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Rare Earth Occurrence in Acid Mine Drainage Precipitates: Northern and Central Appalachian Coal Basins

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Summary Statement

Appalachian basin acid mine drainage (AMD) leaches rare earth elements (REEs) from coal and associated shales. REEs precipitate along a pH gradient nearly identical to Fe^{+3}, the most commonly found metal hydroxide in Appalachian AMD. Conventional AMD treatment systems precipitate metal sludges concentrating REEs nearly 1,500***X***. This project focuses on the commercialization potential the recovery and refinement of REEs from AMD sludges.

Objectives

- Determine if Appalachian AMD provides sufficient quality and quantity to support an REE production industry.
- Characterize in-situ reserves and annual production rates of AMD sourced REEs in the northern and central portions of the Appalachian coal basin (NAPP and CAPP, respectively).
- Justify investment of a commercial enterprise to extract and refine REEs in the Appalachian basin.

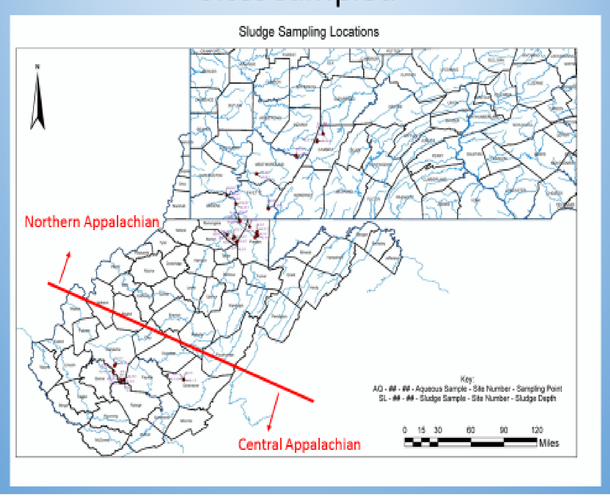
Activities

- Collect 750 aqueous and non-aqueous samples throughout NAPP and CAPP
- Analyze REE and major ion concentrations in AMD
- Conduct leaching characterization tests
- Evaluate extraction variability in solid (sludge) samples
- Identify optimal sludge drying options

Site Selection Criteria

1. Untreated AMD with a pH value less than 5
2. Caustic or anhydrous ammonia based AMD treatment process
3. Measurable discharge volume
4. Operator/owner approval and physical access to site
5. Sludge management plan

Sites sampled



Typical sampling site: WVDEP/OSR-Omega