



Recovery of Rare Earth Elements (REEs) from Coal Mine Drainage: FE0026927

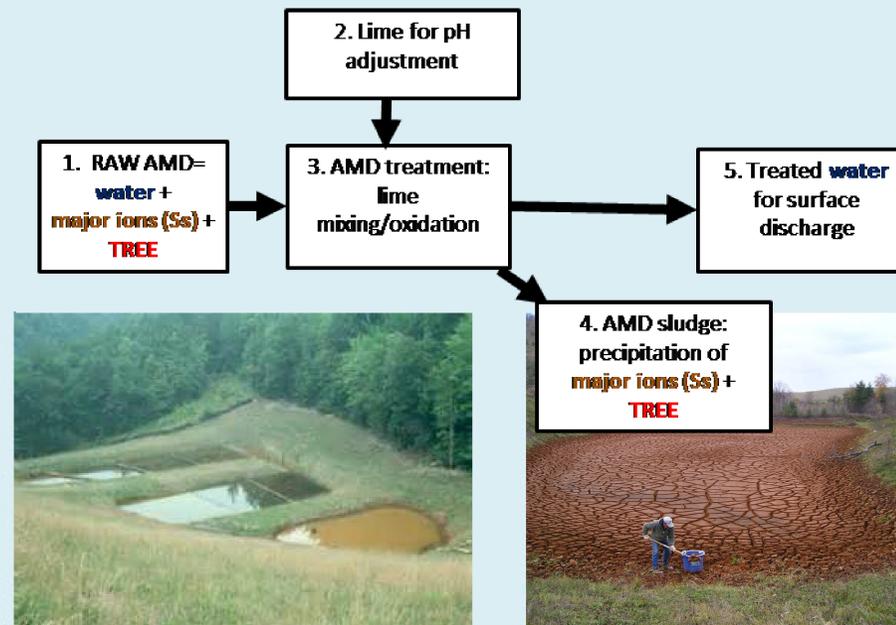
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- Xingbo Liu, Mechanical Engineering Dept.
- Aaron Noble, Mining Engineering Dept.
- Tom He, Water Research Institute

- Consol Energy, Inc.
- Mepeco Inc.
- Rosebud Mining Co.
- WV Dept of Environmental Protection

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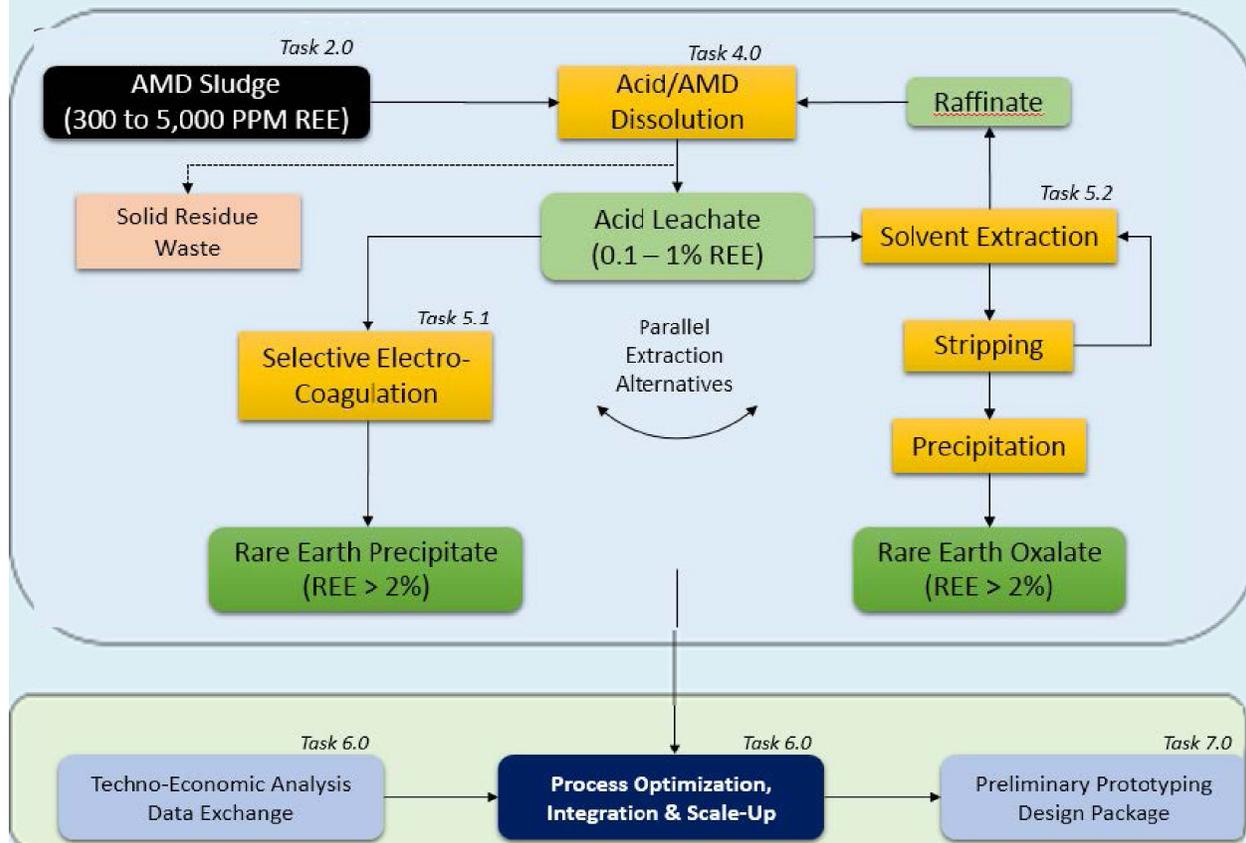
Acid Mine Drainage Treatment



Rosebud Mining:
McVillie Refuse
Freeport PA

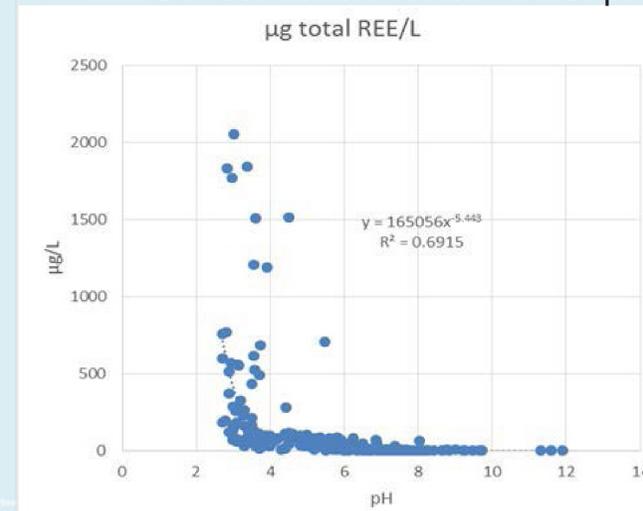


Conceptual Process Flowsheet



Acid Mine Drainage:

TREE Concentration vs. raw water pH



Steele Shaft sludge dissolved in H₂SO₄, pH 1



Geotubes for Sludge dewatering



Upgrading targets: Goal=2% TREE

TREE		req'd conc. factor to 2%
mg/kg	%	
20,000	2.00%	1
10,000	1.00%	2
5,000	0.50%	4
2,563	0.26%	8
1,282	0.13%	16
714	0.07%	28
357	0.04%	56
152	0.02%	132
76	0.01%	263

Average top 15 PA AMD sites (estimated)

DLM sludge (actual)

Sago sludge (actual)

