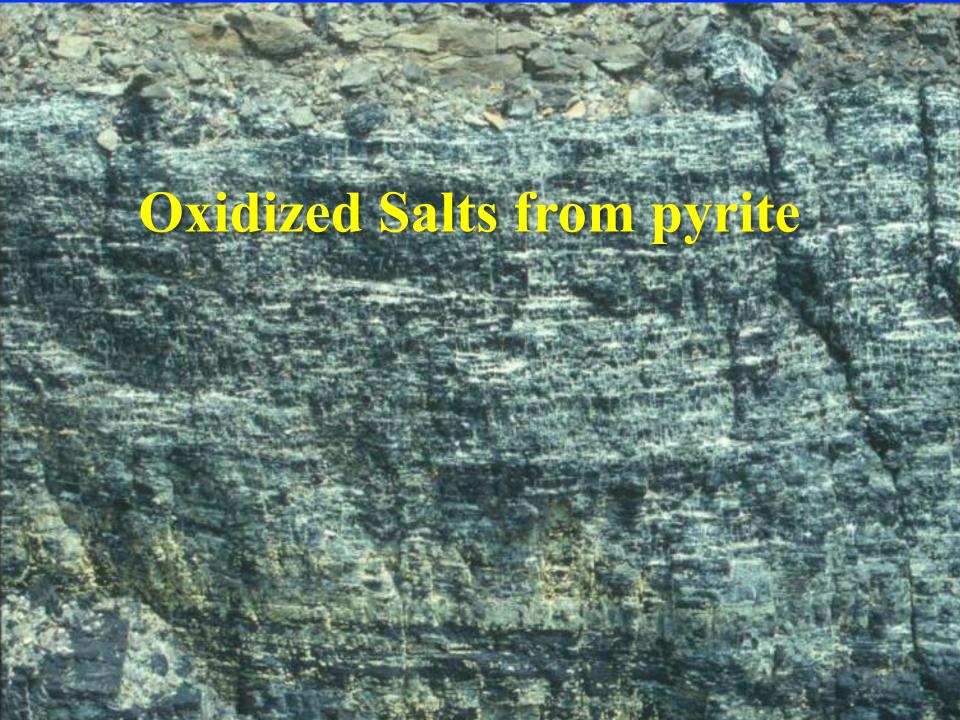


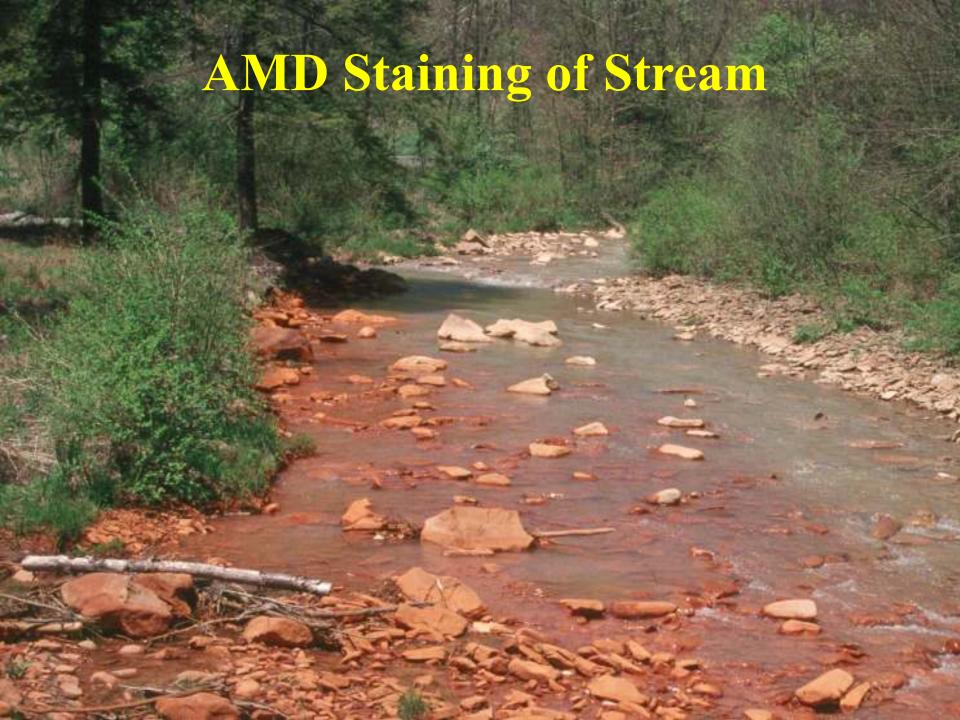


Pyrite Oxidation and Hydrolysis 4 FeS₂ + 15 O₂ + 14 H₂O 4 Fe(OH)₃ + 8 H₂SO₄ Sulfuric Acid **Yellow Boy**

