



PROJECT ENVIRONMENTAL REVIEW
MEMORANDUM TO THE RECORD

Lead Organization: Purdue University

Project Title: Crash Safety of Batteries for Passenger
Vehicle

Date: 11/6/2013

Approved: [Signature]
William J. Bierbower
ARPA-E NEPA Compliance Officer
Concurred: [Signature]
Ping Liu
ARPA-E Program Director

INSTRUCTIONS: Please complete Sections I - V of this memorandum form. Please complete all relevant fields. Where a particular field is irrelevant to the project under review, please indicate "N/A" in the field.

SECTION I. PROJECT INFORMATION

Funding Opportunity Announcement (if any): DE-FOA-0000869 (RANGE)

Lead Organization: Purdue University

Other Participants (Subrecipients, Contractors, etc.): N/A

Locations of Work (City, State): West Lafayette, IN

SECTION II. NEPA ANALYSIS

A. CATEGORICAL EXCLUSION(S) APPLIED

The activities to be conducted under this project fit within the class(es) of actions listed in Categorical Exclusion(s) B3.6. Categorical Exclusion(s) cover(s):

B3.6: Small-scale research and development, laboratory operations, and pilot projects. Siting, construction, modification, operation, and decommissioning of facilities for small-scale 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.

The proposed activities satisfy the elements and requirements of Categorical Exclusion(s).

Purdue University (Purdue) proposes to conduct small-scale research, development, and testing of battery systems that increase impact shock absorption of electric vehicles. The proposed activities aim to improve the safety of manufactured batteries at significantly lower costs than current technologies.

Specifically, Purdue propose to: (1) conduct vehicle system analysis, including determining battery pack design goals, selecting a baseline electric vehicle platform and design parameters of battery design and vehicle crash conditions, performing analysis of energy dissipation of battery packs and the potential vehicle impact safety, and understanding the effect of the physical movement of battery cells on the electrical connection and battery management system; (2) Conduct battery design and modeling, including analyzing candidate battery designs using mechanical modeling to evaluate their energy dissipation capacities, and comparing candidate battery designs and down select a design for fabrication (3) conduct impact energy dissipation demonstration, including a detail build and assembly, safety and maintenance approvals, and data analysis and documentation; and (4) conduct technology-to-market activities.

Minor modifications will be made to Purdue facilities to accommodate the proposed project work. The proposed activities will require the addition of an exhaust hood and ducts to the existing laboratories at Purdue Armstrong building. The proposed modifications do not represent a change in the overall use, mission, or operation of the facility.

B. EXTRAORDINARY CIRCUMSTANCES ANALYSIS (All Categorical Exclusions)

The proposed project will involve the following:

- a. Use, handling, storage, transport, or disposal of radioactive, toxic, or hazardous chemicals or materials Yes No
- b. Use, handling, storage, transport, or disposal of genetically engineered organisms recombinant DNA. Yes No
- c. Use, handling, storage, transport, or disposal of nanoscale materials Yes No
- d. Use, handling, storage, transport, or disposal of solid wastes Yes No
- e. Emissions into the ambient air Yes No
- f. Release of pollutants/contaminants into water resources Yes No
- g. Substantial noise pollution Yes No
- h. Adverse community-based environmental impacts Yes No

Comments: Project activities include the use, handling, storage and disposal of small quantities of hazardous materials. Purdue will use polymer resin used for rapid-prototype 3D printing during fabrication and assembly, and leakage of electrolyte materials from the batteries. The laboratory facilities where the proposed activities will occur are dedicated research and development facilities, designed for the use, storage, and disposal of these materials. Appropriate safety controls, personal protective equipment, storage and containment systems, and staff training requirements, are in place at the Purdue facility to mitigate risk to health and safety. All hazardous materials will be disposed in accordance with all applicable federal, state, and local requirements.

Small amounts of non-hazardous solid wastes, including solidified polymer resin and scrap metal pieces, will be disposed of by Purdue as a result of 3D printing processes and fabrication activities. These materials will be disposed of through the existing university solid waste management system, and in accordance with applicable requirements.

The project activities at Purdue will result in de minimis release of fumes and smoke as a result of mechanical impact testing. Purdue will install a fume collector, exhaust hood, and exhaust

ducts to mitigate risks from the proposed activities.

