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): AK, AZ, CA, IL, MA, MD, NM, NV, NY, OK, SC, SD, TX, WY

Proposed Action Description:

FIFTH AMENDED PROGRAMMATIC NEPA DETERMINATION (See attached original, First, Second, Third, and Fourth Amended Determinations, dated June 22, 2026, July 7, 2026, July 29, 2026, August 25, 2026, and October 22, 2026, respectively). 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 and increase 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 Fifth Amended Determination adds 1 project to the original, First, Second, Third, and Fourth Amended Determinations (see Attachment A for all 13). All 13 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.

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

B3.16 – Research activities in aquatic environments

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: 2026.11.04 13:43:43 -05'00'

Date Determined:

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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, Berkeley (3592-1534)	**Cased-Hole Associated-Particle Dual Imager for Lithology and Logging Anomaly Correction (CADILLAC)**	**The project team will develop a next-generation borehole imaging device to support geoscience modeling by tagging individual radiation emissions and precisely mapping the interaction with the surrounding rock. The device will produce 3D images, providing geoscientists with rich information such as the slope of rock layers with fewer bore holes. 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**
Wetstone Exploration (3592-1720)	Deep-sea Exploration Efficiency Platform (DEEP)	The project team will develop a mobile subsea survey system that scans the seafloor non-invasively using an electromagnetic field that can rapidly characterize buried seafloor massive sulfide deposits at high resolution in a single pass. A novel electric cross-dipole transmitter with an array of three-axis electric dipole receivers will deliver multi-component, 3D electromagnetic subsea images of conductive sub-seafloor ore bodies with more accuracy and in less time. This project is limited to bench-scale laboratory activities, with no domestic 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
Baker Hughes Energy Transition LLC (3592-1522)	Automated Geological Appraisal Technology and Explorer System (AGATES)	The project team will develop a holistic approach to drilling for orebody appraisal by adapting existing technologies for unconventional oilfield and geothermal drilling, and augmenting them with experimental technologies for orebody appraisal. The project aims to provide new opportunities to mine rare-earth elements which are used across various economic sectors such as energy, transportation, healthcare and aerospace. Baker Hughes has not obtained all necessary permits and approvals applicable to their proposed action, and is prohibited from commencing applicable project work until those permits are obtained. Per the terms of the award, a permits certification, and, if necessary, an amended NEPA Determination, are required prior to the conduct of applicable project work.	B3.6; B3.1
University of Texas at Austin (3592-1560)	Acoustic Classification of Polymetallic Nodules	The project team will develop a hybrid sonar system to improve seafloor mining of polymetallic nodules. These nodules are crucial for meeting U.S. critical mineral demands. The project focuses on enhancing the detection, localization, and classification	B3.6, B3.16

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
	on the Deep Ocean Seabed	of these nodules on the seabed through advanced acoustic remote sensing, ultimately optimizing their recovery. The University of Texas at Austin 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 and approvals 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.	
Fieldstone Bio, Inc. (3593-1523)	Rapid In Situ Core Characterization Using Synthetic Biology	The project team will develop a new method for rapid critical mineral detection on drill cores using engineered microbes as biosensors. These microbes are designed to produce distinct colors when they sense specific metals, such as gold or rare earth elements. This allows for immediate, non-destructive metal identification. This technology aims to provide real-time geochemical information directly at drill sites, dramatically shorten timelines and reduce cost of exploration and discovery. 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
Deep Blue Geophysics, LLC (3593-1504)	V6EM: UAV-Based Vector 6-Component Electromagnetics for Critical Mineral Exploration	The project team is developing a next-generation mineral exploration system that deploys coordinated drone fleets to map subsurface geology at depths up to 1,000 meters. The technology adapts controlled-source electromagnetic methods, widely used and validated in offshore energy exploration, to the challenge of locating critical minerals on land. The system will allow for faster identification and survey times, achieve much denser spatial sampling, and can operate in terrain difficult for ground crews. The final system will be validated at three U.S. sites representing key critical mineral deposit types. Deep Blue Geophysics, LLC has not obtained all necessary permits and approvals applicable to their proposed action, nor identified where 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