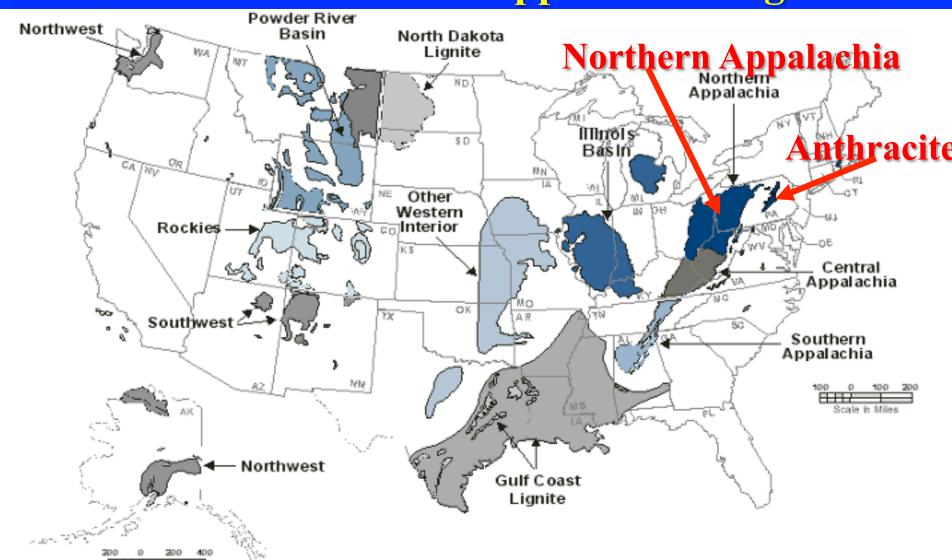


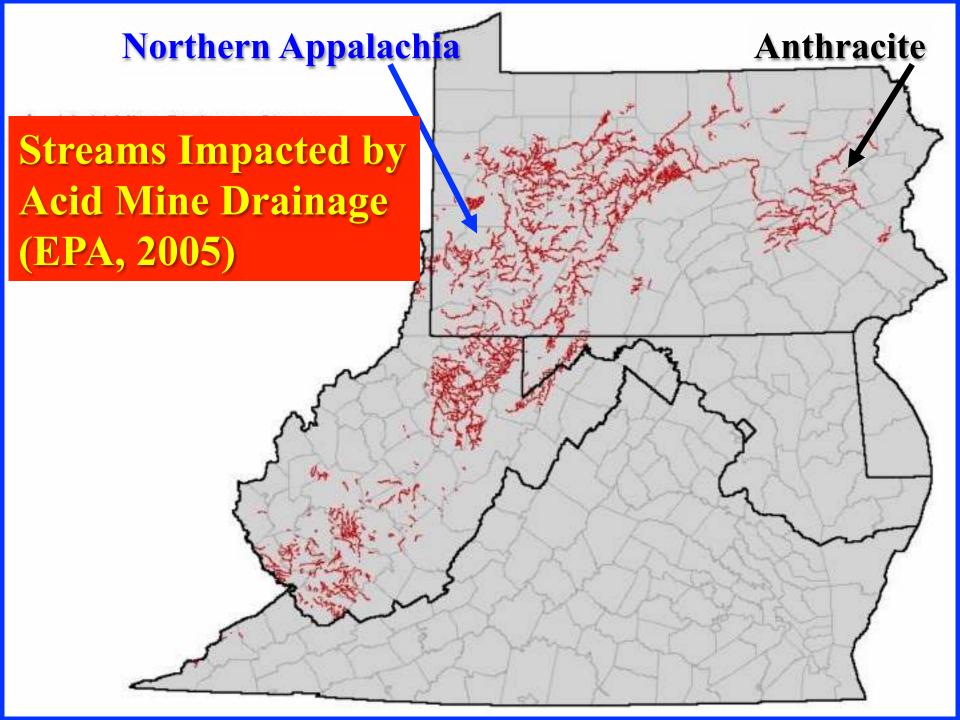


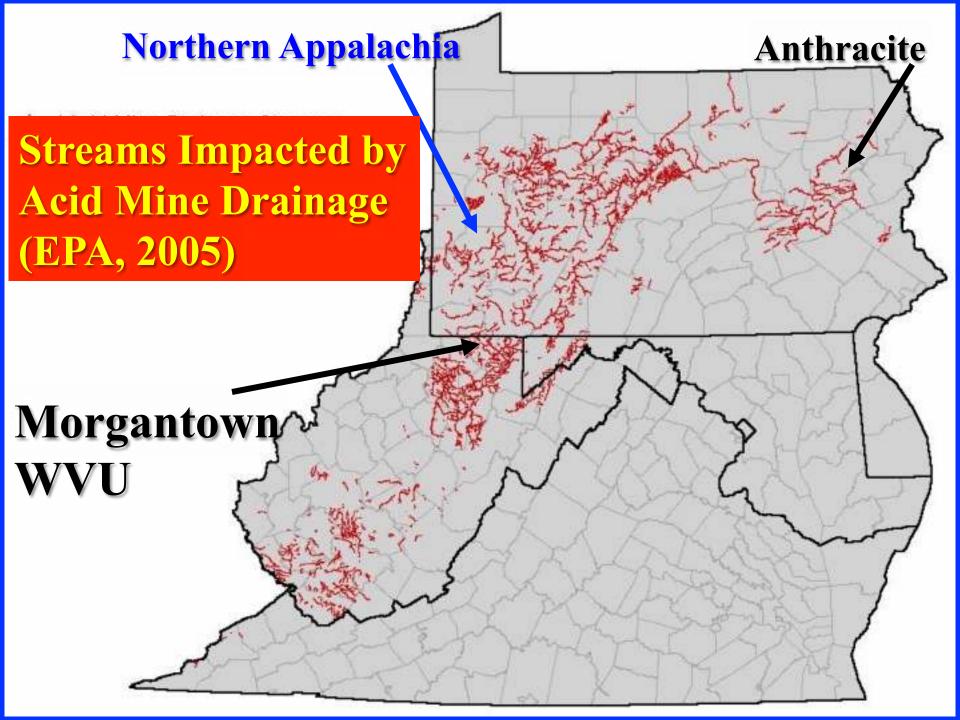


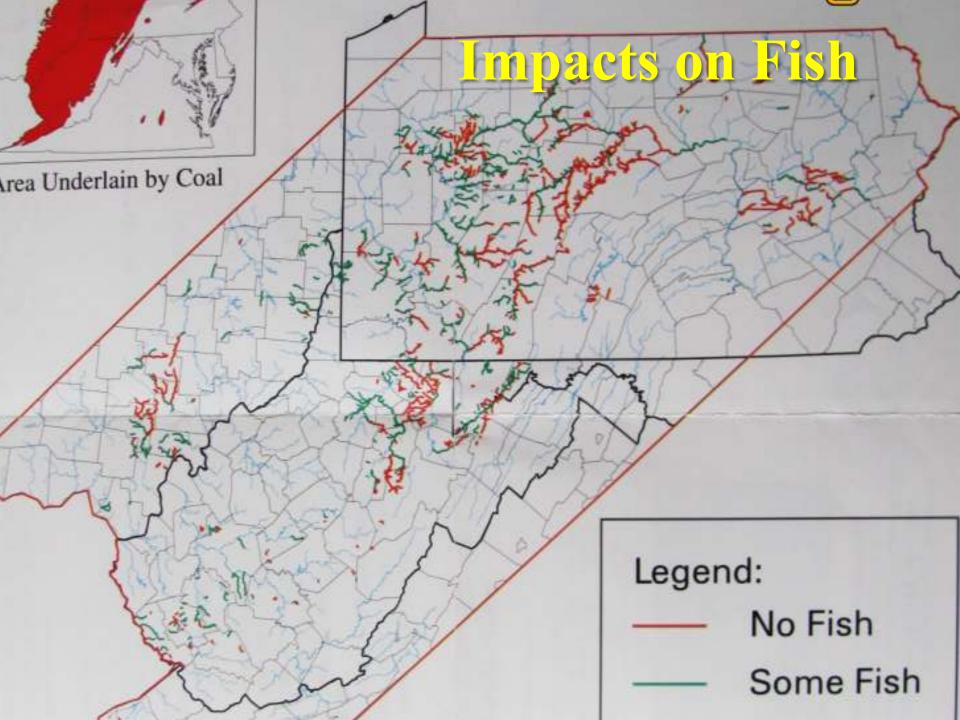


