


October 18, 2011

MEMORANDUM FOR ANTHONY V. CUGINI
DIRECTOR, NATIONAL ENERGY TECHNOLOGY LABORATORY

FROM: RICHARD A. HARGIS, JR. 
DIRECTOR, ENVIRONMENTAL COMPLIANCE DIVISION

SUBJECT: Finding of No Significant Impact and Final Environmental Assessment
for Phycal, Inc.'s Proposed Project under the Industrial Carbon Capture
and Sequestration Initiative (DOE/EA-1829)

The National Energy Technology Laboratory (NETL) has completed its required environmental review for a project proposed by Phycal Inc. (Phycal) under the Industrial Carbon Capture and Sequestration Initiative. The environmental assessment (EA) was prepared in accordance with the Council on Environmental Quality's *National Environmental Policy Act of 1969* (NEPA) regulations (40 CFR Parts 1500 to 1508) and the U.S. Department of Energy (DOE) NEPA implementing regulations (10 CFR Part 1021).

This proposed project is one of six that DOE selected for financial assistance from the two phase application period ending on August 7, 2009, funding opportunity announcement DE-FOA-0000015, *Recovery Act – Carbon Capture and Sequestration from Industrial Sources and Innovative Concepts for Beneficial CO₂ Use Initiative*. DOE's proposed action would provide \$48.5 million in financial assistance under a cost-sharing arrangement with Phycal. The cost of the project is estimated at \$60.6 million.

DOE's proposed action is to provide a grant to partially fund Phycal's proposed project to develop an algae farm and processing facility including shallow ponds, greenhouses, laboratory, office space, a process building, and an outdoor area with equipment facilities. The proposed project would be located in Wahiawa and Kalaeloa, Hawaii. The project would be in two phases or modules: Module 1 would provide a baseline assessment of core processes and initial optimization; Module 2 would include the scaling and integration of supporting processes. The first module would include pond grow-out, dewatering and aqueous extraction at the Poamoho site. During the second module, the remaining production capacity would be developed; this would include the anaerobic digesters, fixed carbon processing, and development of the Tesoro site for processing of the algae oil into jet fuel, renewable naphtha, and renewable diesel.

DOE issued the draft EA on August 15, 2011, and distributed it to appropriate federal and state agencies. DOE established a 30-day public comment period that began August 15 and ended September 13, 2011. DOE considered all comments received and made changes in the final EA as appropriate.

On the basis of the evaluations in the final EA, DOE determined that its proposed action of providing a \$48.5 million federal grant and Phycal's proposed project to develop an algae farm and processing facility near Wahiawa and Kalaeloa, Hawaii, would have no significant impact on the human environment. This determination is documented in the attached Finding of No Significant Impact (FONSI) and is supported by the final EA, also attached.

The proposed project would result in minor impacts to electric energy demand, potable water requirements and wastewater discharge, air emissions, an increase in noise, loss of soil, removal of vegetation, disturbance of wildlife species, disposal of solid wastes, increased traffic, and the use and storage of potentially toxic and hazardous materials on site. All other potential environmental impacts identified and analyzed in the EA would be negligible. Therefore, preparation of an environmental impact statement is not required and the Environmental Compliance Division recommends that NETL issue a FONSI for DOE's proposed action and Phycal's proposed project.

RECOMMENDATION: Sign and issue attached FONSI.

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Original to NEPA File (451.1)

**FINDING OF NO SIGNIFICANT IMPACT
FOR
PHYCAL ALGAE PILOT PROJECT
WAHIAWA AND KALAELOA HAWAII**

RESPONSIBLE AGENCY: U.S. Department of Energy (DOE)

ACTION: Finding of No Significant Impact (FONSI)

SUMMARY: DOE completed its *Final Environmental Assessment for the Phycal Algae Pilot Project, Wahiawa and Kalaeloa, Hawaii* (DOE/EA-1829). Based on the analyses in the environmental assessment (EA), DOE determined that there would be no significant adverse impacts from DOE's proposed action of providing financial assistance to Phycal, Inc., (Phycal) to partially fund its development of a pilot algae farm and processing facility in Wahiawa and Kalaeloa, Hawaii. Phycal's proposed project would develop algae technology that demonstrates the future potential of algal oil for biofuels at a level that results in technical, economic, and environmental advantages. This advanced technology would not only enhance the nation's energy supplies through the responsible development of domestic renewable energy but would also reduce CO₂ emissions to the atmosphere.

