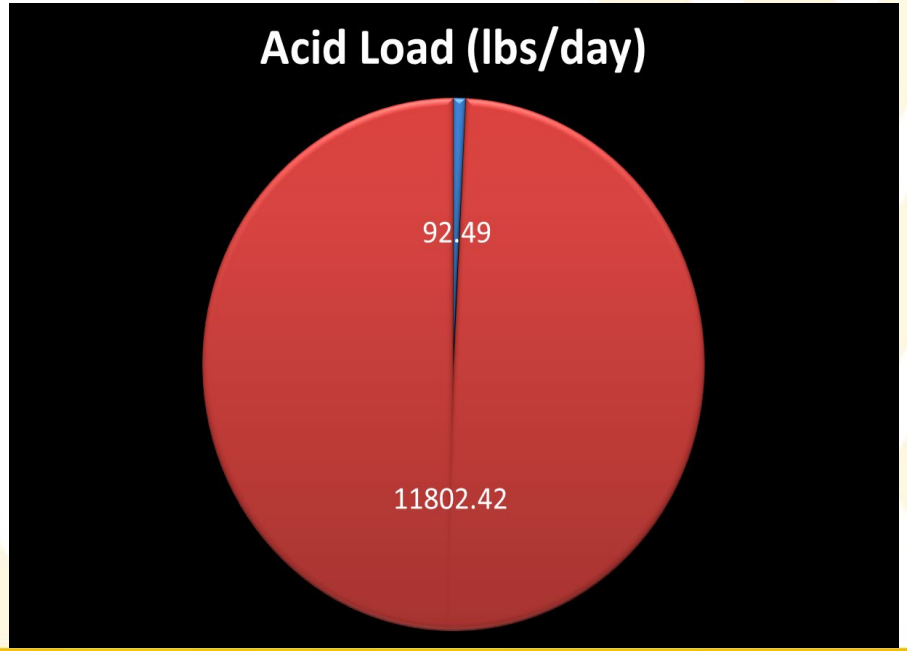
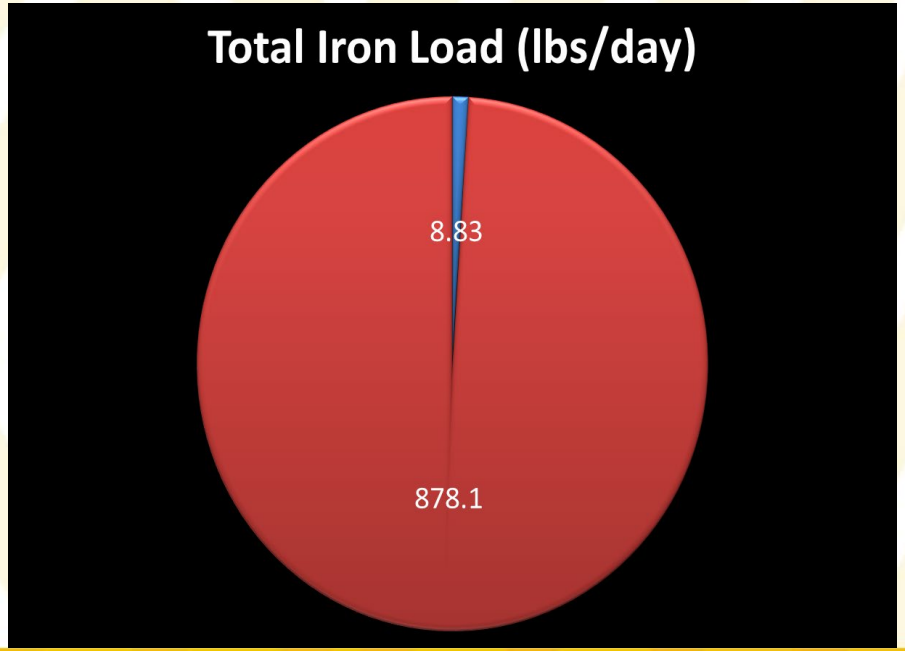
The Muddy Ck Project: Now that we had a useful objective