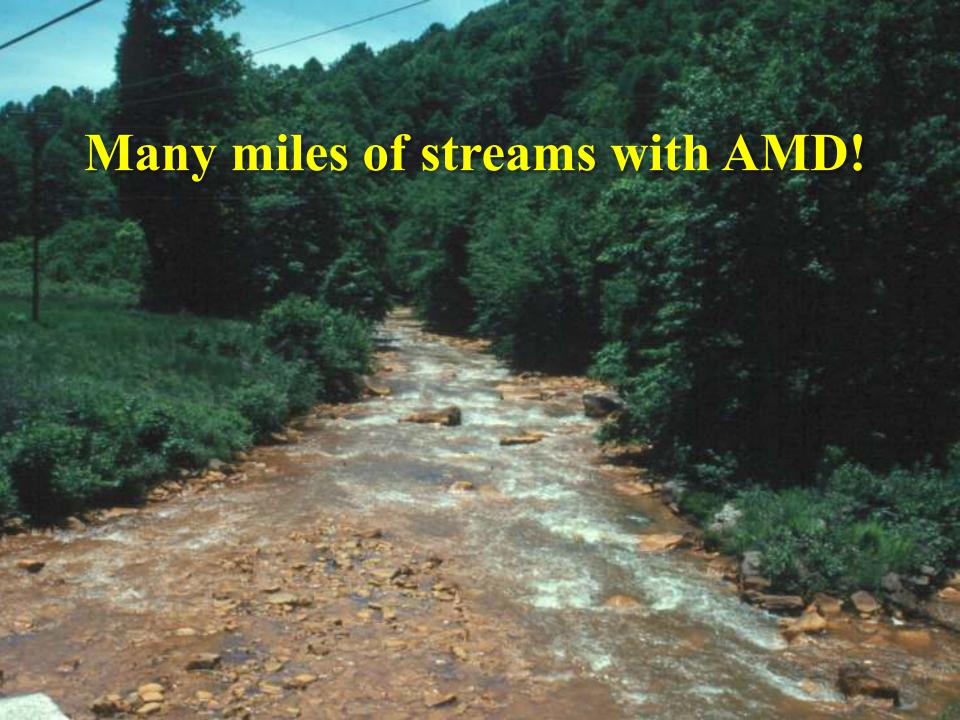
While many areas in the USA have mine drainage, the most severe areas are in the...
Anthracite and Northern Appalachian regions.







