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): DE-SC0022832

Organization Name: Luna Innovations Incorporated

Proposed Action Title: Scaled Reduced Mode Sapphire Fiber Production Towards High Temperature Radiation Resilient Sensors

Total DOE Funding/Total Funding: $199,998

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 project will irradiate at MIT Nuclear Reactor Laboratory (MIT-NRL) in the Silicon Program's through ports for Neutron Transmutation Doping (NTD) multi mode sapphire fiber with a Li6 annulus surrounding the fiber. The neutron irradiation process allows for the reaction: Li6 (n,alpha) H3. Via this process the multi mode fiber is transformed to single mode. The fiber is then removed for various additional processes to produce high temperature sensors. At this point the fiber may contain small (below the NRC license threshold) amounts of tritium. Post irradiation processing and testing will occur at OSU.

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 material will be proccessed at the MIT Nuclear Reactor Laboratory. During proccessing, small amounts of tritium will be produced. The tritium production is within the MIT Nuclear Reactor Laboratory's license limit, and has been approved by the MIT Nuclear Reactor Laboratory. After an initial cool down period MIT-NRL will dispose of the material in accordance with their U.S. Nuclear Regulatory Commission license (cost of $180). Approximately three appropriately trained MIT-NRL personnel will handle material insertion and removal from the reactor facility and irradiated canisters. All radiological activity will be conducted according to 29 CFR 1910.97 and 29 CFR 1910.1096. Once processed at MIT-NRL, the reduced mode sapphire fiber will be cleaned shipped to The Ohio State University (OSU) for evaluation. The fiber has the potential to contain a small amount of tritium within it. Though this is below what would require licensing as a radiation source, OSU's radiation safety office tracks and monitors the testing and processing of these fibers at OSU's laboratory.

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)	☐	☑

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): Mary (Maggie) Hudson, Senior Contracts Administrator

Signature: M Hudson Date: 07/22/2022

e-mail: Maggie.Hudson@LunaLabs.us Phone: (434) 220-1559

B. Optional Secondary Approval (Name and Title): Derek Rountree

Signature: Derek Rountree Date: 07/22/2022

e-mail: rountreed@lunainc.com Phone: (540) 558-1667

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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?	[X]	[ ]
Does an existing generic categorical exclusion apply?	[ ]	[X]

If yes, indicate: _____

Name and Title: Bart Malewski, Contract Specialist

Signature: BARTLOMIEJ MALEWSKI Digitally signed by BARTLOMIEJ MALEWSKI Date: 2022.08.02 17:04:00 -05'00' Date: _____

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))?	[X]	[ ]

If yes, specify the class(es) of action: B3.6, B3.10

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.

[X] 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: PETER SIEBACH Digitally signed by PETER SIEBACH Date: 2022.08.03 13:11:41 -05'00'

Signature: _____ Date: _____

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

Once processed at MIT-NRL, the reduced mode sapphire fiber will be cleaned shipped to The Ohio State University (OSU) for evaluation. The fiber has the potential to contain a small amount of tritium within it. Though this is below what would require licensing as a radiation source, OSU's radiation safety office tracks and monitors the testing and processing of these fibers at OSU's laboratory. Each fiber will have less than 0.8 mCi of tritium, which is below the 1 mCi limit of NRC 30.71 Schedule B, so no license is required to possess each fiber. The number of fibers produced will be approximately 15 (less than 20). The conglomerate of these fibers will contain no more than 16 mCi of tritium, resulting in a total tritium content in the OSU lab of approximately 26 mCi, well below the labs limit of 100mCi.

During the work at MIT-NRL for the DOE award to Luna it is expected that MIT-NRL's radiation workers will be exposed to less than 50 mR, far less than the allowable 5 R, production of tritium will be assed and will be included in MIT's tritium production budget, and low level waste will be disposed of via MIT-NRL's disposal procedures in accordance with the MIT-NRL's NRC license and the MIT-NRL ALARA Program.

Current license/permit associated with the project:
The MIT reactor is a tank-type research reactor. It is owned and operated by the Massachusetts Institute of Technology, a non-profit educational institution, and is licensed by the US Nuclear Regulatory Commission. Its current license, issued in November 2012, authorizes steady-state 6 MW operation for 20 years.