DOE-ID NEPA CX DETERMINATION

CX Posting No.: DOE-ID-16-051

SECTION A. Project Title: Effect of Gamma Irradiation on the Microstructure and Mechanical Properties of Nano-modified Concrete – Vanderbilt University

SECTION B. Project Description

Vanderbilt University, in collaboration with Oak Ridge National Laboratory, proposes to perform gamma irradiation of nano-modified concrete and appropriate control reference samples that are also relevant to current and historic concrete mixes. The research plan will consist of multiscale chemical and mechanical characterization of the performance of nano-modified concretes before and after exposure to gamma radiation. The project will focus on nano-silica and nano-halloysite in Portland cement concrete made with ground granulated blast furnace slag.

SECTION C. Environmental Aspects / Potential Sources of Impact

Radioactive Material Use – Gamma irradiation of control and nano-modified concrete specimens will be performed at the Gamma Irradiation Facility in the High Flux Isotope Reactor (HFIR) at Oak Ridge National Laboratory.

Chemical Use/Storage – Storage and use of chemicals during the project performance will be done following procedures in place in accordance with the Vanderbilt Environmental Health and Safety.

Chemical Waste Disposal – Disposal of all chemical wastes generated at Vanderbilt during the project will be done through the Vanderbilt Environmental Health and Safety. It is expected that about 9 kg of mortar and 2 kg of cement paste containing nano-silica, nano-halloysite, Portland cement, blast furnace slag, and crushed barite and about 5 L of leaching eluate will be generated during the course of the project.

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: B3.15 Siting, construction, modification, operation, and decommissioning of facilities for indoor small-scale research and development projects and small-scale pilot projects using nanoscale materials in accordance with applicable requirements (such as engineering, worker safety, procedural, and administrative regulations) necessary to ensure the containment of any hazardous materials. Construction and modification would be within or contiguous to a previously disturbed or developed area (where active utilities and currently used roads are readily accessible).

Justification: The activity consists of university-scale research aimed at investigating nano-modified concrete exposed to gamma irradiation.

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

Approved by Jack Depperschmidt, DOE-ID NEPA Compliance Officer on 06/30/2016