U.S. Department of Energy
Categorical Exclusion Determination Form

Program or Field Office:	Office of Energy Efficiency and Renewable Energy: Phase III Xlerator Program
Funding Opportunity Number	DE-FOA-0000397
Applicant Name:	Luna Innovations
Location:	Roanoke, VA
Project Title	Low-Drift Ultra-High Temperature Thermal Sensors Phase III

Proposed Action or Project Description — American Recovery and Reinvestment Act: ☐

A low-drift temperature sensor is proposed for nuclear reactor use which supports the Generation-IV (Gen-IV) and Nuclear Hydrogen Initiatives. This sensor will enable safe operation of these new reactors at peak efficiencies, which in turn will reduce the U.S. dependency on foreign oil while simultaneously reducing emission of green house gasses. In Phase I, Luna Innovations identified candidate materials for drift free measurement of temperature using optical fiber techniques. In Phase II, Luna is in the process of preparing to irradiate sensors at Massachusetts Institute of Technology in the reactor shuttle system to investigate the durability with respect to temperatures up to 800°C and fluences up to 1E20 n/cm2 fast neutrons. In Phase III, Luna Innovations proposes to irradiate fiber optic sensors for temperature measurement in the Idaho National Labs (INL) Advanced Test Reactor (ATR) and perform post irradiation evaluation (PIE). Luna proposes to work with INL to develop the required test facilities and support and also further optimize the sensor construction procedure, quality control in preparation for installing the sensors into the ATR. The capsule or possibly shuttle testing would expose the sensors to radiation levels of 1.87E14 n/cm2-s fast neutron flux for sufficient time (one 6 week cycle) to reach 6.8E20 n/cm2 fast fluence while simultaneously using gamma heating to achieve a range of temperatures from 300 - 1200°C. Two cycles would expose the sensors to 1.2E21 n/cm2 approaching Gen-IV levels.

Conditions: None

Categorical Exclusion(s) Applied: B3.6, B5.1

*-For the complete DOE National Environmental Policy Act regulations regarding categorical exclusions, see Subpart D of 10 CFR10 21

This action would not: threaten a violation of applicable statutory, regulatory, or permit requirements for environment, safety, and health, including DOE and/or Executive Orders; require siting, construction, or major expansion of waste storage, disposal, recovery, or treatment facilities, but may include such categorically excluded facilities; 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; or adversely affect environmentally sensitive resources (including but not limited to those listed in paragraph B.(4)) of Appendix B to Subpart D of 10 CFR 1021). Furthermore, there are no extraordinary circumstances related to this action that may affect the significance of the environmental effects of the action; this action is not "connected" to other actions with potentially significant impacts, is not related to other proposed actions with cumulatively significant impacts, and is not precluded by 40 CFR 1506.1 or 10 CFR 1021.211.

Based on my review of information conveyed to me and in my possession (or attached) concerning 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.

ORO NEPA Compliance Officer **James L. Elmore** Date Determined: 9/17/2010

Record ID: 32