PMC-ND

(1.08.09.13)

U.S. DEPARTMENT OF ENERGY
OFFICE OF ENERGY EFFICIENCY AND RENEWABLE ENERGY
NEPA DETERMINATION

RECIPIENT: Arzeda Corp **STATE:** WA

PROJECT TITLE : Fermentative production of Tulipalin A: a next-generation, sustainable monomer that drastically improves the Performance of pMMA

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0001916	DE-EE0008495	GFO-0008495-002	GO8495

Based on my review of the information concerning the proposed action, as NEPA Compliance Officer (authorized under DOE Policy 451.1), I have made the following determination:

CX, EA, EIS APPENDIX AND NUMBER:

Description:

A9 Information gathering, analysis, and dissemination	Information gathering (including, but not limited to, literature surveys, inventories, site visits, and audits), data analysis (including, but not limited to, computer modeling), document preparation (including, but not limited to, conceptual design, feasibility studies, and analytical energy supply and demand studies), and information dissemination (including, but not limited to, document publication and distribution, and classroom training and informational programs), but not including site characterization or environmental monitoring. (See also B3.1 of appendix B to this subpart.)
B3.6 Small-scale research and development, laboratory operations, and pilot projects	Siting, construction, modification, operation, and decommissioning of facilities for smallscale research and development projects; conventional laboratory operations (such as preparation of chemical standards and sample analysis); and small-scale pilot projects (generally less than 2 years) frequently conducted to verify a concept before demonstration actions, provided that construction or modification would be within or contiguous to a previously disturbed or developed area (where active utilities and currently used roads are readily accessible). Not included in this category are demonstration actions, meaning actions that are undertaken at a scale to show whether a technology would be viable on a larger scale and suitable for commercial deployment.

Rationale for determination:

The U.S. Department of Energy (DOE) is proposing to provide federal funding to Arzeda Corp. to produce polymer-grade alpha-methylene butyrolactone (MBL) via a fermentation-downstream process and confirm the performance-enhanced properties of MBL-containing polymers. Project work would seek to optimize and lower the costs of production of MBL.

The project, as proposed in the original SOPO, was comprised of 8 tasks. DOE completed one previous NEPA determination covering Tasks 1-6 (GFO-0008495.001, CX A9, B3.6, 1/02/2019). Since that time Arzeda has made changes to the SOPO in regards to tasks 1-6, has changed the proposed work in tasks 7 and 8, and has added a task 9. This review is for the proposed tasks 1-6 changes, and the remaining tasks (tasks 7-9).

Tasks 1-6 included genetic engineering (e.g. gene synthesis, DNA sequencing, chromosomal integration), fermentation of lignocellulosic hydrolysate using bacterial and fungal strains, strain optimization, and fermentation process optimization (1L and 10L batches). Arzeda has made modifications to tasks 1-6 constituting of changes to the choice of bacterial and fungal strains, and adding additional verification of work (task 4.5) and strain optimization tasks (tasks 6.4-6.6). These changes do not include any additional types of work or locations for work not identified in the previous NEPA determination. In addition, while they include new strains, they do not propose changes to the types of laboratory analysis.

In tasks 7 and 8 Arzeda proposes to complete larger scale fermentations (100 grams up to 1 kilogram). This work would be completed by project partner Iowa State University at their existing laboratory facility in Ames, Iowa. All work would be completed in preexisting indoor laboratory facilities using existing fermentation reactors.

Proposed project activities in tasks 7 and 8 would include data analysis, computer modeling (e.g. computation protein/enzyme design), genetic engineering (e.g. gene synthesis, DNA sequencing, chromosomal integration), fermentation of lignocellulosic hydrolysate using bacterial and fungal strains, strain optimization, and fermentation process optimization.
In task 9 Arzeda would complete both Life Cycle Analysis and Techno Economic Analysis.