C. INTEGRAL ELEMENTS ANALYSIS (Appendix B Categorical Exclusions Only)

The proposed project will:

- a. Threaten a violation of applicable statutory, regulatory, or permit requirements for environment, safety, and health or similar requirements of DOE or Executive Orders.

Yes No

- b. Require siting/construction or major expansion of waste storage, disposal, recovery, or treatment facilities.

Yes No

- c. Disturb hazardous substances, pollutants, contaminants, or petroleum/natural gas products that preexisted in the environment, resulting in an uncontrolled/unpermitted release.

Yes No

- d. Have potential to cause significant impacts on environmentally sensitive resources.

Yes No

- e. For projects involving genetically engineered (GE) organisms, synthetic biology, governmentally designated noxious weeds, or invasive species:

- i. Such organisms will be contained and confined in a manner designed and operated to prevent unauthorized release into the environment.

N/A Yes No

- ii. Activities involving recombinant DNA will be conducted in accordance with NIH Guidelines for Research Involving Recombinant DNA Molecules

N/A Yes No

- iii. Activities involving GE organisms with pesticidal qualities will be conducted in accordance with the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) (7 U.S.C. § 136 et seq.) and EPA's FIFRA Implementing Regulations (40 C.F.R. Parts 150-189).

N/A Yes No

iv. Activities involving GE organisms that may pose a risk to plant/animal health will be conducted in accordance with the APHIS Regulations (7 C.F.R. Part 340).

N/A Yes No

v. Activities involving new GE organisms will be conducted in accordance with the Toxic Substances Control Act (TSCA) (15 U.S.C. § 2601 et seq.) and EPA's TSCA Implementing Regulations (7 C.F.R. Parts 700-790).

N/A Yes No

Comments: N/A

SECTION III. ADDITIONAL COMMENTS/ANALYSIS

The proposed action consists of small scale research and development activities to be performed in existing testing facilities equipped and designed for such activities. The proposed action fits squarely within Categorical Exclusion B3.6, presents no extraordinary circumstances, and satisfies the integral elements for projects categorically excluded under Appendix B of 10 C.F.R. Part 1040.

SECTION IV. RECOMMENDATION FOR CONDITION ON AWARD

It is recommended that the following condition be included in the award:

No NEPA-related condition need be included in the award.

SECTION V. RECOMMENDATION FOR CATEGORICAL EXCLUSION

The activities to be conducted under this project fit within the class of activities identified under the Department of Energy Categorical Exclusion(s) identified above.

The review has not identified any extraordinary circumstances related to the specific project that may affect the significance of the environmental effects of the project.

It is recommended that no further review under NEPA is required; however, any changes to the project may require further review.

Please find attached the selectee's completed and signed NEPA Questionnaire.



U.S. Department of Energy Categorical Exclusion Determination Form

Submit by E-mail

Proposed Action Title: (0869-1522) Purdue University--Crash Safety of Batteries for Passenger Vehicle

Program or Field Office: Advanced Research Projects Agency-Energy

Location(s) (City/County/State): West Lafayette, IN

Proposed Action Description:

Purdue University proposes to conduct small-scale research, development, and testing of battery systems that increase impact shock absorption of electric vehicles. The proposed activities aim to improve the safety of manufactured batteries at significantly lower costs than current technologies.

Categorical Exclusion(s) Applied:

B3.6 - Small-scale research and development, laboratory operations, and pilot projects

For the complete DOE National Environmental Policy Act regulations regarding categorical exclusions, including the full text of each categorical exclusion, see Subpart D of 10 CFR Part 1021.

Regulatory Requirements in 10 CFR 1021.410(b): (See full text in regulation)

The proposal 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 proposal that may affect the significance of the environmental effects of the proposal.

The proposal 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.

Based on my review of the proposed action, as NEPA Compliance Officer (as authorized under DOE Order 451.1B), I have determined that the proposed action fits within the specified class(es) of action, the other regulatory requirements set forth above are met, and the proposed action is hereby categorically excluded from further NEPA review.

NEPA Compliance Officer:

Date Determined: 11/06/2013