	Bond Forfeitures lbs/day	AML lbs/day	Source	
			BF	AML
acid load	92.4	11,802.4	0.78%	99.22%
iron load	8.8	878.1	1.00%	99.00%

Develop a strategy that addresses all the pollutant loads in Muddy Ck.(AML loads in red)





SOLUTION: THE WATERSHED STRATEGY

Develop a TMDL style Watershed Improvement Plan

1. Identify pollutant loads/sources
2. Determine load reduction goals
3. Develop remediation plan
   a. Treatment strategies
   b. CapX, OpX requirements
   c. Financing via:
      - AML (Pre SMCRA 1977)
      - Bond Forfeiture (post SMCRA 1977)
      - Active, dormant permits
      - Private sector contributions (Southwest Energy)
4. Regulatory compliance
   a. Point source NPDES vs.
   b. TMDL pollutant load reduction
5. Managed by the State DEP's Bond Pool or equivalent

Many bond Forfeiture AMD treatment units were replaced by the Consolidated Muddy Ck. AMD plant

Rockville Mining

Muddy Ck AMD plant

The Watershed Strategy

- Higher CapX: water transfer, central facility
- Lower OpX: road maintenance, compliance monitoring, QC, supplies
- Southwestern Energy volunteered to help:

Watershed vs. point source		
	W/SWN	WO/SWN
CapX	7%	21%
OpX	-456%	-89%
Total	-48%	-6%

- Stream mile recovery: The Cheat River is now a walleye fishery
- More attractive to external sponsors
- ESG, offsets, charitable contributions

Point source vs. Watershed Strategies

	Strategy		
Cost ($ million)	Point Source	Watershed *	Watershed **
CapX	$ 12,500,000	$ 15,920,000	$ 15,920,000
Southwestern Energy Contribution		$ (2,500,000)	
Net CapX	$ 12,500,000	$ 13,420,000	$ 15,920,000
OpX per year	$ 1,000,000	$ 530,000	$ 530,000
Southwestern Energy Contribution		$ (350,000)	
Net OpX (10 yrs)	$ 10,000,000	$ 1,800,000	$ 5,300,000
Total costs over 10 years	**$ 22,500,000**	**$ 15,220,000**	**$ 21,220,000**
Savings		$ 7,280,000	$ 1,280,000
Stream Miles Recovered			
Muddy Ck	0	3.20	3.20
Cheat River	0	16.00	16.00
Total stream recovery	**0**	**19.20**	**19.20**

