

SECTION A. Project Title: Development of Advanced High-Cr Ferritic/Martensitic Steels – Colorado School of Mines**SECTION B. Project Description**

The Colorado School of Mines proposes to develop a fundamental understanding of microalloying precipitate design and thermomechanical treatment in high-alloyed steels to suppress void swelling and improve low temperature loss of ductility in HT-9 based alloys. The objective of this study is to use a science-based approach, combining thermodynamically- and experimentally-informed alloy design and experimental performance evaluations (both before and after irradiation), to design and evaluate microstructures that (1) substantially reduce low temperature (300-400°C) embrittlement by removing free nitrogen and (2) simultaneously create fine, stable precipitate dispersions by microalloying additions to improve strength, ductility, and irradiation resistance.

SECTION C. Environmental Aspects / Potential Sources of Impact

Chemical Use/Storage /Chemical Waste Disposal – The project will require the use of chemicals regularly used to perform metallurgical experiments, including lubricants, acids for etching samples, and other chemicals such as ethanol. Quantities are expected to be significantly less than 1 liter of any chemical during the life of the project. The Colorado School of Mines has procedures and policies that dictate and control the use and disposal of chemicals.

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.

B3.10 Siting, construction, modification, operation, and decommissioning of particle accelerators, including electron beam accelerators, with primary beam energy less than approximately 100 million electron volts (MeV) and average beam power less than approximately 250 kilowatts (kW), and associated beamlines, storage rings, colliders, and detectors, for research and medical purposes (such as proton therapy), and isotope production, within or contiguous to a previously disturbed or developed area (where active utilities and currently used roads are readily accessible), or internal modification of any accelerator facility regardless of energy, that does not increase primary beam energy or current. In cases where the beam energy exceeds 100MeV, the average beam power must be less than 250 kW, so as not to exceed an average current of 2.5 milliamperes (mA).

Justification: The activity consists of university-scale research on microalloying precipitate design and thermomechanical treatment of high-alloyed steels.

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 06/28/2017