

DOE-ID NEPA DETERMINATION

Idaho National Laboratory

SECTION A. Project Title: Spark Plasma Sintering at Materials and Fuels Complex (MFC)-784

SECTION B. Project Description and Purpose:

Idaho National Laboratory (INL) has identified the need for additional capabilities for preparation, pressing, and sintering of enriched uranium materials to support research and development activities currently occurring at the Center for Advanced Energy Studies (CAES). The proposed action would relocate equipment from CAES to the Materials and Fuels Complex (MFC) building MFC-784 that was historically part of the Zero Power Physics Reactor (ZPPR). Project activities would install a commercial spark plasma sintering system which consists of an inert atmosphere glovebox, a spark plasma sintering (SPS) chamber, a 25-ton hydraulic press, chiller, and power supply in MFC-784.

In addition to non-radioactive materials fabrication research and development, nuclear fuel powders to be used in the system include uranium oxide, other uranium compounds, and uranium metal. Uranium enriched materials include highly enriched uranium (HEU), and the maximum quantity of HEU processed with the SPS equipment would be limited to of 5 kilograms/year. Maximum 235U quantities being processed at a given time would be limited to less than 700 grams. No transuranic (TRU) constituents would be used in this process.

General material preparation performed in the integrated system glovebox are as follows:

- Place containers of feedstock material, and binders and lubricants in the glovebox
- Weigh materials
- Blend materials and place them in either graphite or tungsten carbide sintering die
- Place loaded die in sintering chamber where the SPS system presses and sinters the material under a constant vacuum at temperatures up to 2200°C to fabricate solid compacts
- Retrieve compacts using a hand press
- Clean compacts and prepare them for packaging
- Transfer compacts to other facilities for analysis or further testing.

The SPS system relocation would require minor modifications to the MFC-784 facility, including 1) electrical power routing to support the SPS equipment, 2) blower and high-efficiency particulate air (HEPA) filtration changes to the facility ventilation ducting, 3) gas piping connections such as argon, glovebox purification unit regeneration gas, and instrument air, and 4) installation and hookup of the SPS equipment.

The SPS system installation and associated facility modifications are proposed to begin in the second quarter of Fiscal Year (FY)17, with material processing in the system forecast to begin in the third or fourth quarter of FY17. The SPS system is expected to remain an enduring programmatic capability in MFC-784. Individual research and development proposals and projects proposing to use the SPS would have separate project specific environmental checklists.

SECTION C. Environmental Aspects or Potential Sources of Impact:

Air Emissions

Air emissions would include argon gas, minor amounts of constituents from process materials such as binders and/or lubricants (i.e., polyox/carbowax), and infrequent small quantities of argon/hydrogen purification unit regeneration gas. Although the SPS equipment includes HEPA filtration, processing uranium powders also has the potential to emit radioactive isotopes to the facility suspect exhaust system (which will also have a separate HEPA filter). A new Air Permit Applicability Determination (APAD) will be generated to verify potential emissions from MFC-784 are below levels that require a Permit to Construct.

Disturbing Cultural or Biological Resources

MFC-784 (ZPPR Materiel Control Building) is eligible for nomination to the National Register of Historic Places and is considered a Category 2 historic property. Removal and/or changes of original features may adversely impact this historic property; however, the project activities are exempt and may proceed as described without further cultural resource review. The described project activities fall under exemption 8 (internal reconfiguration of active laboratories) listed in Table 2 (Idaho National Laboratory Cultural Resource Management Office. Idaho National Laboratory Cultural Resource Management Plan. DOE/ID10997, revision 6, Idaho Falls, Idaho: U.S. Department of Energy, Idaho Operations Office, 2016, pg 51).

Generating and Managing Waste

Relocation of the SPS would have the potential to generate industrial waste such as scrap metal. Any scrap material, if generated, will be recycled or excessed to the extent practicable.

Activities that would use the SPS system are anticipated to produce the following waste types:

Low-Level Waste: Estimated at ~ 1 m³ per year (e.g., contaminated personal protective equipment, contaminated wipes, contaminated equipment, material process loss, damaged graphite dies)

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Industrial Waste: Estimated at ~1 m³ per year (e.g., uncontaminated equipment, wipes)

TRU waste would not be generated.

Waste generation from specific projects using the SPS system will be disclosed and analyzed in project specific ECs.

Releasing Contaminants

Typical construction chemicals such as adhesives, lubricants, oils, paints, etc., would be used on the project. All chemicals would be entered in the vendor data system for approval. The Chemical Coordinator would track these chemicals in the INL Comply Plus Chemical Management System. Chemical use has a potential for small amounts of air emission and spills. Any spills that occur from these chemicals would be reported to the Spill Notification Team and would be cleaned up.

Using, Reusing, and Conserving Natural Resources

All material will be reused and/or recycled where economically practicable. All applicable waste would be diverted from disposal in the landfill when possible.

SECTION D. Determine Recommended Level of Environmental Review, Identify Reference(s), and State Justification: Identify the applicable categorical exclusion from 10 Code of Federal Regulation (CFR) 1021, Appendix B, give the appropriate justification, and the approval date.

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, or similar requirements of Department of Energy (DOE) or Executive Orders; (2) require siting and construction or major expansion of waste storage, disposal, recovery, or treatment or facilities; (3) disturb hazardous substances, pollutants, contaminants, or Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)-excluded petroleum and natural gas products that pre-exist in the environment such that there would be uncontrolled or unpermitted releases; (4) have the potential to cause significant impacts on environmentally sensitive resources (see 10 CFR 1021). In addition, no extraordinary circumstances related to the proposal exist that would affect the significance of the action. In addition, the action is not "connected" to other action actions (40 CFR 1508.25(a)(1) and is not related to other actions with individually insignificant but cumulatively significant impacts (40 CFR 1608.27(b)(7)).

References: 10 CFR 1021, Appendix B to Subpart D categorical exclusion B1.31 "Installation or relocation of machinery and equipment".

Justification: The proposed action is consistent with 10 CFR 1021, Appendix B to Subpart D categorical exclusion B1.31 "Installation or relocation of machinery and equipment" which included "installation or relocation and operation of machinery and equipment (including, but not limited to, laboratory equipment, electronic hardware, manufacturing machinery, maintenance equipment, and health and safety equipment), provided that uses of the installed or relocated items are consistent with the general missions of the receiving structure. Covered actions include modifications to an existing building, within or contiguous to a previously disturbed or developed area, that are necessary for equipment installation or relocation. Such modifications would not appreciably increase the footprint or height of the existing building or have the potential to cause significant changes to the type and magnitude of environmental impacts."

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: 11/25/2016