* with SWE contribution

** without SWE contribution

Middle Cheat Project: Four tribs generate the remaining acid load

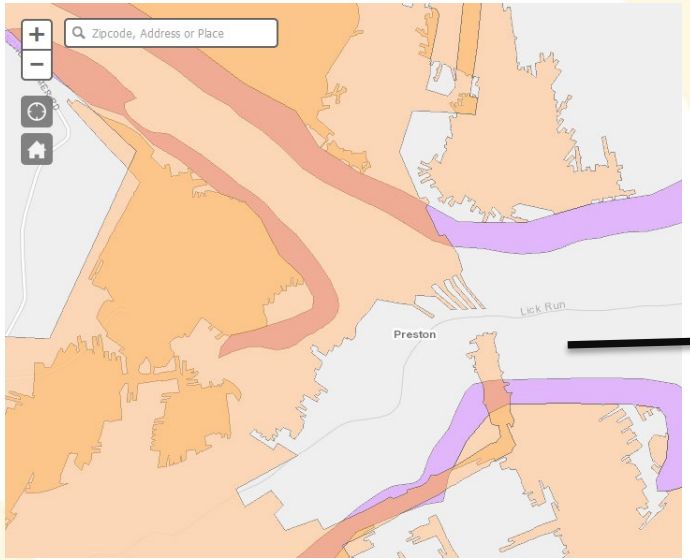
Morgan Run

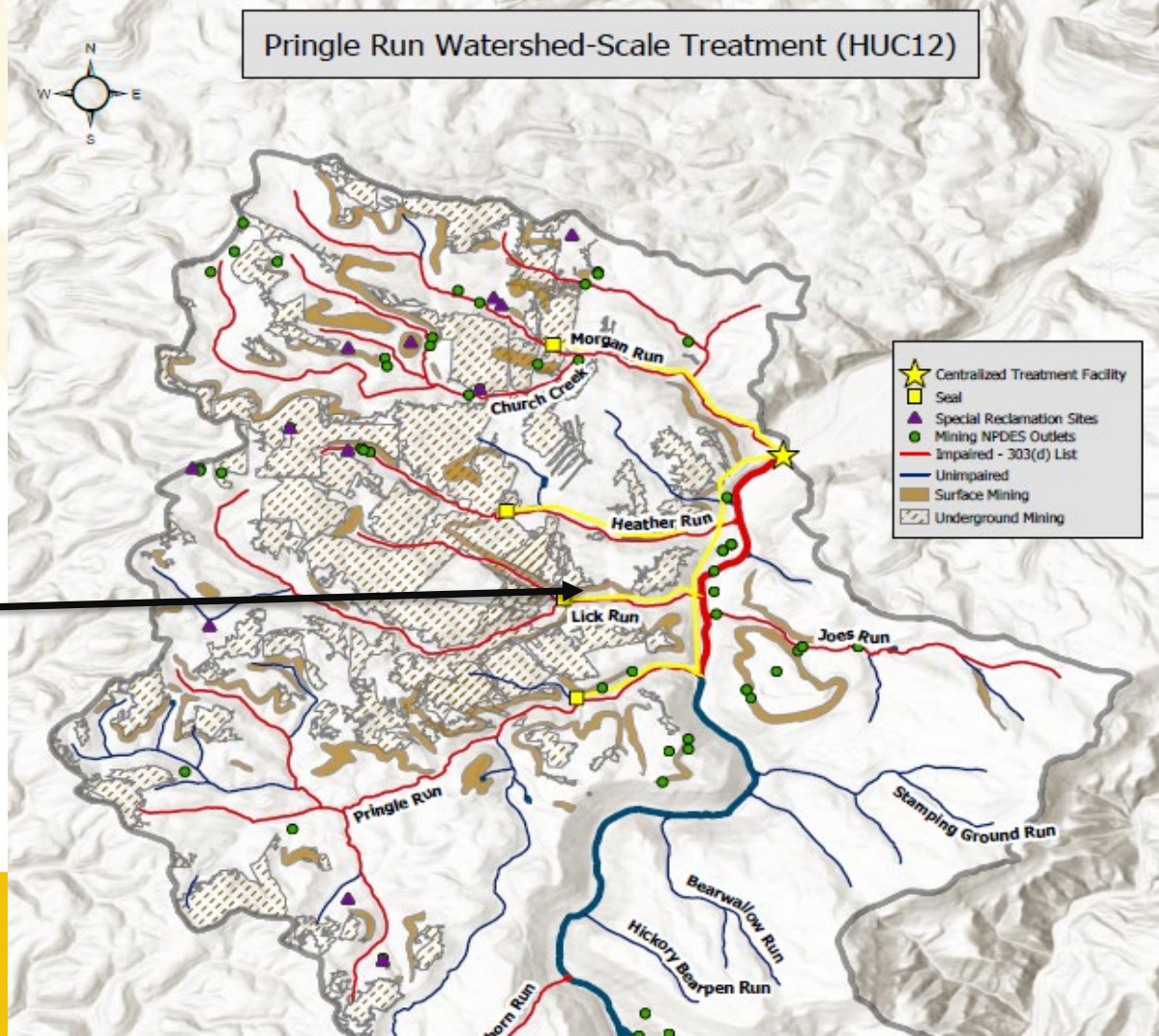
Lick Run

MIDDLE CHEAT RIVER

Estimate:

UG area	5,000 ac
Q	2,500 gpm
REE/Co	13.5 t/yr (Lick Run only)





Watershed Restoration: Integrating AMD treatment with REE/CM recovery

- At-source AMD treatment is typically inefficient
  - High cost
  - Low watershed benefit
- Watershed scale AMD treatment strategies are efficient
  - Lower cost
  - High watershed benefit-TMDL compliance
- Large, consolidated AMD treatment plants are better for REE/CM recovery
  - Feedstock and product quality control
  - Logistics, infrastructure

For more information
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