All project activities would be completed in existing, purpose-built office or laboratory facilities. Strain development and fermentation would be completed at Arzeda's laboratory facility in Seattle, WA. Additional polymer testing would be

completed at the Pacific Northwest National Laboratory (PNNL), in Richland, WA. Larger scale fermentation would be completed at Iowa State. All facilities regularly conduct work similar in nature to that proposed as part of the project's scope. No change in the use, mission or operation of existing facilities would be required.

Industrial chemicals, lignocellulosic hydrolysate, and microorganisms would be used and handled throughout the project. All project activities would be completed indoors, in laboratory settings. Established health and safety policies and procedures would be adhered to at all times. Protocols would include the use of personal protective equipment, staff training, monitoring, and internal assessments.

Biological materials and organisms would be handled in controlled laboratory conditions with no floor drains or risks of contamination to the outside environment. All materials would be contained and disposed of properly. DNA and biological organisms would be disposed of in bio-hazard waste containers for incineration. All non-disposable pieces of equipment would be sterilized using an autoclave. Any DNA or production organism stored for future experimentation would be stored at -80°C.

Arzeda and its project partners would adhere to all applicable Federal, State and local health, safety and environmental regulations.

Any work proposed to be conducted at a federal facility may be subject to additional NEPA review by the cognizant federal official and must meet the applicable health and safety requirements of the facility.

NEPA PROVISION

DOE has made a final NEPA determination.

Notes:

Bio Energy Technologies Office
This NEPA determination does not require a tailored NEPA provision.
Review completed by Roak Parker, 11/16/2021

FOR CATEGORICAL EXCLUSION DETERMINATIONS

The proposed action (or the part of the proposal defined in the Rationale above) fits within a class of actions that is listed in Appendix A or B to 10 CFR Part 1021, Subpart D. To fit within the classes of actions listed in 10 CFR Part 1021, Subpart D, Appendix B, a proposal must be one that would not: (1) threaten a violation of applicable statutory, regulatory, or permit requirements for environment, safety, and health, or similar requirements of DOE or Executive Orders; (2) require siting and construction or major expansion of waste storage, disposal, recovery, or treatment facilities (including incinerators), but the proposal may include categorically excluded waste storage, disposal, recovery, or treatment actions or facilities; (3) disturb hazardous substances, pollutants, contaminants, or CERCLA-excluded petroleum and natural gas products that preexist in the environment such that there would be uncontrolled or unpermitted releases; (4) have the potential to cause significant impacts on environmentally sensitive resources, including, but not limited to, those listed in paragraph B(4) of 10 CFR Part 1021, Subpart D, Appendix B; (5) involve genetically engineered organisms, synthetic biology, governmentally designated noxious weeds, or invasive species, unless the proposed activity would be contained or confined in a manner designed and operated to prevent unauthorized release into the environment and conducted in accordance with applicable requirements, such as those listed in paragraph B(5) of 10 CFR Part 1021, Subpart D, Appendix B.

There are no extraordinary circumstances related to the proposed action that may affect the significance of the environmental effects of the proposal.

The proposed action has not been segmented to meet the definition of a categorical exclusion. This proposal is not connected to other actions with potentially significant impacts (40 CFR 1508.25(a)(1)), is not related to other actions with individually insignificant but cumulatively significant impacts (40 CFR 1508.27(b)(7)), and is not precluded by 40 CFR 1506.1 or 10 CFR 1021.211 concerning limitations on actions during preparation of an environmental impact statement.

The proposed action is categorically excluded from further NEPA review.

SIGNATURE OF THIS MEMORANDUM CONSTITUTES A RECORD OF THIS DECISION.

NEPA Compliance Officer Signature: Electronically Signed By: Roak Parker Date: 11/16/2021

NEPA Compliance Officer

FIELD OFFICE MANAGER DETERMINATION

☑ Field Office Manager review not required
☐ Field Office Manager review required

BASED ON MY REVIEW I CONCUR WITH THE DETERMINATION OF THE NCO :

Field Office Manager's Signature: _____ Date: _____

Field Office Manager