

**SECTION A. Project Title: Integrated Effects Testing & Molten Chloride Fast Reactor Development – Southern Company Services, Inc.****SECTION B. Project Description**

Southern Company Services, in collaboration with TerraPower, LLC and Oak Ridge National Laboratory (ORNL), proposes to advance the technology readiness of the Molten Chloride Fast Reactor (MCFR) technology under development by TerraPower in support of commercial offering by 2035. To support the licensing, detail design, and operation of a test reactor, the team is proposing an Integrated Effects Test (IET) as well as development of key programmatic technologies in support of deployment. In a collaborative effort between TerraPower and ORNL, technology evaluations and demonstrations will be performed to answer key questions on reactor material selection, fuel salt synthesis, and chlorine isotope separation.

**SECTION C. Environmental Aspects / Potential Sources of Impact**

**Radioactive Material Use** – For work conducted at ORNL, anticipated chemicals to be used for characterization of the molten salt include uranium trichloride (UCl<sub>3</sub>), uranium tetrachloride (UCl<sub>4</sub>), and sodium chloride (NaCl). The preliminary list of radioisotopes to be used in testing at the IET includes 300kg – 1000kg of depleted uranium and potentially diagnostic isotopes such as <sup>18</sup>F.

**Radioactive Waste Generation** – Waste generated will be handled as low-level waste (LLW) when uranium is present or has been contacted. This includes glassware associated with the purification and characterization as well as the piping and associated peripherals such as tubing, vacuum pump oil, etc. The LLW is anticipated to be approximately 100-150 lbs. ORNL has procedures in place to handle and dispose of LLW. Less than a single, 55-gallon drum of LLW is expected to be generated each year at IET, and TerraPower has procedures in place for disposal of waste.

**Mixed Waste Generation** – Silver/silver salt electrode would be considered mixed waste. The mixed waste should not exceed 2-3 lbs. ORNL has procedures in place to handle and dispose of mixed waste.

**Chemical Use/Storage / Chemical Waste Disposal** – For work conducted at ORNL, anticipated chemicals to be used for characterization of the molten salt include uranium trichloride (UCl<sub>3</sub>), uranium tetrachloride (UCl<sub>4</sub>), and sodium chloride (NaCl). Fluorinated salts may be used at ORNL. Materials used in the separation of chlorine isotopes will include salts such as sodium chloride or potassium chloride, but may include perchlorate salts. Materials to be used as part of the IET will include molten salt components including NaCl, MgCl, UH<sub>3</sub>, and UCl<sub>4</sub>. ORNL and TerraPower have procedures in place to handle and dispose of chemical waste.

**Industrial Waste Generation** – Non-hazardous solid debris will be managed as sanitary- industrial wastes. ORNL has procedures in place to handle and dispose of sanitary- industrial waste.

**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 research activities to further the molten chloride fast reactor design.

Approved by Jack Depperschmidt, DOE-ID NEPA Compliance Officer on 05/02/2015