ISC-CH F 560 (4/2018)

DOE NEPA Tracking Number

U. S. DEPARTMENT OF ENERGY, OFFICE OF SCIENCE
INTEGRATED SUPPORT CENTER—CHICAGO OFFICE

NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) ENVIRONMENTAL EVALUATION NOTIFICATION FORM

To be completed by "Applicant," i.e., organization with responsibilities for a "Federal action" involving application to DOE for a permit, license, exemption or allocation, or other similar actions. For assistance with this Form, refer to "Instructions for Preparing ISC-CH F-560, Environmental Evaluation Notification Form."

Solicitation/Award No. (if applicable):

Organization Name: Colorado School of Mines (Golden, Colordo)

Proposed Action Title: Grant for "Driving Selectivity Among Rare Earth Elements through Phase Modifiers"

Total DOE Funding/Total Funding: $1,375,275

I. Project Description: ***(Use explanation pages if additional space is required)***

A. Proposed Project/Action (if applicable, delineate Federally funded/Non-Federally funded portions)

The proposed project is a bench-scale, laboratory-based, preliminary investigation of a novel approach to improving the separation of rare earth elements. This research is important because rare earth elements are critical components of many materials, but they are difficult to separate from ores. China dominates the world market for rare earths partly because it dominates the industrial scale separation of rare earth elements. Our project studies the fundamental chemistry of rare earth separations by liquid-liquid extraction to elucidate the potential to use organic solvents, such as octanol, to tune the separations of the rare earth elements to make these separations more sustainable and less expensive.

B. Would the project proceed without Federal funding? Yes ☐ No ☑

If "yes," use explanation page.

II. Description of Affected Environment: ***(Use explanation pages if additional space is required)***

The work will take place indoors in the General Research Laboratory (GRL) building on the Colorado School of Mines campus. The work will occur in laboratory room GRL 342, a fully-equipped 2200 sq. ft. radiochemistry laboratory licensed by the state of Colorado (an NRC agreement state) for work with radioactive materials, including the materials and amounts proposed for this project. Approximately 16 researchers use this laboratory, but currently no more than 7 workers may be present at any time. Approximately 20 more researchers work on other labs located on the same floor of the building.

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III. Preliminary Questions:

		Yes	No
A.	Is the DOE-funded work routinely administrative or *entirely* advisory or a "paper study?"	☐	☑

If "Yes", ensure that the description in Section I reflects this and go directly to Section V.

B. Is there any potential whatsoever for: (***Provide an explanation for each "Yes" response)***

1.	Work to be performed outdoors?	☐	☑
2.	Major modification of a building interior?	☐	☑
3.	Threat of violation of applicable statutory, regulatory, or permit requirements for environment, safety, and health?	☐	☑
4.	Siting, construction or major expansion of waste treatment, storage, or disposal facilities?	☐	☑
5.	Disturbance to hazardous substances, pollutants, or contaminants preexisting in the environment?	☐	☑
6.	The presence of any environmentally-sensitive resources?	☐	☑
7.	Any potential whatsoever for high consequence impacts to human health or the environment?	☑	☐
8.	The work being connected to another existing/proposed activity that could potentially create a significant impact?	☐	☑
9.	Nearby past, present, and/or reasonably foreseeable future actions such that collectively significant impacts could result?	☐	☑
10.	Scientific or public controversy, uncertainty over potential impacts, or conflicts regarding resource usage?	☐	☑

If "No" to ALL Section III.B. questions, go directly to Section V.

IV. Potential Environmental Effects: (***Provide an explanation for each "Yes" response)***

A. Environmentally Sensitive Resources: Could the proposed action potentially result in changes and/or disturbances to any of the following resources?

		Yes	No
1.	Threatened/Endangered Species and/or Critical Habitats	☐	☑
2.	Other Protected Species (e.g., Burros, Migratory Birds, Pollinators)	☐	☑
3.	Sensitive Environments (e.g., Tundra/Coral Reefs/Rain Forests)	☐	☑
4.	Cultural or Historic Resources	☐	☑
5.	Important Farmland	☐	☑
6.	Non-Attainment Areas for Ambient Air Quality Standards	☐	☑
7.	Class I Air Quality Control Region	☐	☑
8.	Special Sources of Groundwater (e.g. Sole Source Aquifer)	☐	☑
9.	Navigable Air Space	☐	☑
10.	Coastal Zones	☐	☑
11.	Areas with Special National Designation (e.g. National Forests, Parks, Trails)	☐	☑
12.	Floodplains and/or Wetlands	☐	☑

B. Regulated Substances/Activities: Would the proposed action involve any of the following regulated Items or activities?

13.	Natural Resource Damage Assessments	☐	☑
14.	Invasive Species or Exotic Organisms	☐	☑
15.	Noxious Weeds	☐	☑
16.	Clearing or Excavation greater than one acre or Removal of Trees Governed by Local Requirement	☐	☑
17.	Dredge or Fill (under Clean Water Act, Section 404, greater than one acre)	☐	☑

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III. Preliminary Questions:

		Yes	No
A.	Is the DOE-funded work routinely administrative or *entirely* advisory or a "paper study?"	☐	☑

If "Yes", ensure that the description in Section I reflects this and go directly to Section V.

