

PMC-ND

(1.08.09.13)

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



RECIPIENT: NMC, Inc.

STATE: NM

PROJECT TITLE: Optimizing Selection Pressures and Pest Management to Maximize Algal Biomass Yield (OSPREY)

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0002029	DE-EE0008902	GFO-0008902-001	G08902

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 funding to NMC to develop novel processes for outdoor cultivation of algal strains. The project would seek to improve harvest yield, robustness, and conversion yield. Process changes would focus on strain selection, maintenance, cultivation improvement, and pest management in order to achieve the desired improvements. Genetic modification of species would not be performed.

Proposed project activities would be performed over four (4) Budget Periods (BPs), with a Go/No-Go Decision Point in between each BP. Both laboratory and outdoor field cultivation of a field adapted algae strain would be performed. The selected strain would be maintained in different environments at each location (e.g. variables such as temperature and irradiance would be distinct at each location). The strain would be optimized for specific traits via directed evolution and ultraviolet mutagenesis.

Specific tasks are detailed below. Task 1 would be exclusive to BP1. All other tasks would be performed across BPs 2, 3, and 4. BPs 3 and 4 would build on the results of the work performed under BP2.

Task 1: Program Verification – Presentation of technical metrics to DOE to demonstrate project readiness.

Task 2: Establishment and Maintenance of a Field-Adapted Nannochloropsis Strain Across New Field Sites – A field strain of Nannochloropsis, currently cultivated at the Qualitas production facility (Imperial, TX) would be isolated from other algae/bacteria and would be established at three outdoor cultivation sites and four laboratory sites. These are described further below.

Task 3: Characterization of Trait Drift in the Field and Laboratory – Genotype and phenotype characterization of Nannochloropsis would be performed on lab and field cultivars in three month intervals. This analysis would be performed in order to determine the extent and timing of trait loss, conservation, or enhancement across cultivation conditions. The strains would be maintained under different environmental conditions (e.g. different temperatures and irradiances).

Task 4: Optimization of Pest Management – This task would use metagenomics analysis to identify pests within the algal ponds that are associated with decreased productivity. Molecular probes would be designed via computer modeling to track and analyze specific pests of interest. It is not yet known what pests would be found in the ponds.

These could include bacteria, flagellates, or other algae. In all cases, these would be naturally occurring in the field test ponds. Pests would not be introduced or cultivated.

Task 5: Improvement of Field Strain Performance and Composition – Directed evolution and ultraviolet mutagenesis would be applied to the field-adapted *Nannochloropsis* strain, with the goal of provoking improvements in productivity, stability, temperature, pest resistance, and composition. Mutant strains would be analyzed and catalogued. Select mutant strains would then be cultivated under diel cycles to promote the survivability of strains with the desired traits.

Task 6: Evaluation of Optimized Practices and New Strains – An engineering process model would be developed to assess the production potential (e.g. biofuel and bioproducts production) of the mutant strains. Techno-economic assessments, life cycle assessments, and dynamic growth modeling would all also be performed.

BP3 Specific Work: Laboratory maintenance and cultivation protocols would be revised based on the results of previous work. Pest test models would be further developed and pest concentrations would be measured. Directed evolution of algal strains would be performed utilizing improved the strains from BP2. Improved cultivation practices from previous BP would be instituted in the outdoor ponds in BP3.

BP4 Specific Work: Recommendations for enhanced cultivation and pest management practices would be developed.

All project work would be overseen by NMC. Laboratory work would be performed indoors, at existing, purpose-built laboratory facilities. These would include facilities operated by the University of California San Diego ('UCSD' – San Diego, CA), Los Alamos National Laboratory ('LANL' – Los Alamos, NM), New Mexico State University ('NMSU' – Las Cruces, NM), and Phase Genomics (Seattle, WA). Outdoor cultivation would be performed using existing mini-pond systems located at Qualitas Health (Imperial, TX), Cyanotech Corporation (Kailua Kona, HI), UCSD's California Center for Algae Biotechnology (San Diego, CA), and NMSU (Las Cruces, NM) continuously, over a period of three years. No physical modifications to existing facilities, construction of new facilities, ground-disturbing activities, or changes to the use, mission, or operation of existing facilities would be required. Likewise, no additional permits or authorizations would be needed to carry out project work.

Project work would involve the use of biological (i.e., non-toxic bacteria, algae) and chemical (e.g., salts, nutrients) materials. All biological strains used would be naturally occurring, non-toxic, and non-pathogenic. All handling of project materials/strains would occur in controlled, laboratory environments. Each institution would adhere to established health and safety policies and procedures. Protocols would include employee training, the use of personal protective equipment, monitoring, and internal assessments. A Material Transfer Agreement would be established between NMC and its project partners, which would outline the transfer of project materials, including biological strains. No additional permitting would be required for the transport of biological strains since all strains would be non-genetically modified and non-toxic specimens. Waste materials produced as a result of project activities would be disposed of properly. Biological strains would be destroyed using bleach or via autoclaving prior to disposal. NMC and its project partners would observe 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:

Bioenergy Technologies Office

This NEPA determination does not require a tailored NEPA provision.

Review completed by Jonathan Hartman, 12/04/2019

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**

NEPA Compliance Officer

Date: 12/4/2019

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: _____

Field Office Manager

Date: _____