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
Sandia National Laboratories (3592-1678)	Developing Downhole Mineralogy Logging Sensors to Accelerate Critical Mineral Exploration Enabled by AI Models and High-Throughput Core Data	The project team will develop downhole spectroscopy sensor techniques, including neutron-based elemental capture spectroscopy, nuclear quadrupole resonance, and electron spin resonance to directly obtain the real-time mineralogy and critical mineral potential of orebodies during drilling or well-logging, thereby accelerating mineral deposit exploration. The project will include laboratory measurements of ore samples to establish the AI-based models for the downhole sensors. 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
South Dakota School of Mines and Technology (3592-1539)	Rapid Adaptive Prescreening and Integrated Downhole Sensing for Rare Earth Elements (RAPID-REE)	The project team will combine three sensing layers: (1) radio-frequency (RF) imaging from the surface; (2) RF antennas in slim boreholes that look outward from the well to fill in gaps between drillholes; and (3) compact downhole instruments that use light and X-rays to directly measure rare earth element (REE) minerals on the borehole wall. Computer models and machine learning will fuse these measurements into 3D maps of rock properties and REE grade, including estimates of uncertainty. The work will be conducted both in the laboratory and in the field and the project team 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, in addition to all permits and approvals for outdoor field work and testing.	B3.6; B3.1
Texas A&M Engineering Experiment Station (3592-1642)	RAPTOR - Rapid Analysis of Precious and Targeted Ores with Rotary Drilling	The project team will research and develop an integrated system for exploration drilling for critical minerals with real-time mineral characterization. The system will combine a drilling rig, control systems, directional assembly, advanced real-time cuttings analysis, and an advanced real-time digital twinning solution based on modelling and inversion methods. The proposed system will allow for rapid analysis and characterization of drilled ore bodies, allowing for improved and more detailed stratigraphy assessment and ore body appraisal. Texas A&M has not obtained all necessary permits and approvals applicable to their proposed action, and is prohibited from commencing applicable project work until those permits are obtained. Per the terms of the award, a permits certification, and, if necessary, an amended NEPA Determination, are required prior to the conduct of applicable project work.	B3.6; B3.1

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,	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
	Laser-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

Bold text indicates the one project included in the Fifth Amended CX.

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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): AK, AZ, CA, IL, MA, MD, NM, NV, NY, OK, SC, SD, TX, WY

Proposed Action Description:

FOURTH AMENDED PROGRAMMATIC NEPA DETERMINATION (See attached original, First, Second, and Third Amended Determinations, dated June 22, 2026, July 7, 2026, July 29, 2026, and August 25, 2026, respectively). 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 and increase 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 Fourth Amended Determination adds 1 project to the original, First, Second, and Third Amended Determinations (see Attachment A for all 12). All 12 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.

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

B3.16 – Research activities in aquatic environments

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: 2026.10.22 13:20:44 -04'00'

Date Determined:

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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
Wetstone Exploration (3592-1720)	**Deep-sea Exploration Efficiency Platform (DEEP)**	**The project team will develop a mobile subsea survey system that scans the seafloor non-invasively using an electromagnetic field that can rapidly characterize buried seafloor massive sulfide deposits at high resolution in a single pass. A novel electric cross-dipole transmitter with an array of three-axis electric dipole receivers will deliver multi-component, 3D electromagnetic subsea images of conductive sub-seafloor ore bodies with more accuracy and in less time. This project is limited to bench-scale laboratory activities, with no domestic 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**
Baker Hughes Energy Transition LLC (3592-1522)	Automated Geological Appraisal Technology and Explorer System (AGATES)	The project team will develop a holistic approach to drilling for orebody appraisal by adapting existing technologies for unconventional oilfield and geothermal drilling, and augmenting them with experimental technologies for orebody appraisal. The project aims to provide new opportunities to mine rare-earth elements which are used across various economic sectors such as energy, transportation, healthcare and aerospace. Baker Hughes has not obtained all necessary permits and approvals applicable to their proposed action, and is prohibited from commencing applicable project work until those permits are obtained. Per the terms of the award, a permits certification, and, if necessary, an amended NEPA Determination, are required prior to the conduct of applicable project work.	B3.6; B3.1
University of Texas at Austin (3592-1560)	Acoustic Classification of Polymetallic Nodules on the Deep Ocean Seabed	The project team will develop a hybrid sonar system to improve seafloor mining of polymetallic nodules. These nodules are crucial for meeting U.S. critical mineral demands. The project focuses on enhancing the detection, localization, and classification of these nodules on the seabed through advanced acoustic remote sensing, ultimately optimizing their recovery. The University of Texas at Austin 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 and approvals 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, B3.16

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
Fieldstone Bio, Inc. (3593-1523)	Rapid In Situ Core Characterization Using Synthetic Biology	The project team will develop a new method for rapid critical mineral detection on drill cores using engineered microbes as biosensors. These microbes are designed to produce distinct colors when they sense specific metals, such as gold or rare earth elements. This allows for immediate, non-destructive metal identification. This technology aims to provide real-time geochemical information directly at drill sites, dramatically shorten timelines and reduce cost of exploration and discovery. 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
Deep Blue Geophysics, LLC (3593-1504)	V6EM: UAV-Based Vector 6-Component Electromagnetics for Critical Mineral Exploration	The project team is developing a next-generation mineral exploration system that deploys coordinated drone fleets to map subsurface geology at depths up to 1,000 meters. The technology adapts controlled-source electromagnetic methods, widely used and validated in offshore energy exploration, to the challenge of locating critical minerals on land. The system will allow for faster identification and survey times, achieve much denser spatial sampling, and can operate in terrain difficult for ground crews. The final system will be validated at three U.S. sites representing key critical mineral deposit types. Deep Blue Geophysics, LLC has not obtained all necessary permits and approvals applicable to their proposed action, nor identified where 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
Sandia National Laboratories (3592-1678)	Developing Downhole Mineralogy Logging Sensors to Accelerate Critical Mineral Exploration Enabled by AI Models and High-Throughput Core Data	The project team will develop downhole spectroscopy sensor techniques, including neutron-based elemental capture spectroscopy, nuclear quadrupole resonance, and electron spin resonance to directly obtain the real-time mineralogy and critical mineral potential of orebodies during drilling or well-logging, thereby accelerating mineral deposit exploration. The project will include laboratory measurements of ore samples to establish the AI-based models for the downhole sensors. This project is limited to bench-scale laboratory activities, with no outdoor or field-testing component, and has already	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
		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.	
South Dakota School of Mines and Technology (3592-1539)	Rapid Adaptive Prescreening and Integrated Downhole Sensing for Rare Earth Elements (RAPID-REE)	The project team will combine three sensing layers: (1) radio-frequency (RF) imaging from the surface; (2) RF antennas in slim boreholes that look outward from the well to fill in gaps between drillholes; and (3) compact downhole instruments that use light and X-rays to directly measure rare earth element (REE) minerals on the borehole wall. Computer models and machine learning will fuse these measurements into 3D maps of rock properties and REE grade, including estimates of uncertainty. The work will be conducted both in the laboratory and in the field and the project team 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, in addition to all permits and approvals for outdoor field work and testing.	B3.6; B3.1
Texas A&M Engineering Experiment Station (3592-1642)	RAPTOR - Rapid Analysis of Precious and Targeted Ores with Rotary Drilling	The project team will research and develop an integrated system for exploration drilling for critical minerals with real-time mineral characterization. The system will combine a drilling rig, control systems, directional assembly, advanced real-time cuttings analysis, and an advanced real-time digital twinning solution based on modelling and inversion methods. The proposed system will allow for rapid analysis and characterization of drilled ore bodies, allowing for improved and more detailed stratigraphy assessment and ore body appraisal. Texas A&M has not obtained all necessary permits and approvals applicable to their proposed action, and is prohibited from commencing applicable project work until those permits are obtained. Per the terms of the award, a permits certification, and, if necessary, an amended NEPA Determination, are required prior to the conduct of applicable project work.	B3.6; B3.1
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	B3.6; B3.15