B. Is there any potential whatsoever for: (***Provide an explanation for each "Yes" response)***

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2.	Major modification of a building interior?	☐	☑
3.	Threat of violation of applicable statutory, regulatory, or permit requirements for environment, safety, and health?	☐	☑
4.	Siting, construction or major expansion of waste treatment, storage, or disposal facilities?	☐	☑
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7.	Any potential whatsoever for high consequence impacts to human health or the environment?	☑	☐
8.	The work being connected to another existing/proposed activity that could potentially create a significant impact?	☐	☑
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If "No" to ALL Section III.B. questions, go directly to Section V.

IV. Potential Environmental Effects: (***Provide an explanation for each "Yes" response)***

A. Environmentally Sensitive Resources: Could the proposed action potentially result in changes and/or disturbances to any of the following resources?

		Yes	No
1.	Threatened/Endangered Species and/or Critical Habitats	☐	☑
2.	Other Protected Species (e.g., Burros, Migratory Birds, Pollinators)	☐	☑
3.	Sensitive Environments (e.g., Tundra/Coral Reefs/Rain Forests)	☐	☑
4.	Cultural or Historic Resources	☐	☑
5.	Important Farmland	☐	☑
6.	Non-Attainment Areas for Ambient Air Quality Standards	☐	☑
7.	Class I Air Quality Control Region	☐	☑
8.	Special Sources of Groundwater (e.g. Sole Source Aquifer)	☐	☑
9.	Navigable Air Space	☐	☑
10.	Coastal Zones	☐	☑
11.	Areas with Special National Designation (e.g. National Forests, Parks, Trails)	☐	☑
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16.	Clearing or Excavation greater than one acre or Removal of Trees Governed by Local Requirement	☐	☑
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B. Regulated Substances/Activities: Would the proposed action involve any of the following regulated Items or activities? (*continued*)

		Yes	No
18.	Noise (in excess of regulations)	☐	☑
19.	Asbestos Removal	☐	☑
20.	Polychlorinated biphenyls (PCBs)	☐	☑
21.	Import, Manufacture, or Processing of Toxic Substances	☐	☑
22.	Chemical Storage/Use	☑	☐
23.	Pesticide Use	☐	☑
24.	Hazardous, Toxic, or Criteria Pollutant Air Emissions	☐	☑
25.	Liquid Effluents	☐	☑
26.	Spill Prevention/Surface Water Protection	☐	☑
27.	Underground Injection	☐	☑
28.	Hazardous Waste	☑	☐
29.	Underground Storage Tanks	☐	☑
30.	Radioactive or Radioactive Mixed Waste	☑	☐
31.	Radiation Exposure	☑	☐
32.	Nanoscale Materials	☐	☑
33.	Genetically Engineered Microorganisms/Plants or Synthetic Biology	☐	☑
34.	Ozone Depleting Substances	☐	☑
35.	Greenhouse Gas Generation/Sustainability	☐	☑
36.	Off-Road Vehicles	☐	☑
37.	Biosafety Level 3-4 Laboratory	☐	☑
38.	Research on Human Subjects or other Vertebrate Animals	☐	☑
39.	Facility footprint exceeds 5,000 Square Feet	☐	☑

C. Other Relevant Information: Would the proposed action involve the following?

		Yes	No
40.	Disproportionate Nearby Presence of Minority and/or Low Income Populations	☐	☑
41.	Existing, Modified, or New Federal/State Permits	☐	☑
42.	Involvement of Another Federal Agency (e.g. license/permit, funding, approval)	☐	☑
43.	Action in a State with NEPA-type law	☐	☑
44.	Expansion of Public Utilities/Services	☐	☑
45.	Depletion of a Non-Renewable Resources	☐	☑
46.	Subject to an Existing Institutional Work Planning and Control Process	☐	☑
47.	Other Pertinent Information Which Could Impact Human Health or the Environment	☐	☑

V. Applicant certification that to the best of their knowledge all information provided on this form is accurate:

	Yes	No
Does this disclosure contain: classified, sensitive business, or other exempt information that DOE would not be obligated to disclose pursuant to the Freedom of Information Act.	☐	☑

A. Organization Official (Name and Title): Jill Bremer, Assistant Director of Pre-Award

Signature: DocuSigned by: Jill Bremer 00EC5B6B92874B5... Date: 9/8/2021

e-mail: jbremer@mines.edu Phone: 303-273-3242

B. Optional Secondary Approval (Name and Title):

Signature: Mark P. Jensen Digitally signed by Mark P. Jensen Date: 2021.09.08 09:48:49 -06'00' Date: 09/09/2021

e-mail: mjensen@mines.edu Phone: 303-273-3785

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Remainder to be completed by DOE

