

**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-580, Environmental Evaluation Notification Form."

Solicitation/Award No. (if applicable): DE-SC0020032

Organization Name: QuesTek Innovations LLC
Evanston, IL

Proposed Action Title: Computational Materials Design of Functionally Graded Structures for Enhanced Cooling
Plasma Facing Components via AM

Total DOE Funding/Total Funding: \$199,894.00

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

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

QuesTek will lead the overall STTR program with the long-term objective to design and fabricate a functionally graded material (FGM) component, joining the W shielding layer and underlying coolant-contacting parts (e.g., RAFM steel) via advanced Additive Manufacturing techniques for enhanced cooling of the PFCs. Prof. Raymundo Arroyave and Prof. Ibrahim Karaman at Texas A&M University (TAMU), leading experts in the field path optimization and AM production of FGM, will serve as academic partners for this STTR program. Path planning and optimization algorithm developed at TAMU and the unique multi-hopper DED laser engineering net shaping (LENS®) AM capabilities at TAMU's AMTex Laboratory will be leveraged to ensure program success.

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)

Our proposed STTR research to design and develop novel functionally graded PFCs with enhanced cooling can directly boost success of fusion energy programs. Advanced helium-cooled fusion reactors offer the promise of environmentally-benign energy generation, substantially eliminating CO₂ and other greenhouse gas plant emissions. Additionally, the radioactive byproducts produced by fusion reactors have a very short half-life compared to nuclear fission, such that the logistics involved with fusion reactor waste storage would be simpler and easier to implement than with fission-based nuclear waste.

III. Preliminary Questions:

- | | | |
|---|--------------------------|-------------------------------------|
| | Yes | No |
| A. <u>Is the DOE-funded work routinely administrative or <i>entirely</i> advisory or a "paper study?"</u> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

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

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 | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 2. | Other Protected Species (e.g., Burros, Migratory Birds, Pollinators) | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 3. | Sensitive Environments (e.g., Tundra/Coral Reefs/Rain Forests) | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 4. | Cultural or Historic Resources | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 5. | Important Farmland | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 6. | Non-Attainment Areas for Ambient Air Quality Standards | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 7. | Class I Air Quality Control Region | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 8. | Special Sources of Groundwater (e.g. Sole Source Aquifer) | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 9. | Navigable Air Space | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 10. | Coastal Zones | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 11. | Areas with Special National Designation (e.g. National Forests, Parks, Trails) | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 12. | Floodplains and/or Wetlands | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

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

- | | | | |
|-----|--|--------------------------|-------------------------------------|
| 13. | Natural Resource Damage Assessments | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 14. | Invasive Species or Exotic Organisms | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 15. | Noxious Weeds | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 16. | Clearing or Excavation greater than one acre or Removal of Trees Governed by Local Requirement | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 17. | Dredge or Fill (under Clean Water Act, Section 404, greater than one acre) | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

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) | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 19. Asbestos Removal | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 20. Polychlorinated biphenyls (PCBs) | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 21. Import, Manufacture, or Processing of Toxic Substances | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 22. Chemical Storage/Use | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 23. Pesticide Use | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 24. Hazardous, Toxic, or Criteria Pollutant Air Emissions | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 25. Liquid Effluents | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 26. Spill Prevention/Surface Water Protection | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 27. Underground Injection | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 28. Hazardous Waste | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 29. Underground Storage Tanks | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 30. Radioactive or Radioactive Mixed Waste | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 31. Radiation Exposure | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 32. Nanoscale Materials | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 33. Genetically Engineered Microorganisms/Plants or Synthetic Biology | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 34. Ozone Depleting Substances | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 35. Greenhouse Gas Generation/Sustainability | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 36. Off-Road Vehicles | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 37. Biosafety Level 3-4 Laboratory | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 38. Research on Human Subjects or other Vertebrate Animals | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 39. Facility footprint exceeds 5,000 Square Feet | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

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

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

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

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. Yes No

A. Organization Official (Name and Title): Padma Kotaru, Contract Administrator

Signature: *Padma Kotaru* Date: _____

e-mail: pkotaru@questek.com Phone: 847-425-8216

B. Optional Secondary Approval (Name and Title): _____

Signature: _____ Date: _____

e-mail: _____ Phone: _____

Remainder to be completed by DOE

VI. DOE Concurrence/Recommendation/Determination:

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

Has the Applicant completed this Form correctly?

Yes

No

Does an existing generic categorical exclusion apply?

If yes, indicate: On file in ACQ Policy

Name and Title: Michael Passo Contract Specialist

Signature: Mike Passo Date: 6/26/19

B. DOE NEPA Team Review (if requested):

Is the class of action identified in the DOE NEPA Regulations (Appendices A-D to Subpart D (10 CFR § 1021))?

Yes

No

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

Name and Title: Peter R. Siebach

Signature: Peter R. Siebach Date: 6/27/2019

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: Peter R. Siebach

Signature: Peter R. Siebach Date: 6/27/2019

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