U.S. Department of Energy
Categorical Exclusion Determination Form

Proposed Action Title: Reliable Ore Characterization with Keystone Sensing -- ROCKS and ROCKS SBIR-STTR (NOFO Nos. DE-FOA-0003592 and DE-FOA-0003593)

Program or Field Office: Advanced Research Projects Agency - Energy

Location(s) (City/County/State): California, Illinois, Maryland, South Carolina, Texas

Proposed Action Description:

The Reliable Ore Characterization with Keystone Sensing (ROCKS) program supports small-scale research and development projects to advance cutting-edge technologies in drilling, sensing, and analytical technologies to enable rapid, high-resolution, and cost-effective assessment of rare earth elements (REE) in ore deposits. Specifically, projects will focus on three main categories: (1) drilling technology to increase penetration rates and core recovery; (2) sensing and analysis technologies to provide higher-resolution mineralogical and geochemical information in situ or at a distance; and (3) other unique concepts that disrupt the current state of REE characterization. If successful, ROCKS projects would reduce the time and cost to characterize REE orebodies, increasing long-term access to REEs and critical minerals needed to power U.S. energy, technology, and defense, thereby increasing U.S. mineral and energy security.
The ROCKS Program is composed of 13 small-scale research and development projects that will be conducted by universities, large and small businesses, and national laboratories. This Determination covers 4 of the 13 projects (listed in Attachment A). These 4 projects fit within the class of actions identified under the DOE Categorical Exclusions identified below. This assessment was based on a review of the proposed scope of work and the potential environmental impacts of each project. All project tasks will be conducted in accordance with established safety and materials/waste management protocols and pursuant to applicable Federal, State, and Local regulatory requirements. KoBold Metals Company has not identified all field site locations nor obtained associated permits and is prohibited from commencing project work until those locations are identified and permits are obtained. Per the terms of the award, identification of the field sites, obtaining all necessary permits and authorizations, and if necessary, an amended NEPA Determination, are required prior to the conduct of applicable project work.

Categorical Exclusion(s) Applied:

B3.6 - Small-scale research and development, laboratory operations, and pilot projects

B3.15 – Small-scale indoor research and development projects using nanoscale materials

B3.1 – Site characterization and environmental monitoring

For the DOE procedures regarding categorical exclusions, including the full text of each categorical exclusion, see 10 CFR 1021.102 and Appendix B to 10 CFR Part 1021, and also Section 5.4 (Applying one or more categorical exclusions to a proposal) and Appendices B and C of DOE's National Environmental Policy Act Implementing Procedures (June 30, 2025).

Requirements and guidance in 10 CFR 1021.102 and DOE's NEPA Implementing Procedures: (See full text in regulation and in Implementing Procedures)

☑ The proposal fits within a class of actions that is listed in Appendix B to 10 CFR Part 1021 or Appendix B and C of DOE's NEPA Implementing Procedures (June 30, 2025).

To fit within the classes of actions listed in Appendix B to 10 CFR Part 1021, or Appendix B of DOE's NEPA Implementing Procedures, a proposal must satisfy the conditions that are integral elements of the classes of actions in Appendix B of both 10 CFR Part 1021 and DOE's NEPA Implementing Procedures.

☑ There are no extraordinary circumstances related to the proposal that may affect the significance of the environmental effects of the proposal. DOE or an applicant may modify the proposal to avoid reasonably foreseeable adverse significant effects such that the categorical exclusion would apply.

☑ The proposal has not been segmented to meet the definition of a categorical exclusion.

[Note: For proposals that fit within the categorical exclusions listed in Appendix C of DOE's NEPA Implementing Procedures, see DOE's notice of adoption for the subject Appendix C categorical exclusion for additional considerations. DOE notices of adoption for other agency categorical exclusions may be found on DOE's Section 109 webpage.]

Based on my review of the proposed action, as NEPA Compliance Officer, I have determined that the proposed action fits within the specified class(es) of action, the other requirements and guidance set forth above are met, and the proposed action is hereby categorically excluded from further NEPA review.

NEPA Compliance Officer: GEOFFREY GOODE
Digitally signed by GEOFFREY GOODE
Date: 2026.06.22 12:54:54 -04'00'

Date Determined:

This form will be locked for editing upon signature.