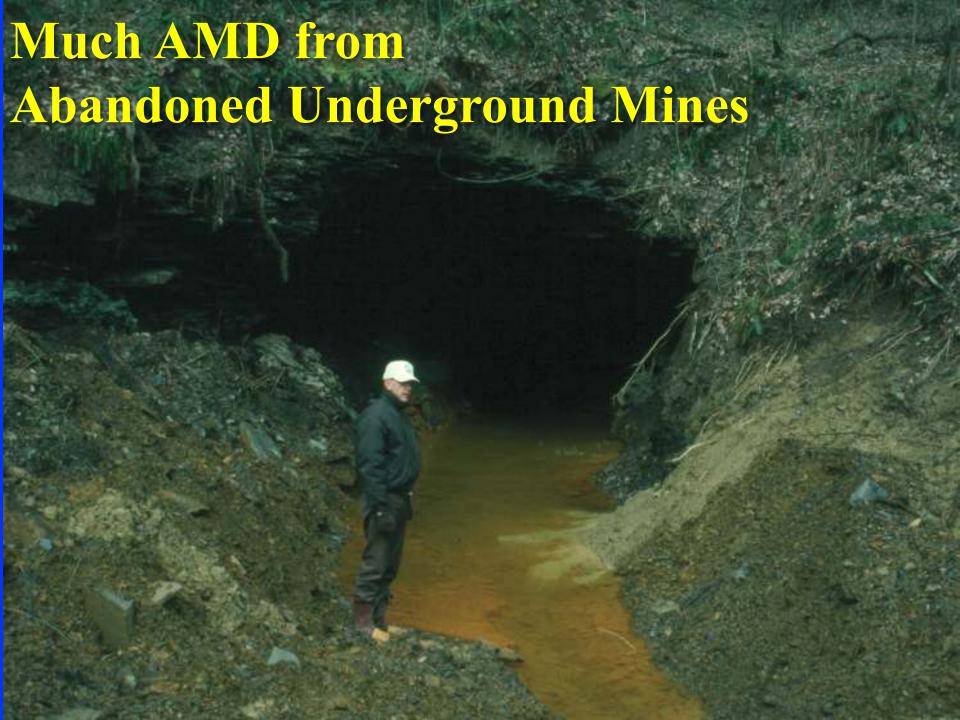


























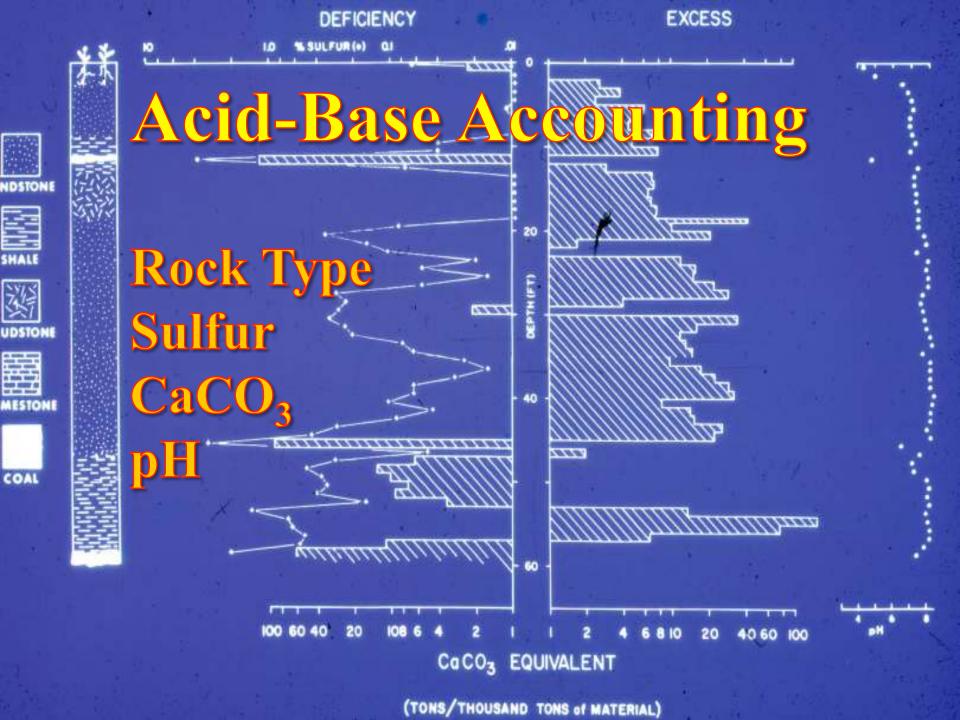












Describes

Sections of Highwall

and

Chemistry of Rocks







PREDICTION OF WATER QUALITY AT SURFACE COAL MINES





Prepared by Members of the Prediction Workgroup
of the
Acid Drainage Technology Initiative (ADTI)



	8.5
	8.0
A Review of Procedures for Surface Mining and	7.0
Reclamation in Areas with Acid-Producing Materials	6.5
	6.0
	5.5
	5.0
	4.5

