INVESTIGATION OF RARE EARTH ELEMENT EXTRACTION FROM NORTH DAKOTA COAL-RELATED FEEDSTOCKS

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Goals and Objectives

Goal:
- To develop a high performance, economically viable, and environmentally benign technology to recover rare earth elements from North Dakota lignite coal, associated sediments, and a lignite drying system reject stream.

Objectives:
- Determine the abundance and forms of rare earth elements in lignite, associated roof and floor materials, and coal drying reject streams,
- Determine the potential to concentrate REEs through traditional and augmented physical beneficiation methods.
- Identify the optimum methods to separate and concentrate the REEs to 2 percent by weight,
- Perform a technical and economic analysis of the optimum concentrating scheme,
- Conduct lab-scale test work to validate the separation methodology selected.
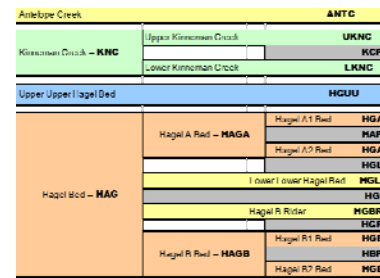
Workplan

Task 1.0 – Project Management and Planning
Task 2.0 – Sampling and Characterization of Proposed Feedstocks
Task 3.0 - Technical and Economic Feasibility
Task 4.0 – Laboratory-scale Testing for Determination of Bench-scale Design Parameters
Task 5.0 – Bench-scale System Design
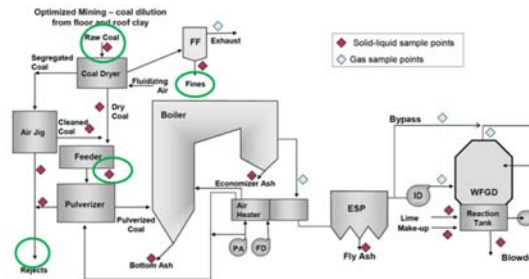Task 6.0 – Final Report

Sampling

- Mine Sampling - Lignite coal, roof, parting and floor materials from the Falkirk mine.
- Plant Sampling: GRE DryFining™ inlet coal, air jig outlet, feeder outlet and fabric filter fines from the Coal Creek station.
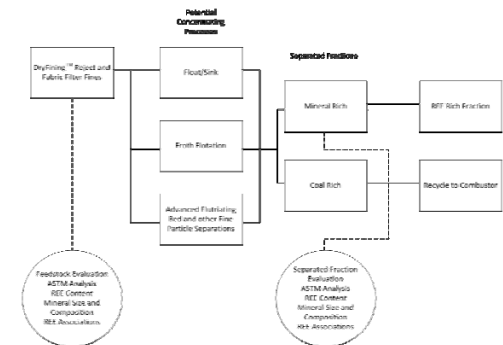
Sampling

Falkirk Mine Sampling

Coal Creek Station Sampling

Characterization

Separation and Concentration

Technical and Economic Analysis

Develop several potential processing schemes for concentrating REEs from the chosen feedstock(s), followed by process modeling and technical and economic evaluation.

Bench-scale System Design

- Basis of the bench-scale design will be the process flow diagrams for a commercial scale facility, with a scaled-down throughput of 5-10 kg/hr of the proposed feedstock.

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