VI. DOE Concurrence/Recommendation/Determination:

A. DOE Project Director/Program Manager or Contract/Grant Management Specialist:

	Yes	No
Has the Applicant completed this Form correctly?	☒	☐
Does an existing generic categorical exclusion apply?	☐	☒

If yes, indicate: _____

Name and Title: Daniella Duverne, Contract Specialist

Signature: Daniella Duverne Digitally signed by Daniella Duverne Date: 2021.09.08 12:05:19 -05'00' Date: 09/08/2021

B. DOE NEPA Team Review (if requested):

	Yes	No
Is the class of action identified in the DOE NEPA Regulations (Appendices A-D to Subpart D (10 CFR § 1021))?	☒	☐

If yes, specify the class(es) of action: B3.6

Name and Title: _____

Signature: _____ Date: _____

C. DOE Counsel (if requested):

Name and Title: _____

Signature: _____ Date: _____

D. DOE NEPA Compliance Officer:

The preceding pages are a record of documentation required under DOE Final NEPA Regulation, 10 CFR § 1021.410.

☒ Action may be categorically excluded from further NEPA review. I have determined that the proposed action meets the requirements for Categorical Exclusion referenced above.

☐ Action requires approval by Head of the Field Organization. Recommend preparation of an Environmental Assessment.

☐ Action requires approval by Head of the Field Organization or a Secretarial Officer. Recommend preparation of an Environmental Impact Statement.

Comments/limitations if any:

NEPA Compliance Officer:

Name: _____

Signature: Peter Siebach Digitally signed by Peter Siebach Date: 2021.09.13 12:39:20 -05'00' Date: _____

Optional Additional Narrative: (add additional detail to description to Sections I and II or explanations to responses in Sections 3 and 4.

22. Chemical storage and use. The project employs organic solvents, such as dodecane and octanol, molar solutions of mineral acids (hydrochloric or nitric acid at 1 - 6 moles/liter), and rare earth nitrate or chloride salts. Each individual experiment requires approximately 0.5 milliliters each of organic and acid solution, so the organic solvents will be stored and used at a rate of approximately 2 gallons per year, while concentrated nitric or hydrochloric acids will be used at a rate of approximately 1 liter per year and diluted to make solutions. Rare earth salts will be used at a rate of approximately 100 grams per year. These chemicals form the basis of this project on chemical separations of rare earths and are necessary to the project. The primary chemical hazards are flammability of the organic solvents and reactivity of nitric acid and nitrate salts. Flammable chemicals are stored in flammable cabinets, and the total load of flammable chemicals in the lab is capped at 30 gallons by our occupancy permit. Acids are stored in acid cabinets. Compliance with all applicable laws and regulations is overseen by the University's Environmental, Health and Safety Office.

28. Hazardous Waste. The project will generate hazardous waste that is flammable, corrosive and/or reactive in the GRL 342 laboratory. Waste is segregated for compatibility and properly accumulated in the lab's Satellite Accumulation Area, which is inspected weekly. The rate of waste generation will be approximately 2 gallons per year of flammable organic solvents, and approximately 2 gallons per year of corrosive and/or reactive acid solutions containing rare earth salts. The waste is removed from the lab by the University's Environmental, Health and Safety Office and packaged for transportation and disposal. The waste is transported and disposed of by a permitted transporter contracted by the University. Given the volumes and generation rates involved, it is anticipated that the waste from this project would constitute a part of two separate shipments.

30. Radioactive Waste. The project will likely generate low-level radioactive waste and low-level mixed waste from the use of europium-152,154 in the laboratory experiments. We will use up to 1.5 microCuries of europium-152,154 per year which would be disposed of as radioactive or mixed waste as appropriate. Up to 10 gallons of low-level waste containing PPE, pipet tips, emptied vials, etc., and up to 100 mL of mixed low-level waste would be generated per year. The mixed waste would be from solvent extraction experiments and would be flammable, corrosive and/or reactive. The waste is segregated and safely accumulated in the laboratory at the point of generation considering both radiation safety and chemical safety. The University's Radiation Safety Office collects and packages the waste for disposal in accordance with all applicable laws and regulations as well as any additional requirements of the waste disposal company that the University contracts with. The waste is transported and disposed of by a permitted radioactive waste disposal contractor hired by the University.

31. Radioactive Materials. The project is likely to use radiotracer rare earth elements to simplify some of the experiments carried out in the GRL 342 laboratory. Each measurement would require approximately 15 nanoCuries of europium-152,154 radiotracer. Up to 100 measurements would be made in a year, giving a total annual use of 1.5 microCuries of europium in the experiments. The material is contained within the experimental apparatus and is protected from release into or from the laboratory by its physical form, engineering controls (i.e. HEPA Filter hoods), and local or exit monitoring. External whole body and extremity doses to the workers, other occupants of the lab, and people outside the lab are expected to be undetectable above the laboratory or natural background and no internal dose is expected. Colorado is an NRC Agreement State, so use of radioactive materials at the Colorado School of Mines is licensed and regulated to use europium-152,154 at these levels and in these experiments by the Colorado Department of Public Health and Environment and overseen by the University's Radiation Safety Office.