# DOE-ID NEPA CX DETERMINATION



CX Posting No.: DOE-ID-16-100

**SECTION A. Project Title: Continued Development of LWR Fuel with Enhanced Accident Tolerance – AREVA Federal Services LLC**

**SECTION B. Project Description**

AREVA Federal Services, in collaboration with EPRI, and Idaho National Laboratory, proposes to perform the necessary irradiation and testing, manufacturing integration, and analyses of the Cr-Cr2O3 concept to support the fabrication and insertion of Enhanced Accident Tolerant Fuel (EATF) Lead Fuel Rods/Lead Fuel Assemblies (LFR/LFAs) and demonstrate to utilities the value and performance of this concept under normal operation and accident conditions.

The effort will focus on tasks necessary to support the development and characterization of the EATF fuel concepts (through testing and analyses in both in-pile and out-of-pile conditions as well as in extreme environments), tasks necessary to develop a comprehensive plan for licensing Cr-Cr2O3 concept that includes identification of host commercial reactor for LFR/LFAs, tasks necessary to fabricate and test the Cr-Cr2O3 rodlets in prototypic Light Water Reactors (LWR) type test reactor, tasks necessary to initiate an evaluation of the concept performance and economic impact, and tasks necessary to support the qualification and integration of manufacturing processes. The first two years of the program will focus on obtaining some key irradiation performance characteristics of the coated cladding, which includes irradiation effects on mechanical properties (strength, ductility, coating performance, and compatibility with other fuel assembly components), irradiation-induced growth, corrosion under irradiation, and performance of irradiated fuel and cladding in simulated accident conditions.

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

Radioactive Material Use – The proposal involves production of nuclear fuel (comprised of enriched UO2). During the two year period of performance, approximately 1 kg of uranium (enriched to as high as 4.95 w/o U235) will be used in the production of test rodlets at AREVA's Richland, WA. Fabrication facility (HRR), to be used for irradiation experiments at ATR and TREAT. Additional quantities (on the order of hundreds of Kgs) of depleted UO2 may be used for the purpose of developing the necessary production processes. These quantities are insignificant relative to the hundreds of metric tons of enriched UO2 fuel that are produced during normal production at AREVA's facility. All production will be performed under requirements dictated by the AREVA Fuel Management Manual (FMM) described above which ensures compliance with Federal, State, and International regulations.

Radioactive Waste Generation – As noted in item 1, we will be producing test rods (less than 1 kg of radioactive material) which will be irradiated and contribute to used nuclear waste once the testing is complete. Since these rods will be tested at DOE facilities (ATR, TREAT, and HFEF), therefore ultimate handling and disposal will be dictated by the DOE procedures for those test facilities. All radioactive waste streams that remain within the HRR facility will be processed in accordance with standard site procedures to extract uranium for reuse and dispose of any remaining low-level waste in accordance with US Federal and Washington State law. Again, all processes are developed and controlled through requirements dictated by the AREVA Fuel Management Manual (FMM) which ensures compliance with Federal, State, and International regulations.

Mixed Waste Generation – AREVA's fuel production process generates mixed wastes in the form of clothing, gloves, and other production materials that are contaminated with uranium oxide at low-levels during the standard production processes. AREVA processes these wastes in accordance with AREVA's FMM which ensures compliance to all Federal, State, and International regulations during these production activities. Quantities of waste produced directly through this proposal are insignificant (likely on the order of tens of Kgs) relative to the volumes produced during normal production operations at the HRR facility and are disposed of at federally licensed mixed waste disposal facilities.

Chemical Use/Storage – AREVA's fuel production processes uses a variety of chemicals during the normal fabrication of nuclear fuel components. Quantities of each needed for the proposal are on the order of Kgs which is insignificant relative to the quantities used during normal daily fuel production. All new development activities and production operations related to this proposal will be controlled by AREVA Fuels FMM which ensures compliance with all Federal, State, and International regulations.

Chemical Waste Disposal – AREVA fuel production processes generate chemical waste streams as part of the normal operation. The quantity of waste generated as a result of this proposal is on the order of Kgs which is insignificant relative to the quantities used during normal daily fuel production. All new development activities and production operations related to this proposal will be controlled by AREVA Fuels FMM which ensures compliance with all Federal, State, and International regulations.

Hazardous Waste Generation – AREVA's fuel production process generate a number of hazardous waste streams in the production of nuclear fuel including items such as hydrofluoric acid. Many of the streams are recycled and/or reused. The total quantity of hazardous materials resulting from operations related to this proposal would be on the order of a few Kgs which is very small relative to the

quantities produced during normal facility production. All operations are controlled by AREVA Fuels FMM which ensures compliance with all Federal, State, and International regulations.

Industrial Waste Generation – AREVA fuel production processes generate several industrial waste streams as part of the normal operation. Additional waste streams created through this proposal would include Cr2O3 dopant mixed in with UO2 powder, depleted chromium targets used in the PVD coating process, and SiC waste stream associated with the production of SiC cladding. The quantity of waste generated as a result of this proposal is on the order of tens of Kgs. The development of new production processes that lead to these new waste streams is controlled by AREVA Fuels FMM which ensures compliance with all Federal, State, and International regulations.

Air Emissions – This proposal includes the addition of Cr2O3 dopant to the fuel. This fuel is sintered in furnaces which can potentially volatilize the chromium. AREVA process development procedures are controlled by AREVA Fuels FMM which ensures compliance with all Federal, State, and International regulations. This includes the monitoring of airborne samples to ensure all OSHA requirements are met with regard to exposure to hexavalent chromium.

**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.

The impacts of transporting and disposing of waste resulting from defense activities that was placed in retrievable storage pursuant to a 1970 Atomic Energy Commission policy (see Section 1.2) and TRU waste that was reasonably expected to be generated by ongoing activities and programs was analyzed in DOE/EIS-0026 (October 1980) and the Final Supplement Environmental Impact Statement for the Waste Isolation Pilot Plant (SEIS-I) (DOE/EIS-0026-FS, January 1990).

NEPA coverage for the transportation and disposal of waste to WIPP are found in DOE/EIS-0200-F (May 1997) and Waste Isolation Plant Disposal Phase Supplemental EIS (SEIS-II) (DOE/EIS-0026-S-2, Sept. 1997), respectively. The 1990 ROD also stated that a more detailed analysis of the impacts of processing and handling TRU waste at the generator-storage facilities would be conducted. DOE has analyzed TRU waste management activities in DOE/EIS-200-F (May 1997). The WM PEIS analyzes environmental impacts at the potential locations of treatment and storage sites for TRU waste; SEIS-II addresses impacts associated with alternative treatment methods, the disposal of TRU waste at WIPP and alternatives to that disposal, and the transportation to WIPP. (SEIS-II also includes potential transportation between generator sites.)

Justification: The activity consists of research and development activities on a fuel rod design utilizing chromium-coated zirconium-alloy cladding for enhanced accident tolerant fuels.

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 09/27/2016