

# DOE-ID NEPA CX DETERMINATION

**SECTION A. Project Title: Passive Radio Frequency Tags and Sensors for Process Monitoring in Advanced Reactors – Dirac Solutions, Inc.**

**SECTION B. Project Description**

Dirac Solutions, Inc. (DSI), in collaboration with Idaho National Laboratory (INL), University of California, Santa Cruz, and Massachusetts Institute of Technology (MIT), proposes to develop next generation specialized wireless monitoring sensor systems, employing passive and semi-passive tags integrated with sensors. To complement the existing efforts in self-power wireless sensors and power harvesting techniques, DSI proposes to develop state-of-the-art wireless RF remote powering and remote switching techniques focusing on passive (i.e. battery-free) tags-and-sensors for sensors with lower power requirements, and semi-passive (battery-assisted-passive) tags-and-sensors for longer range monitoring operations of sensors that require higher operational power. The semi-passive tags-and-sensors proposed here, use a small battery for their communications, however, through smart power management the battery would be remotely activated through a remote RF switching signal. MIT will provide testing environment for exposing the DSI electronics to various levels of radiation from the operational requirement document prepared by INL. The electronics will be exposed to both Gamma and Neutron radiation at MIT Research Reactor (MITR) and will be tested for their functionality by DSI team observed by INL team.

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

Radioactive Material Use – Electronic samples will be irradiated in a thermal neutron beam at the MIT Research Reactor and some neutron activation is expected. Quantities will be small due to low neutron flux and short irradiation time.

Radioactive Waste Generation – Samples may be releasable after days to weeks of decay, but if this is not the case, they will be disposed of in a low-level waste stream from the MIT Nuclear Reactor Laboratory. The action would not create additional environmental impacts above those already permitted at the MITR.

**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 and development activities aimed at developing wireless monitoring sensor systems.

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 04/22/2019