DE-FE0031524: *At-source Recovery of Rare Earth Elements from Coal Mine Drainage*

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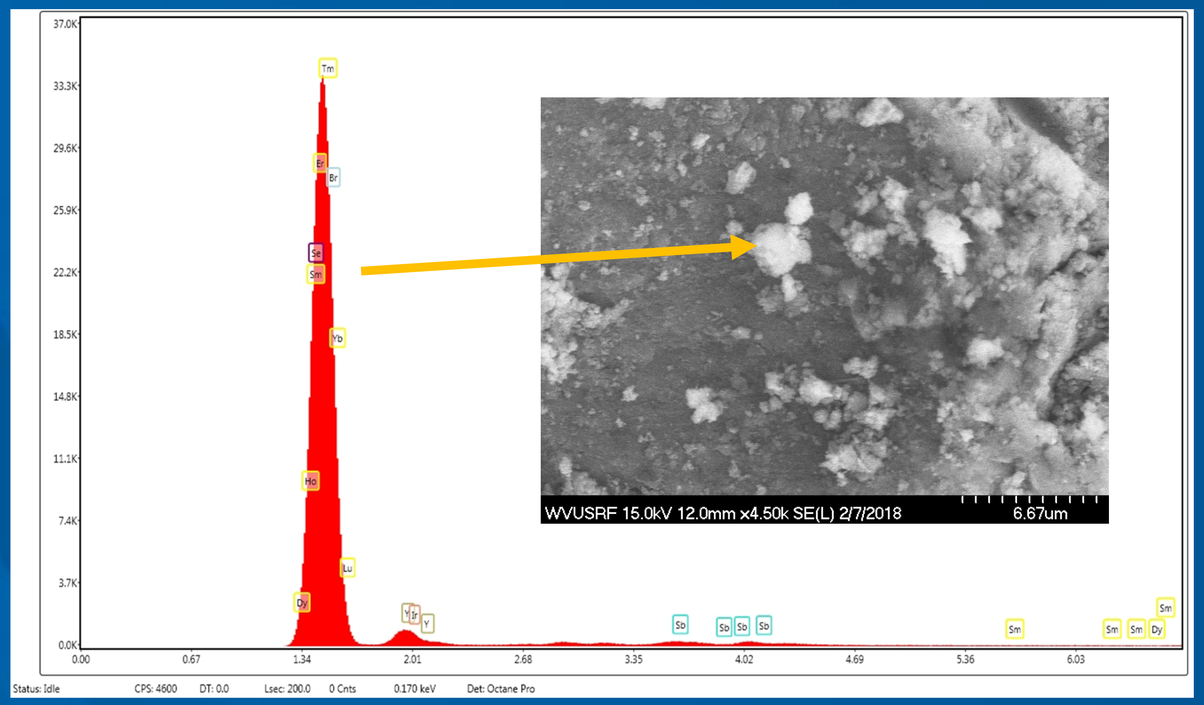
Objective: Direct extract and purify rare earth elements (REEs) from mine drainage to concentrations > 90%.

- Case A: REE extraction from low pH mine water

- pH adjustment between 2.5 and 4.5
- Major ions include Fe, Al, Mn, SO4, Ca, Mg
- ~50% of Fe is Fe^{3+}
- High purity co-precipitation on FeOOH surfaces



- Case B: REE extraction from net alkaline mine water

- Co-precipitation of lanthanides with FeOOH.
- Preliminary results are promising.
- Initial solutions contain 300 ppm Fe(II) + ~1 ppm La or Y.
- Control redox, pH
- >98% of La and Y co-precipitate with FeOOH.
- Separation and dissolution of FeOOH yields >10-fold increase in lanthanide concentration.

Project Deliverables:

- Systems evaluation
  - Model: gangue and REE separation
  - Batch tests: laboratory validation testing
  - Pilot tests: ALSX bench-scale testing
- Techno-Economic Analysis (TEA)

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