AMD CONTROL

- Overburden Analysis
- Handling and Placement
- Postmining Hydrology









TYPES OF REMEDIES

- Active Treatment
- Passive Treatment
- Mechanical Treatment



Break down slopes, grade and topsoil































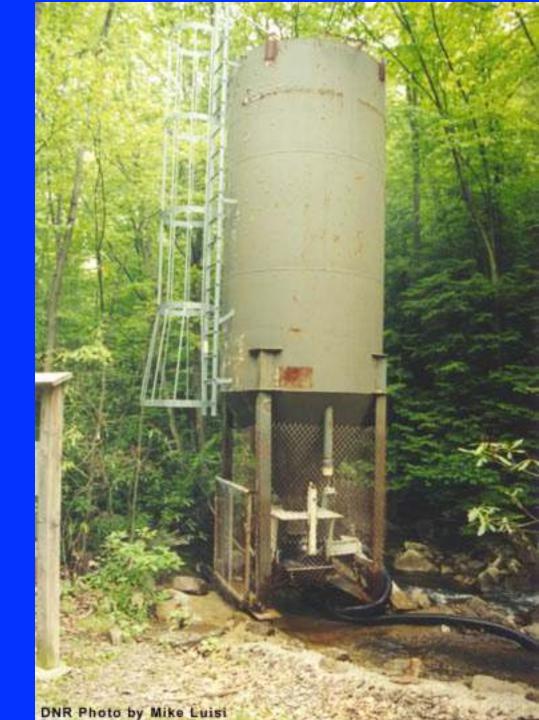
AMD Treatment Plant at Mettiki



High Density Sludge Thickeners

Lime Doser

EPA - CO



















NORTHERN WEST VIRGINIA WATER TREATMENT FACILITY

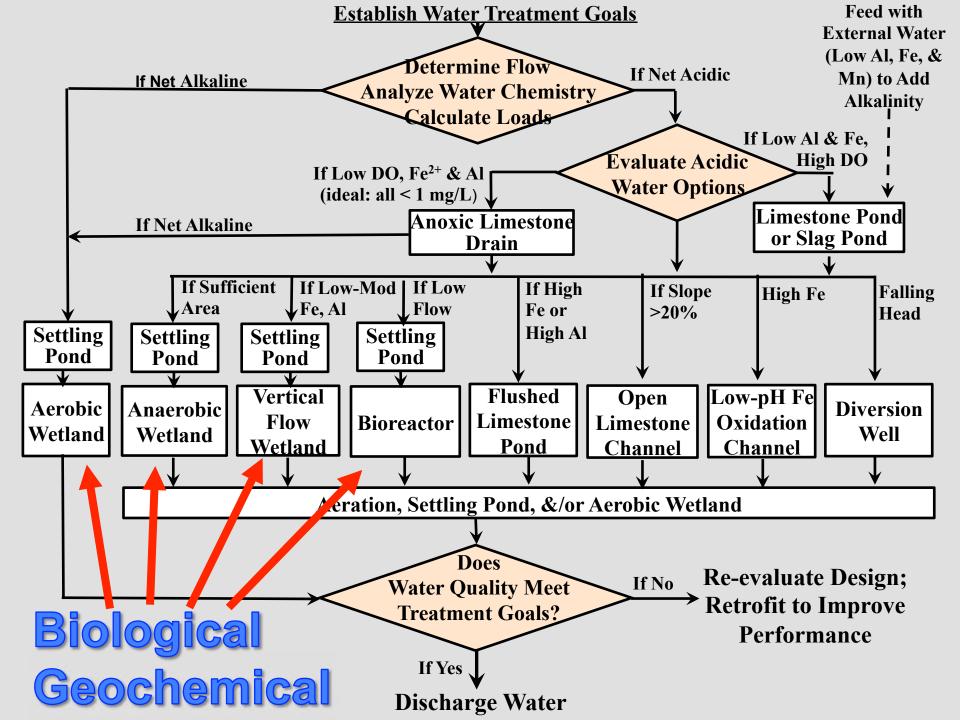


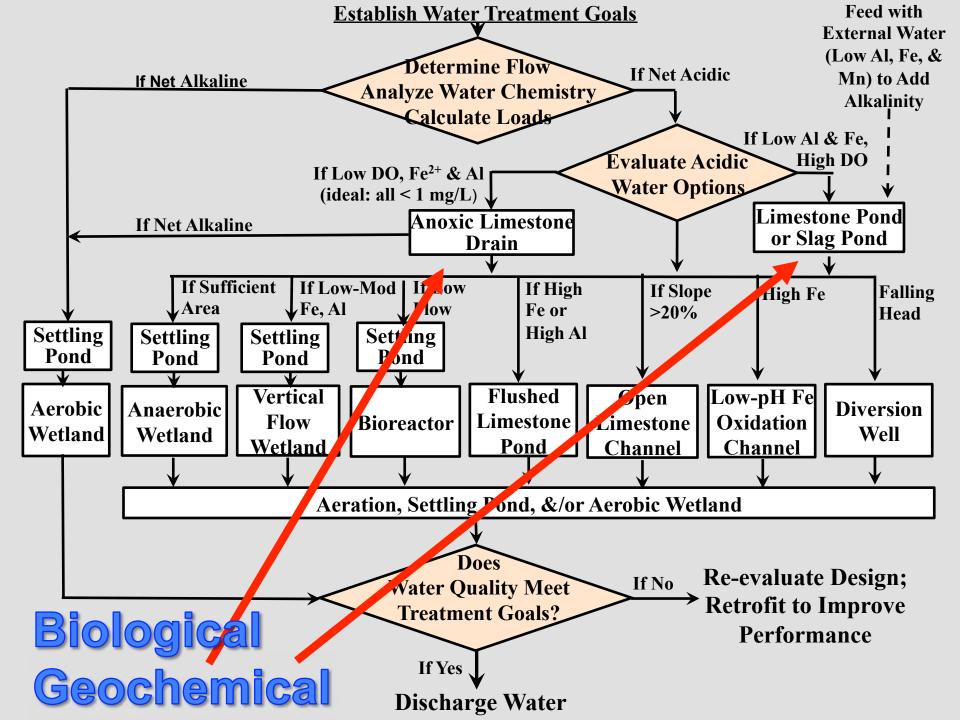


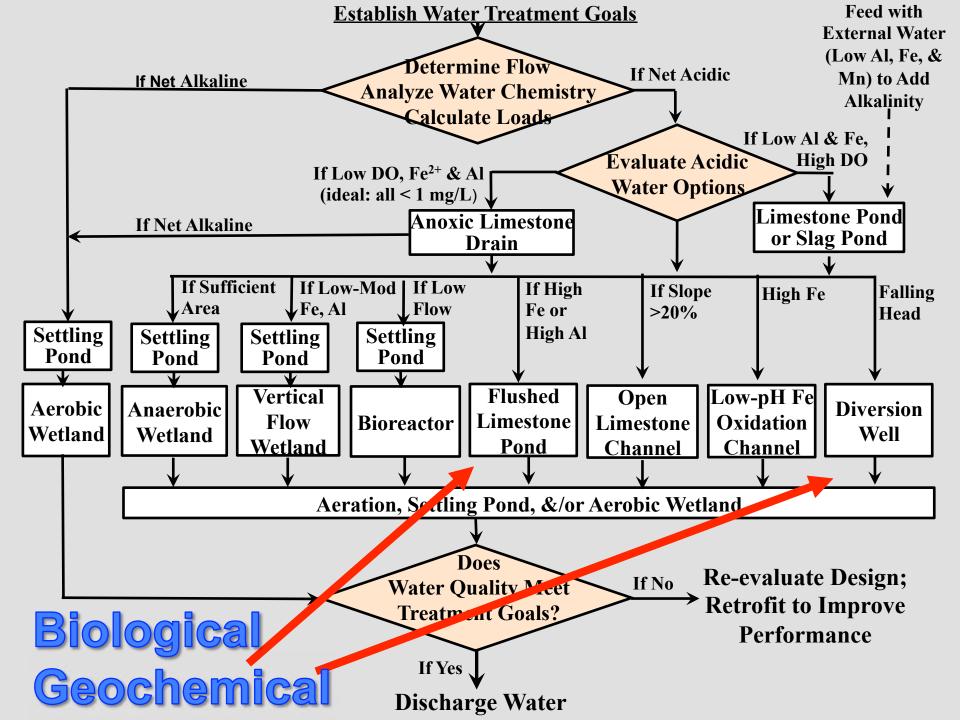


Passive Treatment Systems

Aerobic Wetlands Anaerobic Wetlands Vertical Flow Wetlands **Anoxic Limestone Drains Open Limestone Channels** Alkaline Leach Beds **Diversion Wells** Limestone Sand