BACKGROUND: Congress appropriated funding for DOE's Industrial Carbon Capture and Sequestration (ICCS) Program as part of the *American Recovery and Reinvestment Act of 2009* (Recovery Act) (Public Law 111-5, 123 Stat. 115). DOE selected Phycal's proposed project for competitively awarded funding to increase investment in clean industrial technologies and carbon capture and sequestration projects.

The federal action of providing funding for ICCS projects requires compliance with the *National Environmental Policy Act of 1969* (NEPA) (42 U.S.C. 4321 et seq.), the Council on Environmental Quality's regulations (40 CFR Parts 1500 to 1508) and DOE's NEPA implementing procedures (10 CFR Part 1021). Accordingly, DOE prepared an EA to evaluate the potential environmental consequences of providing a grant for this proposed project.

PURPOSE AND NEED: The overall purpose and need for DOE action, pursuant to the ICCS Program and the funding opportunity under the Recovery Act, is to carry out design, construction, and testing of innovative CO₂ utilization technologies and processes at sufficient scale to assess the technical and economic viability of the concepts for implementation at commercial scale. This program would determine possible pathways and novel approaches for reducing CO₂ emissions by developing beneficial uses for the CO₂ in areas where geologic storage may not be feasible. This work focuses on increasing investment in CO₂ utilization projects by selecting projects that have progressed beyond the fundamental research and development stage and are ready for implementation at pilot scale. DOE intends to further this purpose and satisfy this need by providing financial assistance under cost-sharing arrangements

to the projects selected under this funding opportunity announcement, including Phycal's proposed project.

These projects are needed to evaluate advanced technologies that capture CO₂ emissions from industrial sources for beneficial use and reduction of releases to the atmosphere. This project would also meaningfully assist in the nation's economic recovery by creating jobs in the United States in accordance with the objectives of the Recovery Act.

DESCRIPTION OF THE PROPOSED ACTION: DOE's proposed action is to provide partial funding for Phycal's construction and testing of a pilot scale algae farm and processing facility that would utilize CO₂ to cultivate algae, extract oil from the algal biomass and evaluate the oil as a renewable biofuel. The proposed project would be developed in two separate phases or modules. The first module would provide an assessment of the core technologies, including pond grow-out, dewatering, and aqueous extraction. Core infrastructure elements, such as grading/leveling, fencing, and power connections at the Poamoho site would also be carried out during this phase to support the total development of the project. Once completed, this first module would represent 15-20 percent of the final production capacity of the algae farm. The second module would develop the remaining 80-85 percent of the production capacity, including the anaerobic digesters, fixed carbon processing, and development of the Tesoro site for processing of the algal oil into renewable jet fuel, naphtha, and diesel.

The anticipated process activities for the proposed project at the Poamoho site in Wahiawa would include the following facility components: approximately ten acres of shallow ponds of various sizes for grow-out of algae crop; six greenhouses for initial phase grow-out of algae strains; one visitor trailer and three employee trailers including a building housing indoor algal growing and oil boosting (Heteroboost™) as well as raw material storage and a lay down area. There would also be an outdoor area with processing equipment facilities and storage tanks to support oil removal and purification equipment, a conditioning unit to purify and recycle water, an anaerobic digester (methane captured from the anaerobic digester would be oxidized onsite using a thermal oxidizer), and gas storage (CO₂, propane, nitrogen). The facilities at the Poamoho site would be approximately 5,000 square feet and would house laboratory and bench-scale oil conversion equipment. Areas outside of the facilities would be used to store gases and small quantities of oil product.

