

U. S. DEPARTMENT OF ENERGY, OFFICE OF SCIENCE
NATIONAL ENVIRONMENTAL POLICY ACT (NEPA)
ENVIRONMENTAL EVALUATION NOTIFICATION

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, refer to "Instructions for Preparing Environmental Evaluation Notification."

Solicitation/Award No. (if applicable): DE-SC0024734

Organization Name: Continuum Dynamics, Inc.

Proposed Action Title: Bubble Thermography Velocimetry for Urban Flow Field Characterization

Total DOE Funding/Total Funding: \$249,270.00

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

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

The proposed project involves using soap bubbles and thermal cameras to measure atmospheric turbulence. The proposed technique, named bubble thermography velocimetry or BTV, is aimed to complement existing meteorological observation methods by the capability of characterizing full three-dimensional atmospheric flow field in near real time.

The proposed action will be carried out with DOE being the sole funding agency.

The proposed project involves no bench scale tests, no buildings to be built, no utility lines to be laid, and no excavation.

The proposed project is new.

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)

Testing BTV will be necessarily conducted outdoors. BTV would require generating soap bubbles (80-150 mm diameter) as the atmospheric flow tracer. The bubble liquid will be composed of water, glycerin, guar gum and detergent; among them, guar gum is food grade and makes up 0.1% of the total mass, and eco-friendly dishwashing detergent (e.g., Seventh Generation and Method) will be used with a less than 5% mass fraction. Glycerin will have a mass fraction in the range of 1 to 20%, depending on the relative humidity and our test results of bubble lifetime. Given the above, we expect the potential environmental impacts of soap bubbles to be negligible.

The outdoor testing of BTV is planned to be conducted at Ewing Township, Plainsboro Township and Princeton of New Jersey. See the explanation pages for their general geographic setting and population.

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 checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2. Major modification of a building facade or 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. Tundra, Coral Reefs, or 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 checked="" type="checkbox"/> | <input type="checkbox"/> |
| 7. Class I Air Quality Control Region | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 8. Special Sources of Groundwater (e.g., Sole Source Aquifer) | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 9. Navigable Air Space | <input checked="" type="checkbox"/> | <input 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 Including Emerging Chemicals (e.g., PFAS)	<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 checked="" type="checkbox"/>	<input 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 checked="" type="checkbox"/>	<input 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 checked="" type="checkbox"/>	<input type="checkbox"/>
44. Action Would Require 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 Notification 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): Melissa Kinney
 Signature: Melissa Kinney Digitally signed by Melissa Kinney
Date: 2024.01.29 13:39:31 -05'00' Date: 1/29/2024
 e-mail: melissa@continuum-dynamics.com Phone: 609-538-0444 ext. 128

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 Notification correctly?

Yes

No

Does an existing generic categorical exclusion apply?

If yes, indicate: _____

Name and Title: Olivia Ross, Grants Management Specialist

Signature: Olivia Ross

Digitally signed by Olivia Ross
Date: 2024.01.31 11:07:19 -05'00'

Date: 31 January 2024

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 & B3.8

Name and Title: Environmental Engineer

Signature: Jayashree Jayaraj

Digitally signed by Jayashree Jayaraj
Date: 2024.01.31 10:27:27 -06'00'

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 the SC Director of Field Operations. Recommend preparation of an Environmental Impact Statement.

Comments/limitations if any:

NEPA Compliance Officer:

Name: _____

Signature: PETER SIEBACH

Digitally signed by PETER SIEBACH
Date: 2024.01.31 13:43:15 -06'00'

Date: _____

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

Additional notes for Section II:

The outdoor testing of BTV is planned to be conducted at the following locations of New Jersey:

- (1) Ewing Township
Total area 40.29 sq. km, including 39.38 sq. km of land and 0.90 sq. km of water;
Total population 37,264, as of 2020
- (2) Plainsboro Township
Total area 31.37 sq. km, including 30.40 sq. km of land and 0.97 sq. km of water;
Total population 24,084, as of 2020
- (3) Princeton
Total area 47.69 sq. km, including 46.48 sq. km of land and 1.21 sq. km of water;
Total population 30,681, as of 2020

Above information is from Wikipedia.

Explanations to 'Yes'

III.B.1:

Testing BTV will be necessarily conducted outdoors, including tests for soap bubble physical properties, camera thermal visibility range, and verification and validation of BTV performance.

IV.A.6, 7:

Whether or to what extent releasing soap bubbles at the rate given above (III.B.6) affects air quality is uncertain.

IV.A.9:

Whether or to what extent releasing soap bubbles at the rate given above (III.B.6) affects navigable air space is uncertain

IV.B.24:

Same as IV.A.6

IV.B.35:

Technically, water vapor is the strongest greenhouse gas. However, water vapor from airborne soap bubbles has NO negative influence to the environment.

IV.C.43:

New Jersey Executive Order 215

