EXTRACTING RARE EARTH ELEMENTS AFFORDABLY AND EFFICIENTLY

Creating an economically competitive domestic supply of crucial Rare Earth Element (REE) materials

RESPONSIBILE, COST-COMPETITIVE TECHNOLOGY



NETL researchers have extracted REEs from coal and underclays with a minimally invasive technique.

These extremely mild solvents have been tailored to only extract easily accessible REEs, leaving most of the source material intact. This ultimately leads to lower costs and less material to process. **QUICK FACTS**

AWARD NUMBER FWP-1022420

PROJECT BUDGET

total award value \$2.3 million

CONTACTS

Advanced 3D characterization and identification of mineral phases enables discovery of revolutionary extraction schemes.

TARGETING WASTE PRODUCTS & SELECT COAL SEAMS

NETL geoscientists discovered underclays that have **considerable levels of ion-exchangeable REEs,** similar to those found in Chinese REE deposits.

Producing REEs from these mining waste materials represents a potential new value stream for coal mining operations.



Preliminary research has uncovered three promising Appalachian underclays containing up to ~30% of ion-exchangeable REEs. HQ PROGRAM MANAGER REGIS CONRAD

TECHNOLOGY MANAGER
MARY ANNE ALVIN

TECHNICAL PORTFOLIO LEAD THOMAS TARKA

PRINCIPAL INVESTIGATOR CIRCE VERBA



Discovering ion-exchangeable REEs could represent a breakthrough for economic extraction of REEs in coal-related strata and the reuse of coal refuse and byproducts.

REE RECOVERY FOR SECURITY & ECONOMIC PROMISE

NETL's selective extraction solutions have the potential to extract REEs using mild liquids found in nature, such as lemon juice or vinegar, minimizing potential environmental impacts. This method is selective and is **expected to reduce the amount of extraction waste, ultimately reducing cost.**

NEXT STEPS -

Leverage NETL's unique capabilities in advanced characterization, sub-surface flow modeling, and process engineering to develop innovative extraction systems. Focus will be placed on waste streams from coal preparation plants, waste coal piles, and select coal seams.



REEs, a group of 17 elements, are an integral component of many products, including smart phones, lasers, DVDs, LEDs, and computer hard drives.

Roughly 50% of goods imported into the United States contain REE, valued at approximately \$1.2 trillion dollars.

ACCOMPLISHMENTS

2018

Creating new jobs, products, and markets for coal.