The Tesoro Site is situated on vacant industrial lands in the James Campbell Industrial Park, which is located in Kalaeloa, Ewa District, on the island of Oahu. The algal oil product would be transported off-site for refinement by Tesoro at its existing facility in the industrial park. Adjacent to Tesoro, the site would house a small, pilot-scale General Electric Research Center unit that would convert the algal oil into renewable jet fuel, naphtha, and diesel in small quantities (i.e., less than 75 gallons per day (gpd) maximum throughput). The Tesoro site would also have an equipment trailer with a single office space, and a covered, outdoor chemical, algal oil, and fuel storage area. The covered storage area would have engineered secondary containment and capacity to store sixteen algal oil drums, four fuel drums, one drum of sulfur, and two wastewater drums.

The project would generate cost information and test data to assess the technology viability for future implementation at commercial scale. DOE would provide \$48.5 million in financial assistance in a cost-sharing arrangement with the project proponent, Phycal. The cost of the project is estimated at \$60.6 million. Additionally, the project would create approximately 40 jobs for the duration of the three-year pilot program.

ALTERNATIVES CONSIDERED: In addition to the proposed project, DOE considered the No Action Alternative as required under NEPA. Under the No Action Alternative, DOE would not provide funds for the proposed project. For the purposes of the EA, DOE assumed that the project would not proceed without DOE funding. This assumption establishes a baseline against which the potential environmental impacts of the proposed project are compared.

ENVIRONMENTAL CONSEQUENCES: DOE evaluated the potential environmental consequences of the proposed project and the No Action Alternative. DOE considered seventeen environmental resource areas in the preparation of the EA. However, not all areas were evaluated at the same level of detail. DOE focused more detailed analysis on areas that would require new or revised permits, have the potential for significant adverse environmental impacts, or have the potential for controversy. The areas DOE evaluated in more detail included utilities and energy use, air quality and greenhouse gas emissions, noise, geology and soils, vegetation and wildlife, solid and hazardous wastes, transportation and traffic, and human health and safety. For these areas, DOE determined there would be minor environmental impacts.

During construction, Phycal would provide utilities to the project sites. Generators would be used for electrical power until electric service connections are completed. Water would be trucked onto the site and stored in bladders. Domestic wastewater would be maintained through use of a self contained wastewater collection system (portable toilets).

The project would require a peak load of 1.5 megawatts of electricity to power the labs and office spaces, equipment and algae ponds on both the Poamoho and Tesoro sites. During operations, the proposed project's potable water requirements for the Poamoho site and Tesoro sites would be trucked in from a source acceptable to the Board of Water Supply and stored on-site. The proposed project's potable water requirements are estimated at an average daily demand of 928 gpd for the Poamoho site and 32 gpd for the Tesoro site. Domestic wastewater at the Poamoho site would be managed through an on-site wastewater pump station that would discharge sewage through a new pipeline connected to an existing 10-inch pipeline. Wastewater flows are estimated at 14,200 gpd. The majority of the wastewater from pond operations and processing at the Poamoho site would be reconditioned in the on-site facility to allow for reuse in the ponds. An onsite disposal system, consisting of a septic tank and leachfield, would be installed for domestic wastewater at the Tesoro site.

The quantity of emissions released during the construction process would generally be low. Fugitive dust emissions from the construction site would be minimized using appropriate suppression control methods. Air quality monitoring would be implemented to ensure compliance with National Ambient Air Quality Standards and State Ambient Air Quality Standards. Due to the limited duration of the construction phases, DOE expects the overall

impacts to air quality from the construction of the proposed project would be short-term and minor. The proposed project would have minimal impacts on ambient air quality during operation. Emissions sources at the Poamoho site include the propane-fired, 10 million British Thermal Unit (MM BTU) boiler, a propane-fired 2 MM BTU thermal oxidizer, and a supplemental 1230 kilowatt diesel generator. The proposed project is required to obtain a Noncovered Source Permit with the State Department of Health (DOH), Clean Air Branch, and would be subject to state and federal regulations. Operations at the Tesoro processing facility would also have minimal impacts on ambient air quality. Gases emitted from the combustion flare include water vapor, CO₂, nitrogen, and sulfur dioxide. The overall CO₂ emissions from the proposed project would be low.

