

# DOE-ID NEPA CX DETERMINATION

## Idaho National Laboratory

**SECTION A. Project Title:** INL Evaluation of Super-concentrated Electrolytes for Li-ion Cells for Renault Group

**SECTION B. Project Description and Purpose:**

Revision 1

This environmental checklist is being revised as a 1st tier document to address activities at Boise State University (BSU) that are not covered in the previously referenced overarching EC. The scope, work activities, environmental impacts, and conditions and instructions have not changed.

Original EC

Idaho National Laboratory (INL) proposes to oversee modeling and laboratory evaluation of super-concentrated battery electrolytes considered for use within lithium-ion battery cells. Modeling will be facilitated by the INL advanced electrolyte model (AEM).

Project objectives are listed below:

For the electrolyte systems of interest, apply AEM to determine a variety of transport and thermodynamic properties. These would include, but not be limited to the following over salt concentration and temperature: conductivity, diffusivity (all species), apparent diffusivity, viscosity, transference number, salt activity coefficient, solvated ion diameters, solvent-to ion binding energies (average and by ligand), solution permittivity, solvent permittivity, Walden parameters, osmotic pressure, solvent activity, preferential ion solvation, ionic velocities under potential gradients and others. Regarding conductivity, INL will investigate and discuss the following factors that influence conductivity, as utilized within a modified Stoke's Law expression:

- random motion effects,
- solvent-ion (dipole) effects,
- counter-ion effects,
- solvated ion sizes,
- viscosity,
- ion association,
- ion hopping.

Evaluations involve salt concentrations to 5 molal (or greater as needed) and temperatures ranging from -30 to 60°C. Twenty-five total cases will be considered with single salts: for example, 10 single-solvent electrolyte cases and up to 15 multi-solvent cases and may be extended to include up to five (5) mixed salt systems.

Laboratory conductivity measurements will be made for priority systems (multi-solvent) to validate AEM predictions. INL will oversee a subcontract with Boise State University for performing the laboratory measurements of electrolyte properties. In addition, a small number of prioritized electrolytes will be tested in coin cells (type CR-2032) to determine feasibility in a Li-ion cell environment.

**SECTION C. Environmental Aspects or Potential Sources of Impact:**

**Generating and Managing Waste**

The only waste that is anticipated to be generated are the electrolyte solutions to be tested at Boise State University (BSU) and perhaps very small amounts of cathode and anode materials used for lithium-ion cells. Management and disposition of the waste would be handled by BSU personnel.

**Using, Reusing, and Conserving Natural Resources**

All applicable waste will be diverted from disposal in the landfill when possible. Project personnel will use every opportunity to recycle, reuse, and recover materials and divert waste from the landfill when possible. The project will practice sustainable acquisition, as appropriate and practicable, by procuring construction materials that are energy efficient, water efficient, are bio-based in content, environmentally preferable, non-ozone depleting, have recycled content and are non-toxic or less-toxic alternatives. New equipment will meet either the Energy Star or Significant New Alternatives Policy (SNAP) requirements as appropriate (see <http://www.sftool.gov/GreenProcurement/ProductCategory/14>).

**SECTION D. Determine Recommended Level of Environmental Review, Identify Reference(s), and State Justification:** Identify the applicable categorical exclusion from 10 Code of Federal Regulation (CFR) 1021, Appendix B, give the appropriate justification, and the approval date.

For Categorical Exclusions (CXs), the proposed action must not: (1) threaten a violation of applicable statutory, regulatory, or permit requirements for environmental, safety, and health, or similar requirements of Department of Energy (DOE) or Executive Orders; (2) require siting and construction or major expansion of waste storage, disposal, recovery, or treatment or facilities; (3) disturb hazardous substances, pollutants, contaminants, or Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)-excluded petroleum and natural gas products that pre-exist in the environment such that there would be uncontrolled or unpermitted releases; (4) have the potential to cause significant impacts on environmentally sensitive resources (see 10 CFR 1021). In addition, no extraordinary circumstances related to the proposal exist that would affect the significance of the action. In addition, the action is not

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“connected” to other action actions (40 CFR 1508.25(a)(1) and is not related to other actions with individually insignificant but cumulatively significant impacts (40 CFR 1608.27(b)(7)).

**References:** National Environmental Policy Act (NEPA) Implementing Procedures, Final Rule, 10 CFR 1021 Appendix B to Subpart D, Categorical Exclusion B3.6, "Small-scale research and development, laboratory operations, and pilot projects."

**Justification:** Project activities are consistent with 10 CFR 1021 Appendix B to Subpart D, Categorical Exclusion B3.6, "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."

Is the project funded by the American Recovery and Reinvestment Act of 2009 (Recovery Act)       Yes    No

Approved by Jason Sturm, DOE-ID NEPA Compliance Officer on: 10/08/2019