STATEMENT OF CONSIDERATIONS

REQUEST BY EASEL BIOTECHNOLOGIES, LLC ("EASEL") FOR AN ADVANCE WAIVER OF PATENT RIGHTS UNDER DOE AWARD NO. DE-EE0005773; W(A) 2015-013

EASEL has requested a waiver of patent rights of the United States of America for all subject inventions arising from its participation under the above referenced award entitled "Bio-Oxo Technology." The award was made under the Innovative Manufacturing Initiative (DE-FOA-0000560).

As described in the waiver petition, under the award, Easel will "use a lignocellulosic biomass source as a feedstock to produce Oxo chemicals such as isobutyraldehyde in an effort to increase yields and reduce the energy consumption of the Oxo chemical production process." Easel will be "genetically modifying non-pathogenic *Escherichia coli* strains."

The total anticipated cost of the project is $2.5 million of which $500,000 will be cost share for a cost share percentage of 20%. This waiver is contingent upon EASEL maintaining a cost sharing percentage of at least 20% during the course of the award. The period of performance for the award is December 2014 to December 2017.

According the waiver petition, the research efforts of EASEL will be led by three senior research scientists, Drs. Yixin Huo, Lars Rohlin, and Wendy Higashide. Dr. Huo was the first to demonstrate a carbon and nitrogen neutral biofuel production process, which was the featured cover story in Nature Biotechnology and highlighted by the Nature Chemical Biology and Nature journals. His patents in biofuel production are the basis for EASEL's commercialization processes. Dr. Rohlin has over 20 publications in both engineering and molecular biology. Dr. Higashide was an inventor of the first direct production of isobutyraldehyde from CO_2 and sunlight using cyanobacterium *Synechococcus* sp. PCC 7942 and developed a cellulose degrading Clostridium strain to produce isobutanol directly from cellulose.

EASEL was founded by Dr. James Liao and Nantworks LLC (Nantworks) in 2010. Nantworks is the umbrella organization for the following entities: NantHealth, NantMobileHealth, NantOmics, NantBioScience, NantCell, NantPharma, NantCapital and NantCloud. Nantworks has had much success in developing its subsidiaries. Recently, NantOmics has raised $150 million and NantCell has raised $100 million.

Prior to this award, EASEL has invested years of manpower (*e.g.*, scientists, technicians, scientific advisors) and significant monetary resources for the successful advancement of its bio-Oxo technology. With the successful maturation of the technology under this award, EASEL and Nantworks would pursue commercialization of it, including seeking partnerships to create pilot programs to demonstrate that the technology can scale to production levels.

EASEL has agreed that this waiver shall be subject to the march-in and preference for U.S. industry provisions, as well as the U.S. Government license, comparable to those set out in 35 U.S.C. 202-204. Further, EASEL has agreed to the attached U.S. Competitiveness provision,

paragraph (t). In brief, EASEL has agreed that products embodying a waived invention or produced through the use of a waived invention will be manufactured substantially in the United States unless EASEL can show to the satisfaction of the DOE that it is not commercially feasible to do so.

Referring to item 10 of the waiver petition, granting this waiver is anticipated to have a minimal effect on limiting competition. There are numerous competing technology attempting to create production level Oxo from various forms of biomass that differ from the targeted approach under this award. The granting of this waiver should not impact the ability for others to continue to explore these different technologies.

Considering the foregoing, it is believed that awarding this waiver will provide EASEL with the necessary incentive to invest its resources in commercializing the results of the award in a manner that will make the above technology available to the public in the shortest time. Therefore, upon evaluation of the waiver petition and in view of the objectives and considerations set forth in 10 CFR 784, all of which have been considered, it is recommended that the requested waiver be awarded.

[redacted]

Glen R. Drysdale
Patent Attorney
Golden Field Office

Date: 12/29/15

Based upon the foregoing Statement of Considerations and representations in the attached waiver petition, it is determined that the interests of the United States and the general public will be best served by a waiver of patent rights of the scope determined above, and therefore the waiver is awarded. This waiver shall not apply to any modification or extension of the award, where through such modification or extension, the purpose, scope, or cost of the award has been substantially altered.

CONCURRENCE:

[redacted]

Mark Johnson
Office Director
Advanced Manufacturing Office

Date: February 24, 2016

APPROVAL:

[redacted]

John T. Lucas
Assistant General Counsel for Technology
Transfer and Intellectual Property

Date: 3/10/2016

(t) U.S. COMPETITIVENESS

The Contractor agrees that any products embodying any waived invention or produced through the use of any waived invention will be manufactured substantially in the United States unless the Contractor can show to the satisfaction of the DOE that it is not commercially feasible to do so. In the event the DOE agrees to foreign manufacture, there will be a requirement that the Government's support of the technology be recognized in some appropriate manner, *e.g.*, recoupment of the Government's investment, etc. The Contractor agrees that it will not license, assign or otherwise transfer any waived invention to any entity unless that entity agrees to these same requirements. Should the Contractor or other such entity receiving rights in the invention undergo a change in ownership amounting to a controlling interest, then the waiver, assignment, license, or other transfer of rights in the waived invention is suspended until approved in writing by the DOE.