Construction activities would result in short-term, intermittent and localized noise impacts. Construction trucks and personal vehicles would add to the regional traffic noise and the use of heavy equipment and delivery trucks would increase noise levels at the site. While significant impacts from these increased noise levels are not anticipated, Phycal would implement mitigation measures to minimize noise impacts; these measures include limiting work to daytime hours and reducing idling when not in use.

Impacts from operational noise are expected to be minor. At the Pomoho site, all significant noise producing equipment would be located toward the southern end of the property line – furthest away from the residential areas. At the Tesoro site, noise levels would be minimal and within the allowable ranges associated with industrial areas. All operations associated with this proposed project would comply with the noise guidelines in Title 11, Chapter 46 of the Hawaii Administrative Rules.

The construction of the proposed project would result in minor impacts to geology and soils at both of the sites. At the Poamoho site, Phycal would regrade the soils, level the land, and install new drainage area and wastewater service. The Tesoro Site is nearly flat and minimum grading would be necessary. The overgrown vegetation and brush would be cleared for the placement of the equipment and trailer facility. Some added impervious surfaces onsite would contribute to a slight increase in stormwater runoff. To mitigate this effect, a small infiltration basin would be constructed adjacent to the facility to collect runoff and promote infiltration into the permeable soils.

Temporary erosion control measures would be incorporated during the construction period to minimize soil loss and erosion hazards. Phycal would use Best Management Practices (BMPs), including: sediment traps; temporary diversion berms and swales; silt fences; dust fences; inlet protection; stabilized construction entrances; and truck wash-down areas. Operations would have no impacts to either geology or soil resources.

Phycal conducted a botanical survey for both the Poamoho and Tesoro sites and the potential for rare, threatened or endangered species or habitat was found to be unlikely. While no endangered Hawaiian waterbirds were detected during the survey, several listed waterbird species may be attracted to the facility at the Poamoho site. The U.S. Fish and Wildlife Service (USFWS) approved a plan to implement on-site endangered waterbird BMPs. These include: (1) an on-

site Endangered Species Awareness Program and (2) predator trapping for feral cats and mongoose. A complete list of BMPs requested by USFWS is provided in Appendix C of the final EA. With the proposed BMPs in place, the proposed project would not be likely to adversely affect federally-listed threatened or endangered species. No mitigation measures would be required for wildlife impacts at the Tesoro site.

Solid waste resulting from production outputs of the proposed project, such as biomass, gums, waxes, and sulfur, would be collected and placed into an anaerobic digester located on the site. After digestion, the material would be used as compost and fertilizer within the project site. No solid waste would be generated from the Tesoro site. Solid waste management would conform to State DOH and County requirements.

The operations of the pilot processing facility at the Poamoho and Tesoro sites would involve the use of hazardous materials in facilities maintenance activities, including fuels, lubricants and cleaning products. The laboratory processes and algae oil extraction process would also require the use of chemicals, some of which are classified as hazardous materials. Hazardous waste from operations of the project would meet applicable environmental standards and regulations. Hazardous materials kept on site would be properly stored on the site.

Short-term but measurable adverse impacts to traffic are expected during the construction phase. Approximately 65 construction workers would be at the site during the construction phase. Construction-related vehicles would add to existing local traffic and would cause minor congestion, higher traffic noise, and increased vehicle emissions. Construction impacts to existing transportation resources would be minor, temporary and localized, and could be accommodated through the existing road network. The operation of the Poamoho and Tesoro sites would generate a minor long-term increase in personal vehicle traffic due to employment of 37 workers at the Poamoho site and two workers at the Tesoro site. Deliveries to the site would be made on an as-needed basis to support operations.