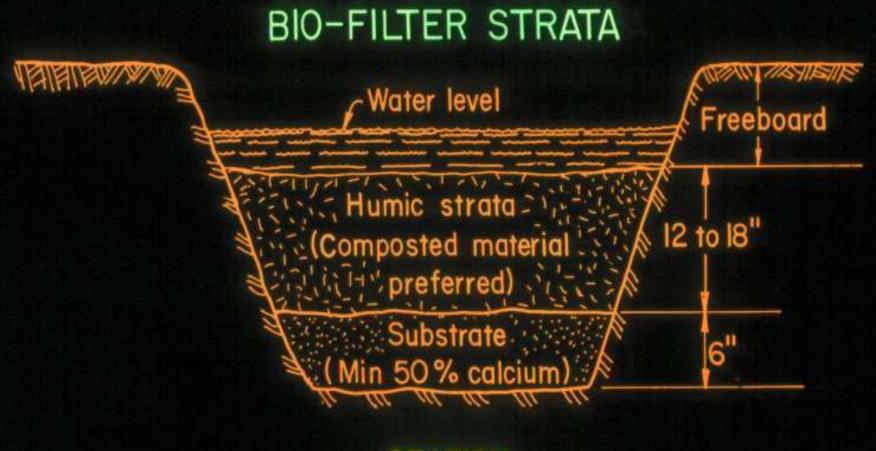






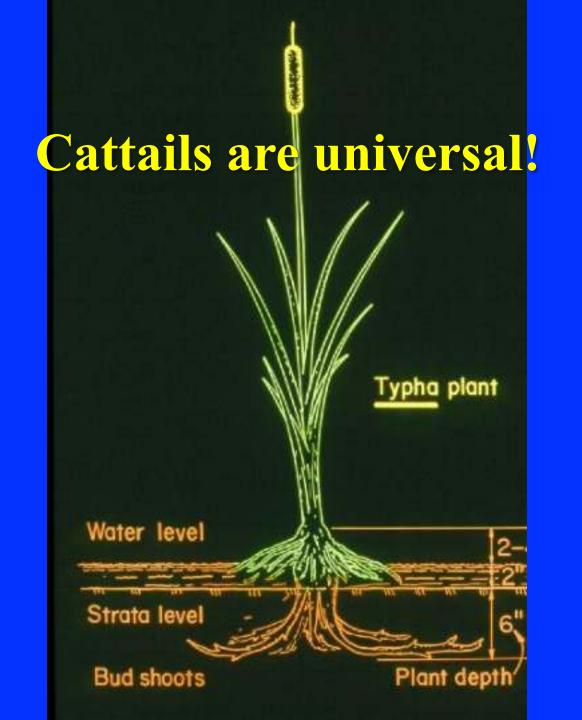


Anaerobic Wetland Substrate Design



SECTION

Lots of different recipes for the substrate











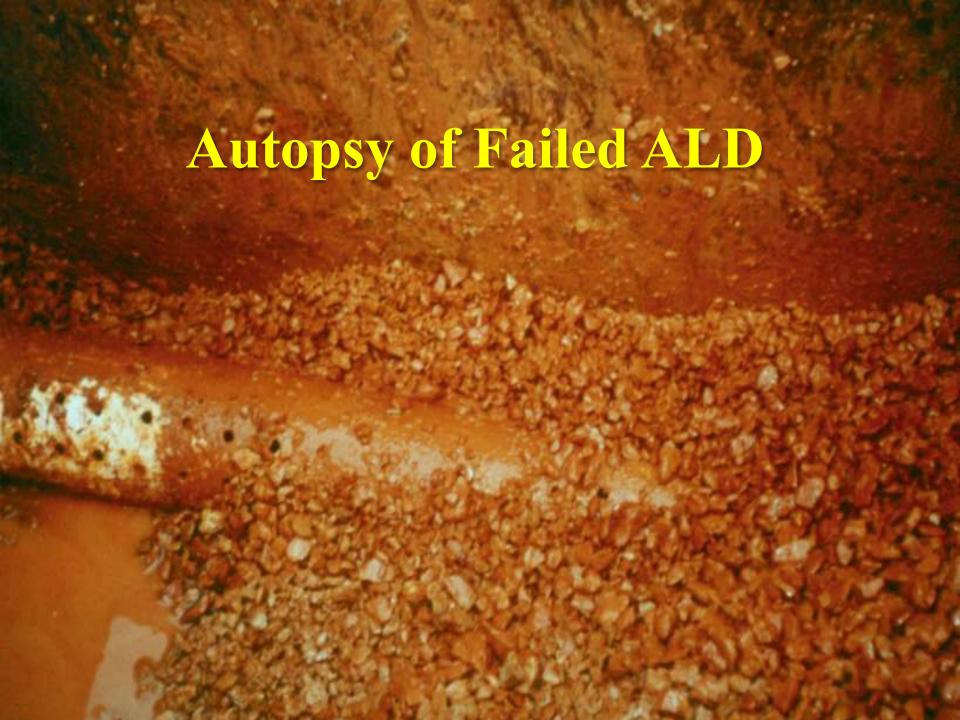














Pipes and Drainage Systems!