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
		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.	
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-Plasma Electron Accelerator	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-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	B3.6

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Prime Recipient (Control No.)	Project Title	Project Description	Categorical Exclusion
		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

Bold text indicates the one project included in the Fourth Amended CX.

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): AK, AZ, CA, IL, MA, MD, NM, NV, NY, OK, SC, SD, TX, WY

Proposed Action Description:

THIRD AMENDED PROGRAMMATIC NEPA DETERMINATION (See attached original, First, and Second Amended Determinations, dated June 22, 2026, July 7, 2026, and July 29, 2026, respectively). 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 and increase 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 Third Amended Determination adds 1 project to the original, First, and Second Amended Determinations (see Attachment A for all 11). All 11 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. Baker Hughes Energy Transition LLC has not identified all field testing locations nor obtained all necessary permits and approvals applicable to their proposed actions, and is prohibited from commencing applicable project work until such locations are communicated and permits are obtained. Per the terms of the award, a permits certification, 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

B3.16 – Research activities in aquatic environments

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: 2026.08.25 15:31:12 -04'00'

Date Determined:

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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
Baker Hughes Energy Transition LLC (3592-1522)	**Automated Geological Appraisal Technology and Explorer System (AGATES)**	**The project team will develop a holistic approach to drilling for orebody appraisal by adapting existing technologies for unconventional oilfield and geothermal drilling, and augmenting them with experimental technologies for orebody appraisal. The project aims to provide new opportunities to mine rare-earth elements which are used across various economic sectors such as energy, transportation, healthcare and aerospace. Baker Hughes has not obtained all necessary permits and approvals applicable to their proposed action, and is prohibited from commencing applicable project work until those permits are obtained. Per the terms of the award, a permits certification, and, if necessary, an amended NEPA Determination, are required prior to the conduct of applicable project work.**	**B3.6; B3.1**
University of Texas at Austin (3592-1560)	Acoustic Classification of Polymetallic Nodules on the Deep Ocean Seabed	The project team will develop a hybrid sonar system to improve seafloor mining of polymetallic nodules. These nodules are crucial for meeting U.S. critical mineral demands. The project focuses on enhancing the detection, localization, and classification of these nodules on the seabed through advanced acoustic remote sensing, ultimately optimizing their recovery. The University of Texas at Austin 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 and approvals 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, B3.16
Fieldstone Bio, Inc. (3593-1523)	Rapid In Situ Core Characterization Using Synthetic Biology	The project team will develop a new method for rapid critical mineral detection on drill cores using engineered microbes as biosensors. These microbes are designed to produce distinct colors when they sense specific metals, such as gold or rare earth elements. This allows for immediate, non-destructive metal identification. This technology aims to provide real-time geochemical information directly at drill sites, dramatically shorten timelines and reduce cost of exploration and discovery. 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	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
		Safety) approvals necessary for use of all the materials that it will need over the course of this project.	
Deep Blue Geophysics, LLC (3593-1504)	V6EM: UAV-Based Vector 6-Component Electromagnetics for Critical Mineral Exploration	The project team is developing a next-generation mineral exploration system that deploys coordinated drone fleets to map subsurface geology at depths up to 1,000 meters. The technology adapts controlled-source electromagnetic methods, widely used and validated in offshore energy exploration, to the challenge of locating critical minerals on land. The system will allow for faster identification and survey times, achieve much denser spatial sampling, and can operate in terrain difficult for ground crews. The final system will be validated at three U.S. sites representing key critical mineral deposit types. Deep Blue Geophysics, LLC has not obtained all necessary permits and approvals applicable to their proposed action, nor identified where 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
Sandia National Laboratories (3592-1678)	Developing Downhole Mineralogy Logging Sensors to Accelerate Critical Mineral Exploration Enabled by AI Models and High-Throughput Core Data	The project team will develop downhole spectroscopy sensor techniques, including neutron-based elemental capture spectroscopy, nuclear quadrupole resonance, and electron spin resonance to directly obtain the real-time mineralogy and critical mineral potential of orebodies during drilling or well-logging, thereby accelerating mineral deposit exploration. The project will include laboratory measurements of ore samples to establish the AI-based models for the downhole sensors. 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
South Dakota School of Mines and Technology (3592-1539)	Rapid Adaptive Prescreening and Integrated Downhole Sensing for Rare Earth Elements (RAPID-REE)	The project team will combine three sensing layers: (1) radio-frequency (RF) imaging from the surface; (2) RF antennas in slim boreholes that look outward from the well to fill in gaps between drillholes; and (3) compact downhole instruments that use light and X-rays to directly measure rare earth element (REE) minerals on the borehole wall. Computer models and machine learning will fuse these measurements into 3D maps of	B3.6; B3.1

