

SECTION A. Project Title: Fundamental Electrochemical Properties of Liquid Metals in LiCl-KCl for Separation of Alkali/Alkaline-Earths (Cs, Sr, and Ba) – The Pennsylvania State University

SECTION B. Project Description

The Pennsylvania State University proposes to investigate and develop selective liquid metal electrodes for the electrochemical separation of the alkali/alkaline-earth elements of Cs, Sr, and Ba from molten salt electrolyte.

SECTION C. Environmental Aspects / Potential Sources of Impact

Chemical Use/Storage / Chemical Waste Disposal / Hazardous Waste Generation – The proposed research will use laboratory chemicals such as halide salts and metals for electrochemical experiments. The moisture-sensitive chemicals of halide salts and reactive metals will be stored in the argon-filled gloveboxes. Non-reactive chemicals such as tungsten and precious metal wire will be stored in chemical cabinets. Flammable liquids such as acetone will be stored in a flammable cabinet. The chemical inventory will be updated periodically to ensure safe use and handling of chemicals. Typical electrochemical experiments will use about 50 grams of halide salt mixture (LiCl-KCl) and 10 grams of metal electrodes. The proposed research involves use of reactive metals (e.g., Ba). The preparation and measurement of the experiments will be performed under an inert argon atmosphere (gloveboxes). The chemical wastes generation and disposal will be conducted under procedures and guidelines of Environmental Health and Safety Policy at the Pennsylvania State University and the partnering institutions.

SECTION D. Determine the Level of Environmental Review (or Documentation) and Reference(s): Identify the applicable categorical exclusion from 10 CFR 1021, Appendix B, give the appropriate justification, and the approval date.

Note: 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, including requirements of DOE orders; 2) require siting and construction or major expansion of waste storage, disposal, recovery, or treatment facilities; 3) disturb hazardous substances, pollutants, contaminants, or CERCLA-excluded petroleum and natural gas products that pre-exist in the environment such that there would be uncontrolled or unpermitted releases; 4) adversely affect environmentally sensitive resources. In addition, no extraordinary circumstances related to the proposal exist which would affect the significance of the action, and the action is not “connected” nor “related” (40 CFR 1508.25(a)(1) and (2), respectively) to other actions with potentially or cumulatively significant impacts.

References: 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 development.

Justification: The activity consists of university-scale research aimed at investigation of liquid metal electrodes in molten salt electrochemical cells.

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

Approved by Jason Sturm, DOE-ID Deputy NEPA Compliance Officer on 06/25/2015