Selenium Bioreactor





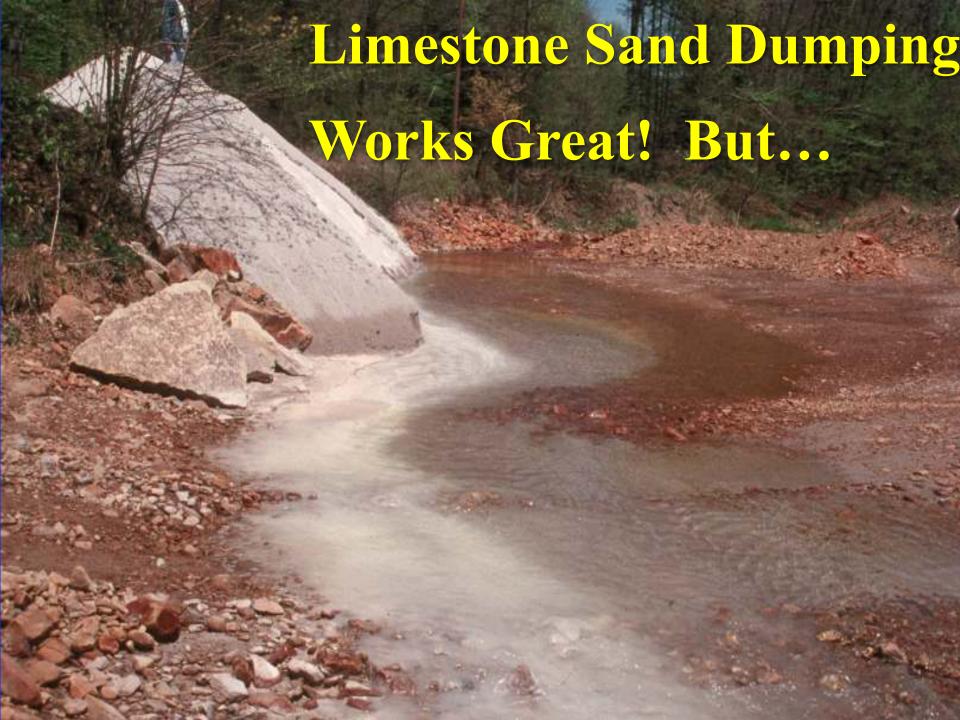
Limestone Diversion Wells

water power & churning















Steel slag Ponds

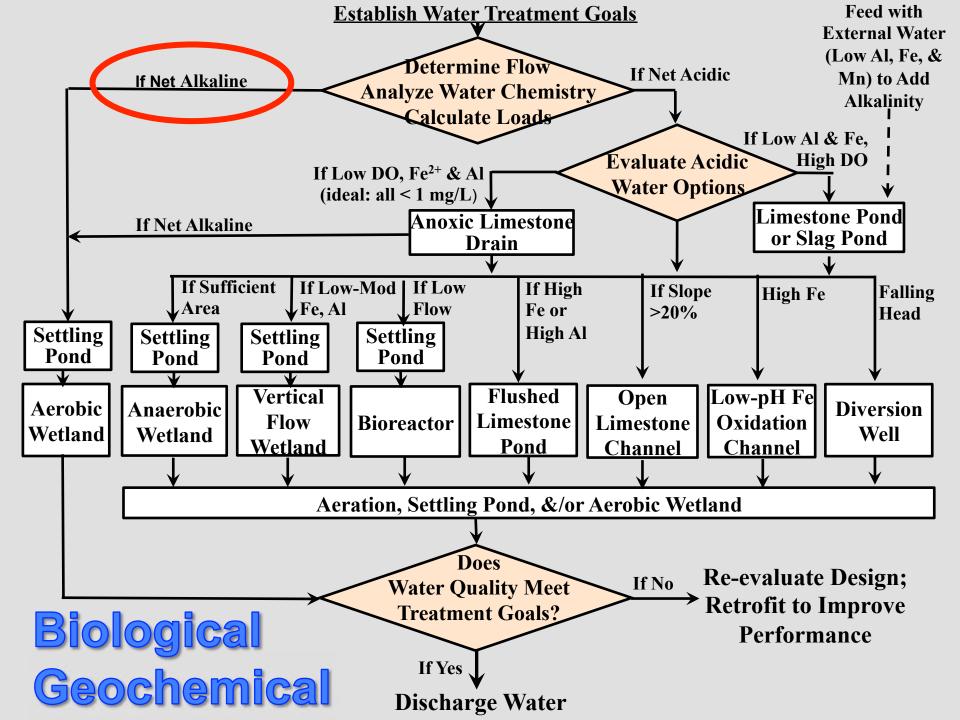


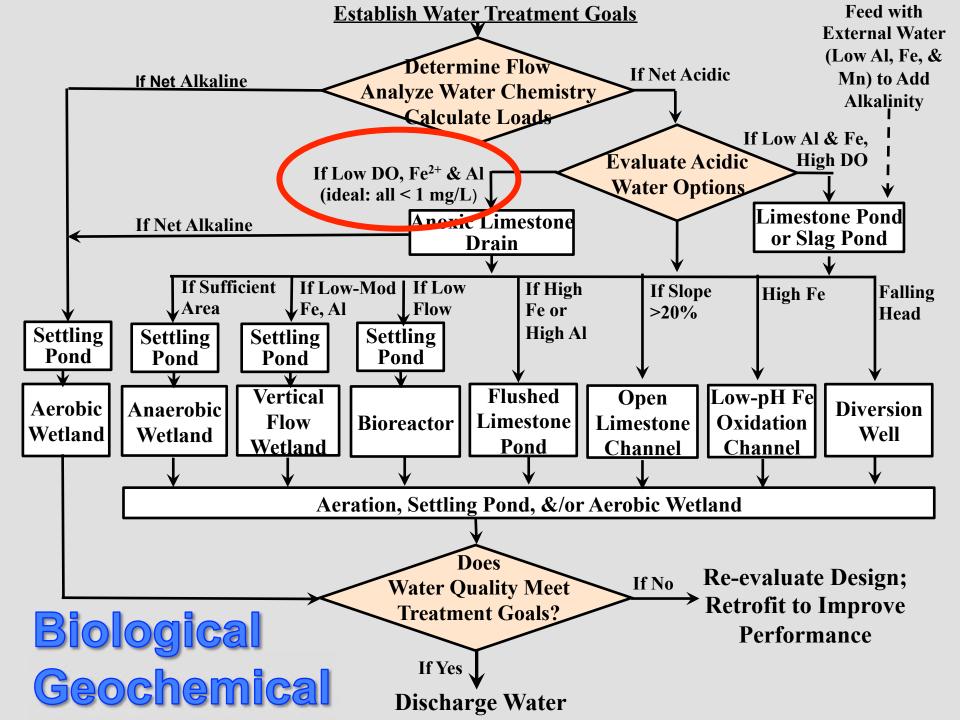
- Steel slag = calcium aluminosilicate oxides
- Source is Mingo
 Junction OH, steel mill