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
		rock properties and REE grade, including estimates of uncertainty. The work will be conducted both in the laboratory and in the field and the project team 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, in addition to all permits and approvals for outdoor field work and testing.	
Texas A&M Engineering Experiment Station (3592-1642)	RAPTOR - Rapid Analysis of Precious and Targeted Ores with Rotary Drilling	The project team will research and develop an integrated system for exploration drilling for critical minerals with real-time mineral characterization. The system will combine a drilling rig, control systems, directional assembly, advanced real-time cuttings analysis, and an advanced real-time digital twinning solution based on modelling and inversion methods. The proposed system will allow for rapid analysis and characterization of drilled ore bodies, allowing for improved and more detailed stratigraphy assessment and ore body appraisal. Texas A&M has not obtained all necessary permits and approvals applicable to their proposed action, and is prohibited from commencing applicable project work until those permits are obtained. Per the terms of the award, a permits certification, and, if necessary, an amended NEPA Determination, are required prior to the conduct of applicable project work.	B3.6; B3.1
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

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
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-Plasma Electron Accelerator	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-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.	B3.6
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	B3.6; B3.1

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
		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.	

Bold text indicates the one project included in the Third Amended CX.

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): AK, CA, IL, MA, MD, NM, NV, NY, OK, SC, SD, TX, WY

Proposed Action Description:

SECOND AMENDED PROGRAMMATIC NEPA DETERMINATION (See attached original and First Amended Determinations, dated June 22, 2026 and July 7, 2026, respectively). 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 and increase 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 Second Amended Determination adds 2 projects to the original and First Amended Determinations (see Attachment A for all 10). All 10 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. The University of Texas at Austin has not identified all sample collection sites nor obtained associated authorizations or permits, and is prohibited from commencing applicable project work until such locations are identified and all necessary permits or authorizations are obtained. Per the terms of the award, identification of the sample collection 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

B3.16 – Research activities in aquatic environments

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: 2026.07.29 07:07:30 -04'00'

Date Determined:

