

Muddy Creek Restoration Project Preston County, WV

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Metals From Martin, Fickey and Glade Coming out of Suspension "Sludge"

Muddy Creek Watershed

Confluence of Martin and Muddy Creek August 2017

Martin Creek Staining

Trout Stream No Staining



The Costs Treating Title 5 Discharges

OSR is required to attain NPDES permits for all their Title 5 AMD discharges.

In 2016

<u>T&T EM-113 MINE</u>

1994 (time of forfeiture) to 2016 OSR had spent over \$9 million in operational costs. Outdated and inefficient facility.

New facility was needed to meet NPDES limits at a cost of \$8 Million.

ADDITIONAL MINE STIES IN MUDDY CREEK WATERSHED

In 2016 OSR had 6 active water treatment sties . Capital costs for those sites were \$8 Million.

OSR had spent over \$3.5 Million in operations cost for those sites. (*Average of \$50,000/site/year*.)

At that time OSR also had 3 additional sites that required initial capital costs of nearly \$4 Million. It was estimated that these sites would have a yearly total operational costs of \$120,000/year.



Treating all Title 5 AMD Discharges "Point Source" approach

Operational Costs/Year \$

Capital Costs

12,500,000

1,000,000



Title 5 Point Source Approach



Capital Costs

Design & Engineering Dosing Units Settling Ponds Clarifiers Computer Monitoring Systems Power 24/7 Sludge Storage Pumps Lift Stations AMD Collection Lines Road Access Realty













Operations & Maintenance

Chemical Sludge Disposal Maintenance Operators



Cost Comparison "Point Source" vs. "Watershed Approach"

Treating all Title 5 AMD Discharges
"Point Source" approach

Capital Costs \$ 12,500,000 Operational Costs/Year \$ 1,000,000

Spending \$12M in CapX and \$1M in O & M

Muddy Creek Still a Dead Stream

Treating all Title 5 & Title 4 AMD Discharges "Watershed" approach				
Capital Costs	\$	15,920,000		
Operational Costs/Year	\$	\$530,000		

Note Operational Costs Less in Watershed Approach Because you Have Less Sites to Maintain.

S	$\mathbf{\Lambda}$			
Southw	este	ern E	nerg	y®

"Freshwater Neutral" Company Policy

Contribute \$2.5 Million for Capital Costs

Annual Contribution of \$350,000 for Operational Costs

Treating all Title 5 & Title 4 AMD Discharges "Watershed" approach						
Capital Costs	\$	13,420,000				
Operational Costs/Year	\$	180,000				

The Variance

In order for OSR to implement a watershed-wide treatment approach that would address Title 4 and Title 5 AMD the DEP had to apply for a variance to water quality standards.

The variance states:

40 CFR 125.3(f)



7.2.d.8.2. A variance pursuant to 46 CSR 6, Section 5.1, based on human-caused conditions which prohibit the full attainment of any designated use and cannot be immediately remedied, shall apply to WVDEP Division of Land Restoration's Office of Special Reclamation's discharges into Martin Creek of Preston County and its tributaries, including Glade Run, Fickey Run, and their unnamed tributaries. The following existing conditions will serve as instream interim criteria while this variance is in place: pH range of 3.2-9.0, 10 mg/L total iron, and 15 mg/L dissolved aluminum. Alternative restoration measures, as described in the variance application submitted by WV DEP Division of Land Restoration's Office of Special Reclamation, shall be used to achieve significant improvements to existing conditions in these waters during the variance period. Conditions will be evaluated during each triennial review throughout the variance period. This variance shall remain in effect until action by the Secretary to revise the variance or until July 1, 2025, whichever comes first.

- Participated in the development of the permit
- Approved WV's in-stream permit in August 2017



The Components

To address the AMD entering Martin Creek & Glade Run

> This approach will remove approximately 86% of the acid and metal loads from Fickey Run.

68% of the load reductions would come from pre-law mine discharges





Aid Flocculation



(3) Mix tank



(4) Two 8O' Diameter Clarifiers

The Plant



(5) Sludge Pumps to Mine or Geotubes



(1) Lime Slurry Injection for pH Adjustment





(6) Geotube Deep Mine Sludge Storage





Fish Community Results

Credit WVDEP Watershed Assessment Branch 2023

T & T Plant 📃 Glade Run 🔤 Fickey Run

Muddy Creek

Martin Creek

Mouth of Muddy Fish Community Comparison						
	<u>2015</u>		<u>2019</u>		<u>2021</u>	<u>2023</u>
Total Species	0		9		10	8
Total Collected	0		143		150	134
Fish/Meter	0		0.48		0.5	0.45



What have we learned

Lime

Pelletized Lime

Drops through dosing unit silos well 98% CaO Outer microns of particle react unreacted lime



Drops through dosing units with vibrator Mixes well with water 71.63% CaO



Tech Grade

Droops through silo with aid of vibrator Too fine particle size to use other than in a slurry Due to small mesh size mixes very well with water 95% CaO Consistent pH for REE

95% CaO1.05 X \$225/Ton= \$23671.63% CaO1.28 X \$225/Ton= \$288





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Questions?