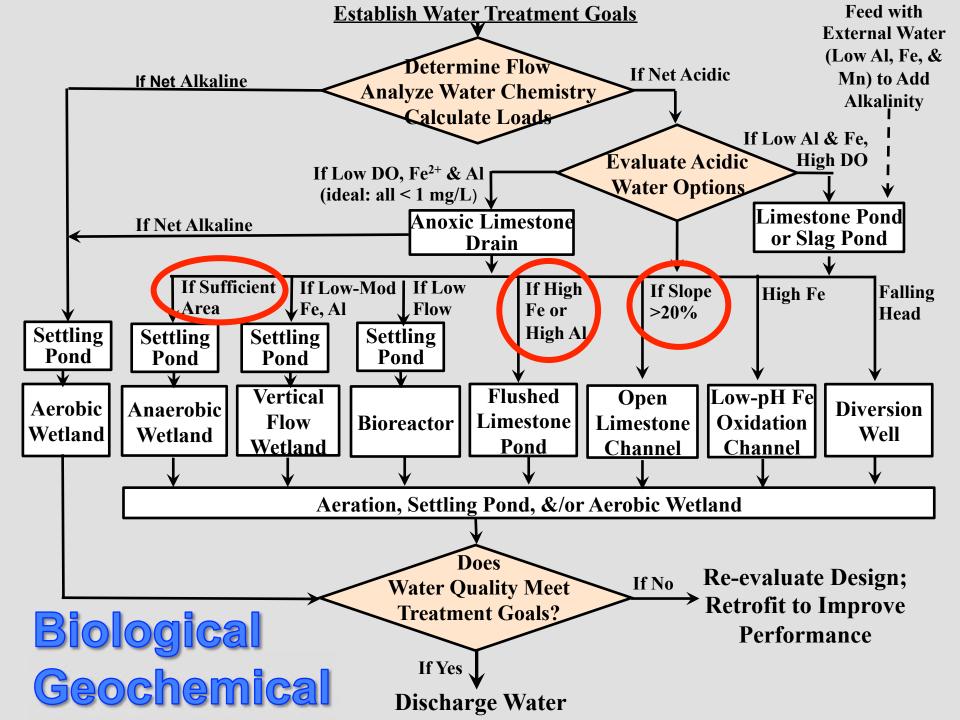




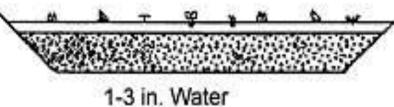






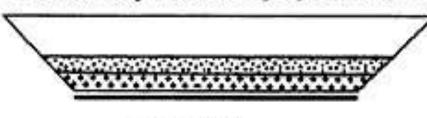


A. Aerobic Wetlands



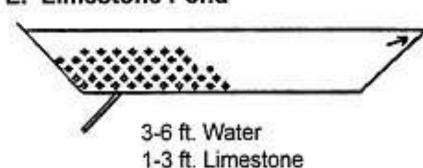
1-3 ft. Organic Matter

C. Alkalinity Producing Systems (APS)

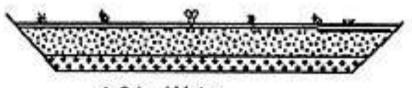


3-6 ft. Water 6-12 in. Organic Matter 1-2 ft. Limestone Drainage System

E. Limestone Pond



B. Anaerobic Wetlands



1-3 in. Water 1-2 ft. Organic Matter .5- 1 ft. Limestone

1 TOTAL STATE STATE STATES STATES

D. Anoxic Limestone Drains (ALD)

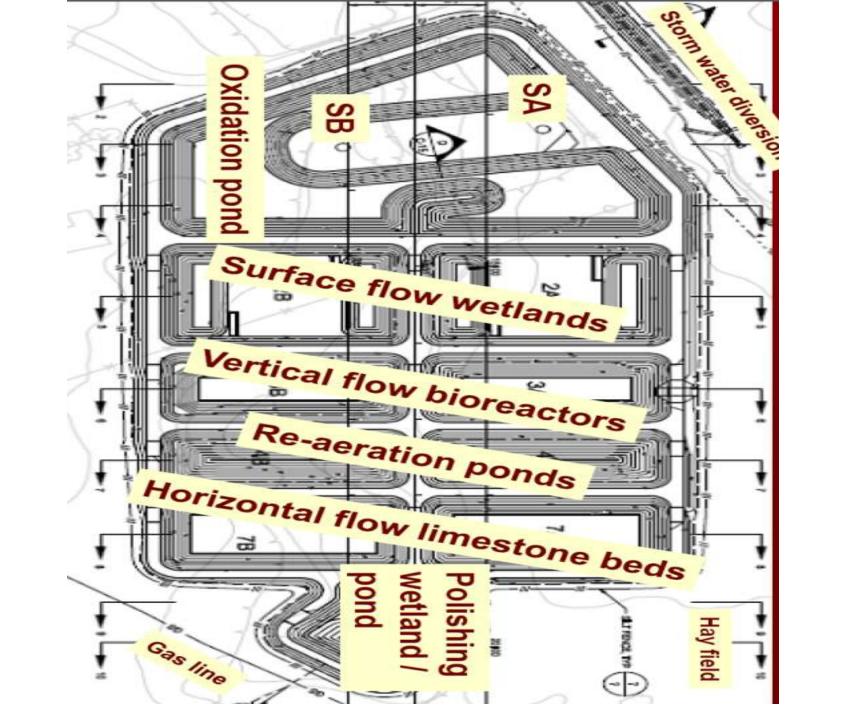


2-4 ft. Soil 20-40 mil Plastic Liner surrounding or covering LS Trench or bed of Limestone

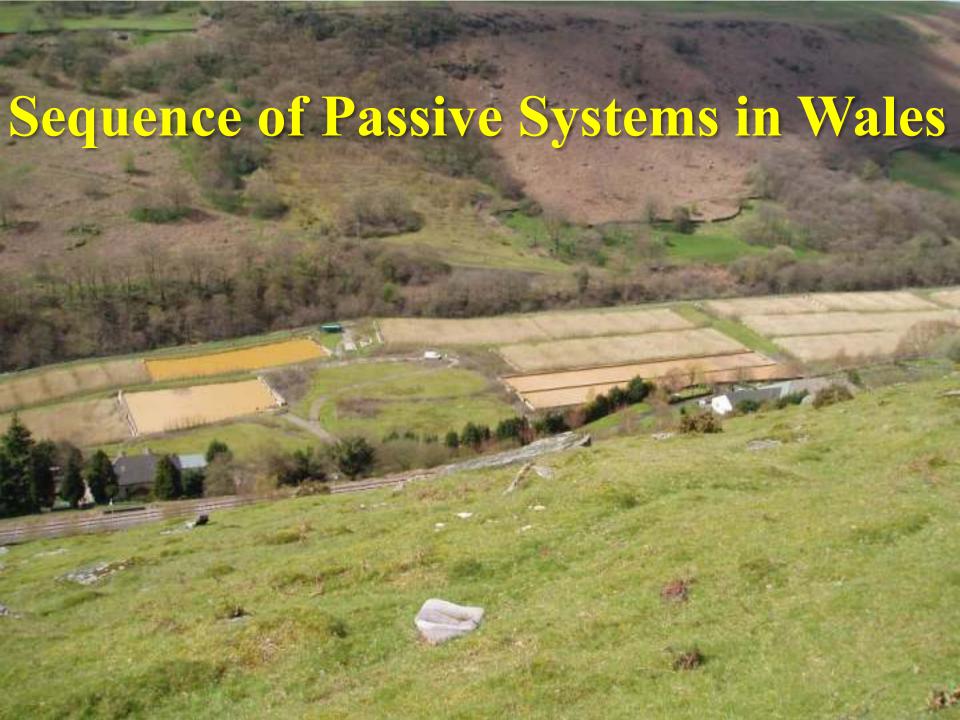
F. Open Limestone Channel (OPC)



Small or large sized Limestone placed along sides and in bottom of culverts, diversions, ditches, or stream channels.







Tab-Simco AMD Passive Treatment System



Wingfield Pines System October 19, 2009

Photo provided by PADEP Bureau of Abandoned Mine Reclamation



Bob Hedin

System Type

Design Factor

Aerobic wetland 10 g Fe m⁻² d-1

Anaerobic wetland 3 g acidity m⁻² d⁻¹ 10 g Fe m⁻² d⁻¹

Vert Flow Wetland 35 g acidity m²/₂dt¹

System Type Anoxic LS Drain

Design Factor 15 hr residence time 50 g acidity ton-1 d-1

Open LS Channel Load and Retention

Limestone Pond

2 hr residence time

Steel-Slag Pond

1,000 g acidity ton-1 d-1

Limestone Sand

2x Acid Load