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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 Texas at Austin (3592-1560)	**Acoustic Classification of Polymetallic Nodules on the Deep Ocean Seabed**	**The project team will develop a hybrid sonar system to improve seafloor mining of polymetallic nodules. These nodules are crucial for meeting U.S. critical mineral demands. The project focuses on enhancing the detection, localization, and classification of these nodules on the seabed through advanced acoustic remote sensing, ultimately optimizing their recovery. The University of Texas at Austin has not obtained all necessary permits and approvals applicable to their proposed action, nor identified where the sample collection will take place, and is prohibited from commencing applicable project work until those permits and approvals are obtained and sample collection sites are identified. Per the terms of the award, identification of sample collection sites, a permits certification, and, if necessary, an amended NEPA Determination, are required prior to the conduct of applicable project work.**	**B3.6, B3.16**
Fieldstone Bio, Inc. (3593-1523)	**Rapid In Situ Core Characterization Using Synthetic Biology**	**The project team will develop a new method for rapid critical mineral detection on drill cores using engineered microbes as biosensors. These microbes are designed to produce distinct colors when they sense specific metals, such as gold or rare earth elements. This allows for immediate, non-destructive metal identification. This technology aims to provide real-time geochemical information directly at drill sites, dramatically shorten timelines and reduce cost of exploration and discovery. 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**
Deep Blue Geophysics, LLC (3593-1504)	V6EM: UAV-Based Vector 6-Component Electromagnetics for Critical Mineral Exploration	The project team is developing a next-generation mineral exploration system that deploys coordinated drone fleets to map subsurface geology at depths up to 1,000 meters. The technology adapts controlled-source electromagnetic methods, widely used and validated in offshore energy exploration, to the challenge of locating critical minerals on land. The system will allow for faster identification and survey times, achieve much denser spatial sampling, and can operate in terrain difficult for ground crews. The final system will be validated at three U.S. sites representing key critical mineral deposit types. Deep Blue Geophysics, LLC has not obtained all necessary permits and approvals applicable to their proposed action, nor identified where field	B3.6; B3.1

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
		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.	
Sandia National Laboratories (3592-1678)	Developing Downhole Mineralogy Logging Sensors to Accelerate Critical Mineral Exploration Enabled by AI Models and High-Throughput Core Data	The project team will develop downhole spectroscopy sensor techniques, including neutron-based elemental capture spectroscopy, nuclear quadrupole resonance, and electron spin resonance to directly obtain the real-time mineralogy and critical mineral potential of orebodies during drilling or well-logging, thereby accelerating mineral deposit exploration. The project will include laboratory measurements of ore samples to establish the AI-based models for the downhole sensors. 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
South Dakota School of Mines and Technology (3592-1539)	Rapid Adaptive Prescreening and Integrated Downhole Sensing for Rare Earth Elements (RAPID-REE)	The project team will combine three sensing layers: (1) radio-frequency (RF) imaging from the surface; (2) RF antennas in slim boreholes that look outward from the well to fill in gaps between drillholes; and (3) compact downhole instruments that use light and X-rays to directly measure rare earth element (REE) minerals on the borehole wall. Computer models and machine learning will fuse these measurements into 3D maps of rock properties and REE grade, including estimates of uncertainty. The work will be conducted both in the laboratory and in the field and the project team 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, in addition to all permits and approvals for outdoor field work and testing.	B3.6; B3.1
Texas A&M Engineering Experiment Station (3592-1642)	RAPTOR - Rapid Analysis of Precious and Targeted Ores with Rotary Drilling	The project team will research and develop an integrated system for exploration drilling for critical minerals with real-time mineral characterization. The system will combine a drilling rig, control systems, directional assembly, advanced real-time cuttings analysis, and an advanced real-time digital twinning solution based on modelling and inversion methods. The proposed system will allow for rapid analysis and characterization of drilled ore bodies, allowing for improved and more detailed stratigraphy assessment and ore body appraisal. Texas A&M has not obtained all necessary permits and	B3.6; B3.1

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
		approvals applicable to their proposed action, and is prohibited from commencing applicable project work until those permits are obtained. Per the terms of the award, a permits certification, and, if necessary, an amended NEPA Determination, are required prior to the conduct of applicable project work.	
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

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
Lawrence Berkeley National Laboratory (3592-1578)	Rapid, High-Resolution Ore Sensing with an Active, Multi-GeV Muon Source from a compact, Deployable, Laser-Plasma Electron Accelerator	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-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.	B3.6
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

Bold text indicates the two projects included in the Second Amended CX.

