LRC-C (100) B: “Amendment to Rare Earth Element Extraction and Concentration at Pilot-Scale from ND Coal-Related Feedstocks. (Amendment to FY20-XC-221)”

Submitted by: Institute for Energy Studies, UND

Principal Investigator: Nolan Theaker

Request: $175,000 in new funding is being requested. In addition to the originally awarded $900,000 totals $1,075,000; Total Project Costs: Amendment $650,000. Original total $6,508,555. Combined total $7,158,555.

Project Duration: Change to 42 months from original 30 months.

Description of the Project:

The University of North Dakota (UND), in collaboration with Microbeam Technologies Inc. (MTI), Barr Engineering Co., Rare Earth Salts (RES) and MLJ Consulting continue to demonstrate novel technology for rare earth element recovery from North Dakota lignite coal feedstocks. The objectives of this project include: 1) Confirm coal seams found within active North Dakota mines have elevated REE content and collect a large sample (300-500 tons) for further processing, 2) Design and construct a pilot-scale facility for REE extraction and concentration with at least 0.25 tons/hr coal feed, 3) Determine optimal operating conditions using existing bench-scale equipment and utilize these optimized parameters to process at least 100 tons of high REE coal, and 4), verify REE product quality with downstream REE refiners (RES) and reduce potential costs and time-to-market associated with coal-related REE materials. The expected technical and economic impacts are the following: 1) Develop a low-cost, environmentally friendly REE concentrate from North Dakota lignite feedstocks, 2) Verify scalability of the process proven at the bench scale and develop a baseline for future commercial demonstration, and 3) Perform rigorous economic modeling equivalent to a preliminary Front End Engineering Design for evaluation of the technology at a potential commercial demonstration site. The request is for adjusting the budget and schedule as noted above.

Technical Advisor’s Recommendation:

Fund - The REE opportunity addresses new value-added uses for lignite and the project is a strong leveraging of NDIC / Lignite Research Program funding. One reviewer recommended funding and two recommended funding be considered, with an average scoring of 201 out of 250. Based on industry, State, and Federal interest in this REE opportunity, the fit within our R&D priorities, and the positive project results to date, funding is recommended. The recommendation for funding also is based on consideration of the technical reviewer comments and responses to reviewer questions.

Funding would be subject to the following:

- Technical advisor continues to participate in project reviews
- Technical advisor reviews the revised project management plan with the project team including, HAZOP considerations, and work / budget schedule breakout.
- Receipt of the industry and federal matching funds

Conflicts of Interest: North American Coal, Great River Energy, Minnkota Power Cooperative, BNI Energy, Great Northern Properties