The project would store and use some potentially toxic and hazardous materials on site for the production and processing of the algae. Toxic substances would also be generated from the refinery process at the Tesoro site. Hazardous substances kept on the proposed project sites would be stored appropriately in designated areas of the site. Appropriate training would be provided to employees handling any toxic or hazardous substances. The risk of exposure to the general population is negligible since operations would be contained within the designated project sites, secured against public access, and away from the general public. DOE determined that, with appropriate safety procedures in place and the use of personal protective equipment, the potential for an impact to the health and safety of workers would be minor.

The other environmental areas DOE evaluated for potential impacts were land use; meteorology; socioeconomics; environmental justice; visual resources; cultural resources; wetlands and floodplains; and surface and groundwater. DOE determined that there would be no potential for adverse impacts for these resource areas or that the impacts would be negligible, temporary, or both. The EA gives the reasons DOE did not conduct more detailed evaluations of these areas.

NO ACTION ALTERNATIVE: Under the No Action Alternative, the project would either be delayed, as Phycal sought other funding sources, or abandoned altogether. If abandoned, the potential environmental consequences and benefits would not occur.

PUBLIC AVAILABILITY: DOE distributed the draft EA on August 15, 2011, and advertised its release in the *Honolulu Star Advertiser* on August 14, 2011. In addition, DOE sent copies for public review to the Wahiawa Public Library, 820 California Avenue, Wahiawa, HI 96786 and the Kapolei Public Library, 1020 Manawai Street, Kapolei, HI 96707. DOE established a 30-day public comment period that began August 15 and ended September 13, 2011. DOE announced it would accept comments by mail, e-mail, and facsimile.


The draft EA was distributed to various federal, state, and local agencies with jurisdiction or special expertise. DOE conducted consultations with the USFWS, the State Department of Land and Natural Resources (National Heritage Program), the Office of Hawaiian Affairs (OHA), Hawaiian Civic Clubs of Honolulu, Hui Malama I Na Kupuna O Hawaii Nei, Oahu Island Burial Council, and the State Historic Preservation Division (SHPD) per requirements of Section 7 of the Endangered Species Act and Section 106 of the National Historic Preservation Act. Responses were received from USFWS, OHA, and SHPD. In each case, the correspondence supported DOE's determinations of no potential impacts to threatened or endangered species and critical habitat and no potential impacts to properties listed on or eligible for inclusion in the *National Register of Historic Places*. Copies of the letters and the responses received are included in Appendix A of the final EA.

DOE received comments on the draft EA from the State of Hawaii-Department of Agriculture, State of Hawaii-OHA, and the USFWS. The State of Hawaii-Department of Agriculture asked whether the pilot project would include research and assessment of the feasibility of alternative uses of by-products of algae processing. The State of Hawaii-OHA commented on algae genera that would be grown in the ponds and stated that it had no objections to the impacts as described in the draft EA. The USFWS commented on the project's affect on Hawaiian waterbirds and requested that BMPs be implemented to mitigate impacts. DOE requires and Phycal agrees to implement the measures requested by USFWS. DOE and Phycal addressed all comments received, and responses to the comments are included in the body of the final EA and Appendix C.

Copies of the final EA and this FONSI will be sent to stakeholders that provided comments or consultation and will be available on DOE's NETL web site at <http://www.netl.doe.gov/publications/others/nepa/ea.html>.

DETERMINATION: On the basis of the evaluations in the final EA, DOE determined that its proposed action to provide a \$48.5 million federal grant and Phycal's proposed project to develop an algae farm and processing facility in Wahiawa and Kalaeloa, Hawaii, would have no significant impact on the human environment. All potential environmental impacts identified and analyzed in the EA would not be significant. Therefore, preparation of an environmental impact statement is not required, and DOE is issuing this FONSI.

Issued in Pittsburgh, Pennsylvania, this __ day of November, 2011.



Anthony V. Eugini
Director
National Energy Technology Laboratory