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): AK, CA, IL, MA, MD, NM, OK, SC, SD, TX, WY

Proposed Action Description:

FIRST AMENDED PROGRAMMATIC NEPA DETERMINATION (See attached original Determination, dated June 22, 2026). 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, increase 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 First Amended Determination adds 4 projects to the original Determination (see Attachment A for all 8). All 8 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. Deep Blue Geophysics, LLC has not identified all field site locations nor obtained associated permits and is prohibited from commencing applicable 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. Texas A&M has not obtained all necessary permits and approvals applicable to their proposed action, and is prohibited from commencing applicable project work until those permits are obtained. Per the terms of the award, a permits certification, 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: 2026.07.07 13:42:23 -04'00'

Date Determined:

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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
Deep Blue Geophysics, LLC (3593-1504)	V6EM: UAV-Based Vector 6-Component Electromagnetics for Critical Mineral Exploration	The project team is developing a next-generation mineral exploration system that deploys coordinated drone fleets to map subsurface geology at depths up to 1,000 meters. The technology adapts controlled-source electromagnetic methods, widely used and validated in offshore energy exploration, to the challenge of locating critical minerals on land. The system will allow for faster identification and survey times, achieve much denser spatial sampling, and can operate in terrain difficult for ground crews. The final system will be validated at three U.S. sites representing key critical mineral deposit types. Deep Blue Geophysics, LLC has not obtained all necessary permits and approvals applicable to their proposed action, nor identified where 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
Sandia National Laboratories (3592-1678)	Developing Downhole Mineralogy Logging Sensors to Accelerate Critical Mineral Exploration Enabled by AI Models and High-Throughput Core Data	The project team will develop downhole spectroscopy sensor techniques, including neutron-based elemental capture spectroscopy, nuclear quadrupole resonance, and electron spin resonance to directly obtain the real-time mineralogy and critical mineral potential of orebodies during drilling or well-logging, thereby accelerating mineral deposit exploration. The project will include laboratory measurements of ore samples to establish the AI-based models for the downhole sensors. 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
South Dakota School of Mines and Technology (3592-1539)	Rapid Adaptive Prescreening and Integrated Downhole Sensing for Rare Earth Elements (RAPID-REE)	The project team will combine three sensing layers: (1) radio-frequency (RF) imaging from the surface; (2) RF antennas in slim boreholes that look outward from the well to fill in gaps between drillholes; and (3) compact downhole instruments that use light and X-rays to directly measure rare earth element (REE) minerals on the borehole wall. Computer models and machine learning will fuse these measurements into 3D maps of rock properties and REE grade, including estimates of uncertainty. The work	B3.6; B3.1

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
		will be conducted both in the laboratory and in the field and the project team 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, in addition to all permits and approvals for outdoor field work and testing.	
Texas A&M Engineering Experiment Station (3592-1642)	**RAPTOR - Rapid Analysis of Precious and Targeted Ores with Rotary Drilling**	**The project team will research and develop an integrated system for exploration drilling for critical minerals with real-time mineral characterization. The system will combine a drilling rig, control systems, directional assembly, advanced real-time cuttings analysis, and an advanced real-time digital twinning solution based on modelling and inversion methods. The proposed system will allow for rapid analysis and characterization of drilled ore bodies, allowing for improved and more detailed stratigraphy assessment and ore body appraisal. Texas A&M has not obtained all necessary permits and approvals applicable to their proposed action, and is prohibited from commencing applicable project work until those permits are obtained. Per the terms of the award, a permits certification, and, if necessary, an amended NEPA Determination, are required prior to the conduct of applicable project work.**	**B3.6; B3.1**
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

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
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-Plasma Electron Accelerator	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-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.	B3.6
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	B3.6; B3.1

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
		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.	

Bold text indicates the four projects included in the First Amended CX.

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:

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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