Attachment A: Projects in the ROCKS (NOFO Nos. DE-FOA-0003592 and DE-FOA-0003593) Program

Prime Recipient (Control No.)	Project Title	Project Description	Categorical Exclusion
University of California, Los Angeles (3592-1619)	High-Throughput Terahertz Time-Domain Spectroscopy for Rare Earth Element Sensing	The project team aims to develop a compact, field-ready terahertz time-domain spectroscopy (THz-TDS) platform that enables rapid, non-destructive detection and quantification of rare earth elements (REE) during exploration, drilling, and processing. The team will build a high-throughput THz-TDS scanner that combines advanced terahertz focal-plane arrays, fiber-coupled modular design, and machine-learning analytics to generate spectroscopic maps of REE-bearing minerals at millimeter lateral and micrometer depth resolution. The project concludes with a validated, ruggedized sensing tool, comprehensive datasets, and integration pathways for modern drilling systems. This project is limited to bench-scale laboratory activities, with no outdoor or field-testing component, and has already obtained the required EH&S (Environmental, Health and Safety) approvals necessary for use of all the materials that it will need over the course of this project.	B3.6; B3.15
Halliburton Technology Partners LLC (3592-1639)	Real-Time In-Situ Advanced Geochemical Vectoring for Ore Body Evaluation Using Wireline Conveyed Magnetic Particle Spectroscopy Logging	Halliburton is developing a technology that enables real-time, geochemical vectoring in boreholes, aimed at dramatically accelerating and improving the evaluation of REE which is expandable to other critical mineral deposits. The project team intends to introduce ligand-functionalized magnetic nanoparticle tracers into the drilling fluid, which are designed to bind selectively to a target REE in the formation water. The project team will utilize an outward-looking magnetic particle spectroscopy sensor to detect these tracer nanoparticles' magnetic signatures and measure localized concentrations of dissolved ions in the surrounding rock, thereby inferring the presence of mineral ore tens to hundreds of meters from the wellbore by geochemical vector triangulation of the ore position from multiple wellbores. This project is limited to bench-scale laboratory activities, with no outdoor or field-testing component, and has already obtained the required EH&S (Environmental, Health and Safety) approvals necessary for use of all the materials that it will need over the course of this project.	B3.6; B3.15
Lawrence Berkeley National Laboratory (3592-1578)	Rapid, High-Resolution Ore Sensing with an Active, Multi-GeV Muon Source from a compact, Deployable, Laser-	This project focuses on the small-scale research and development of a remote mineral sensing technology using laser plasma accelerator (LPA) muons by combining two LPA accelerators in one beamline, therefore doubling the electron and muon energy. A compact, field-deployable muon source could penetrate through 50-200 meters of rock and soil, with radiography on the transmitted muon beam enabling three-	B3.6

Attachment A: Projects in the ROCKS (NOFO Nos. DE-FOA-0003592 and DE-FOA-0003593) Program

Prime Recipient (Control No.)	Project Title	Project Description	Categorical Exclusion
	Plasma Electron Accelerator	dimensional mapping of valuable ore, rare-earth elements, and other critical mineral deposits. The proposed project would turn plasma LPA technology into compact multi-stage, high-energy particle acceleration, and strengthen the mining industry with access to a deployable active muon source for penetrative probing. This project is limited to bench-scale laboratory activities, with no outdoor or field-testing component, and has already obtained the required EH&S (Environmental, Health and Safety) approvals necessary for use of all the materials that it will need over the course of this project.	
KoBold Metals Company (3592-1701)	MIDAS - Muon Imaging and Distributed Acoustic Sensing	KoBold Metals is developing a Muon Imaging and Distributed Acoustic Sensing (MIDAS) technology to reduce timelines and costs for resource characterization. MIDAS will directly map critical mineral deposits in 3D using underground sensors to measure muon absorption in dense ore combined with seismic sensors to detect sound waves reflecting off ore body boundaries. The MIDAS technology will provide 30x better resolution than conventional geophysics and accurately delineate the resource between widely-spaced drillholes. This project has bench-scale laboratory activities, and an outdoor component of field testing their MIDAS technology. KoBold metals has not obtained all necessary permits and approvals applicable to their proposed action, nor identified where the field testing will take place, and is prohibited from commencing applicable project work until those permits are obtained and field sites are identified. Per the terms of the award, identification of the field sites, a permits certification, and, if necessary, an amended NEPA Determination, are required prior to the conduct of applicable project work.	B3.6; B3.1