

PMC-ND
(1.08.09.13)

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



RECIPIENT: University of North Dakota Energy & Environmental Research Center

STATE: ND

PROJECT TITLE : Low-Pressure Electrolytic Ammonia Production

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA 0001465	DE-EE0008324	GFO-0008324-001	

Based on my review of the information concerning the proposed action, as NEPA Compliance Officer (authorized under DOE Order 451.1A), 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.
B3.15 Small-scale indoor research and development projects using nanoscale materials	Siting, construction, modification, operation, and decommissioning of facilities for indoor small-scale research and development projects and small-scale pilot projects using nanoscale materials in accordance with applicable requirements (such as engineering, worker safety, procedural, and administrative regulations) necessary to ensure the containment of any hazardous materials. Construction and modification activities would be within or contiguous to a previously disturbed or developed area (where active utilities and currently used roads are readily accessible).

Rationale for determination:

The U.S. Department of Energy (DOE) is proposing to provide funding to the University of North Dakota's (UND) Energy & Environmental Research Center (hereafter 'EERC') to develop a method for the synthesis of ammonia with a reduced energy input requirement. A low pressure process would be developed using nitrogen and hydrogen gas as feed sources, and electricity, in a high temperature proton exchange membrane.

Proposed project activities would include polymer/monomer analysis and testing, computer modeling, cathode catalyst performance screening, electrolyte, polymer and nanofiber synthesis, process development and performance optimization, and the design, fabrication, and operation of a low-pressure electrolytic ammonia system. All work activities would be carried out at the facilities of EERC and its sub-recipients. EERC (Grand Forks, ND) would be responsible for developing and testing an inorganic proton-conducting ceramic, as well as designing and testing a bench-scale membrane electrode assembly for the production of ammonia; North Dakota State University ('NDSU' – Fargo, ND) would be tasked with the development of polymer-inorganic membrane synthesis methods and durability optimization; Proton OnSite (Wallingford, Connecticut) would be responsible for developing ink formulations and deposition parameters to integrate membranes and catalysts; UND's Department of Chemistry (Grand Forks, ND) would be responsible for catalyst characterization and synthesis.

The proposed project would involve the use and handling of various hazardous materials including industrial organic solvents, gases (e.g. nitrogen and hydrogen), polymers (e.g. polybenzimidazole), metals (e.g. alkali metal blends), ceramics, and plastics. These substances would be used and handled in amounts under one-kilogram. Ammonia is included on the EPA's Extremely Hazardous Substances List. Ammonia production would be limited to amounts under 100 g per day. This amount falls below EPA's reporting threshold of 100 lbs., per the U.S. Emergency Planning and Community Right-to-Know Act. All laboratory, manufacturing, and R&D centers where project work would be conducted are purpose-built facilities operated by EERC or its sub-recipients. No change in the use, mission or

operation of existing facilities would arise as a result of the proposed project. EERC and its sub-recipients all have internal health, safety and waste management policies and procedures in place that would be followed for all work activities. These include employee training, use of proper personal protective equipment, equipment controls, monitoring, and internal assessments. All project activities would also comply with existing Federal, State and local environmental regulations.

NDSU and UND's Department of Chemistry would both potentially use nano-scale materials for the project activities that they would undertake. NDSU would make use of nanotechnology for the fabrication of continuous fibers used in the manufacture of organic-inorganic composite membranes. Nanofibers would be contained using specially designed nanofiber collectors. Proper safety procedures for the handling of these materials would be adhered to, including the use of fume hoods with controlled air circulation, protective coats, respirator masks, and goggles. All nanofibers would be disposed of in accordance with University Laboratory Safety Regulations. UND's Department of Chemistry would fabricate particles of catalyst materials, some of which may be at the nanoscale. Particles would be kept in a liquid solution, which would chemically react with a polymer membrane and become permanently bonded to the surface, mitigating the risk of an airborne hazard. Solutions containing nanoparticles would be disposed of by the UND Office of Safety in compliance with university policy and procedures.

Based on the review of the proposal, DOE has determined the proposal fits within the class of action(s) and the integral elements of Appendix B to Subpart D of 10 CFR 1021 outlined in the DOE categorical exclusion(s) selected above. DOE has also determined that: (1) there are no extraordinary circumstances (as defined by 10 CFR 1021.410 (2)) related to the proposal that may affect the significance of the environmental effects of the proposal; (2) the proposal has not been segmented to meet the definition of a categorical exclusion; and (3) the proposal is not connected to other actions with potentially significant impacts, related to other proposals with cumulatively significant actions, or an improper interim action. This proposal is categorically excluded from further NEPA review.

NEPA PROVISION

DOE has made a final NEPA determination for this award

Insert the following language in the award:

If the Recipient intends to make changes to the scope or objective of this project, the Recipient is required to contact the Project Officer, identified in Block 15 of the Assistance Agreement before proceeding. The Recipient must receive notification of approval from the DOE Contracting Officer prior to commencing with work beyond that currently approved. If the Recipient moves forward with activities that are not authorized for Federal funding by the DOE Contracting Officer in advance of a final NEPA decision, the Recipient is doing so at risk of not receiving Federal funding and such costs may not be recognized as allowable cost share.

Note to Specialist :

Advanced Manufacturing Office
 This NEPA determination does not require a tailored NEPA Provision
 NEPA review completed by Jonathan Hartman 5/30/2018

SIGNATURE OF THIS MEMORANDUM CONSTITUTES A RECORD OF THIS DECISION.

NEPA Compliance Officer Signature:  _____ Date: 5/30/2018
 NEPA Compliance Officer

FIELD OFFICE MANAGER DETERMINATION

Field Office Manager review required

NCO REQUESTS THE FIELD OFFICE MANAGER REVIEW FOR THE FOLLOWING REASON:

- Proposed action fits within a categorical exclusion but involves a high profile or controversial issue that warrants Field Office Manager's attention.
- Proposed action falls within an EA or EIS category and therefore requires Field Office Manager's review and determination.

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

Field Office Manager's Signature: _____ Date: _____
 Field Office Manager