

SECTION A. Project Title: Pyrotechnic Effect Material Evaluation at UB3

SECTION B. Project Description and Purpose:

This Idaho National Laboratory (INL) project was originally covered under ECP INL-12-017 and is being revised with coverage under the INL-24-026 Tent ECP, SMALL-SCALE RESEARCH AND DEVELOPMENT, LABORATORY OPERATIONS AND PILOT PROJECTS.

The majority of pyrotechnic effect (PE) work activities occur in Room 115 of IF-682. Limited test quantities occur in Room 106 of IF-682. PE work activities under this LI may also occur at the National Security Test Range (NSTR). Storage and testing limits for PE materials are defined in applicable facility Explosive Site plans, Tenant Use Agreements (TUAs) for applicable facilities, as well as documented by the various Explosive Safety subcommittees at INL. This scope can cover explosive operations when given specific approval by the INL Explosive Safety Committee and the appropriate Explosive Safety Subcommittees.

Explosive materials are stored in explosive magazines or cabinets as designated by their hazard classification and compatibility group. Explosives development work can occur under this ECP and is regulated by the INL Explosive Development Committee. Materials that are under development will be stored as Group L materials unless specifically designated by the INL Explosive Development Committee. This ECP covers PE and explosive materials which are under development. The INL Explosive Development committee must be review and approve activities before any work commences.

General chemicals will be stored as required by the TUA and applicable International Building Code (IBC) and Fire Codes.

Testing and Processing equipment can include: LabRam mixer, Speedmixer, Perkin Elmer TGA/DSC, Impact Tester, Friction Tester and ESD Tester. Explosive initiation devices are approved by the INL ESC Fire-set subcommittee. A single ventilated test chamber is also available on the south side of room 115.

PE work activities do not occur at IF-611 or IF-657 and these locations are to be removed from the ECP. The test chambers at these facilities are not used for work activities under this ECP.

Waste may include:

- Industrial: Ventilation filters, "empty" expended test containers, used firebrick, (<100 gal/yr)
- Hazardous: Used solvents, i.e. acetone, ethanol, hexane, spent batteries, leaking/bulged used batteries, and saturated solvent wipes (<5 gal/yr)
- Recyclable: Used/Spent batteries and scrap metal (< 100 gal/yr)
- Industrial: PPE, Dry used Solvent wipes/rags (< 5 gal/yr)
- Test residues: Cured epoxy or cured urethane, carbon, iron and aluminum oxide.

All waste will be managed in accordance with Waste Generator Service procedures.

Original scope:

This work conducts R&D scale processing and testing of various Pyrotechnic Effect (PE) materials in support of multiple WFO programs with specific requirements. This includes the evaluation of various blends and forms of PE materials for reaction rates and effectiveness. These activities include storing, mixing, blending, reacting, heating, curing, pressing, grinding, extruding, and testing small quantities of experimental blends of PE materials. Testing covers both the experimental blends or PE materials and their associated housings. This includes the use of explosive ignition systems (e.g., electronic matches (e-matches) and time-fuse).

Work described in this EC will take place at IF-682, University Boulevard # 3 (UB-3).

The work activities include the construction and operation of an explosive storage area on the East side of UB-3, the removal of an existing welding trunk exhaust system, and installation of two new test chambers and a new exhaust system to provide ventilation for the new two test chambers inside of UB-3.

The two new test chambers will be used to continue work underway at IF-611 and IF-657; this work has been documented in separate ECs and is expected to continue in both existing locations. The new explosive storage area will be used to store materials prior to testing and in-between tests.

Unbound engineered NanoParticles (UNP) are specifically NOT APPROVED for purchase or use under this EC.

PE materials will be created and tested by individuals with experience in energetic processing or under the direct guidance of an individual experienced with energetic processing. PE materials may be prepared through mixing, blending, synthesizing, heating, curing, pressing, grinding, extruding, or other means. Testing shall be performed per any specific instruction requested by the Explosives Development Committee (EDC) and under the guidance of individuals experienced in energetic testing. Quantities will be limited to the smallest usable amount. These PE materials may then be assembled into a device with an appropriate igniter, such as an electric match, safety fuse, primers, etc. These energetic devices will be tested to determine final product functionality.

All PE material development activities will be reviewed and approved by the Explosives Development Committee (EDC) prior to commencing development activities. The EDC will determine if the activity is PE or explosive development. The EDC's approval of PE material development activities including the synthesizing, formulation, modifying, testing, and certification requirements must be incorporated into the project file(s). If the EDC determines the activity is an 'explosive operation' as defined per MCP-3369, this EC does not cover the work. Explosives

development work will require a separate EC and other work control documentation, developed with the assistance of the EDC, to address the requirements associated with explosive development.

Thermite, pyrophoric and explosive materials will be stored in cabinets specifically designed for the application, as required by the International Fire Code.

PE materials shall be limited and controlled by their material name and associated hazard class/division designators in accordance with the International Fire Code and the appropriate Explosives Use Permit.

PE materials may be purchased which are well characterized as to what functionality they have. Explosive materials may also be purchased which are well characterized as to what functionality they have. These would include explosive devices, such as electric matches, primers, and safety fuse.

PE materials may be formulated and produced in-house. As these PE materials may be sensitive to various ignition stimuli, formulating and processing should be performed only by individuals experienced in energetic processing. New formulations will be processed in the smallest usable quantities and evaluated for sensitivity to ignition stimuli. This will include burning of samples to determine burn rates and other burn dependent reaction characteristics.

No thermite or other PE waste is generated. All recovered thermite and pyrophoric scrap (chips), powder spillage, and excess pellets are stored as thermite/pyrophoric materials. Recovered materials are subsequently used in secondary testing. Spilled thermite/pyrophoric powders, chips, and broken pellets are recovered primarily by carefully sweeping materials into a clean dust pan. No liquid wastes are anticipated. Should a hazardous material waste (such as leachable chromium) be generated, Waste Generator Services (WGS) will be notified for proper waste characterization and inventory. Vanadium pentoxide will not be in a waste form, and the reagent bottle will be returned to the custodian. WGS will characterize and manage all Solid Waste.

Project personnel will maintain a record of the quantities of each material used in testing to ensure Air Permit Applicability Determination emission limits are not exceeded.

SECTION C. Environmental Aspects or Potential Sources of Impact:

Air Emissions

Testing of explosive and pyrophoric materials is expected to release air pollutants. Testing will be performed in the UB-3 burn chambers. Project activities conducted under this overarching EC will require completion of an Air Permitting Applicability Determination (APAD) (See Condition 1, in Section E). The amount of daily and annual emissions (or material used) must be compared to the APAD, with records maintained to demonstrate compliance.

Discharging to Surface-, Storm-, or Ground Water

NA

Disturbing Cultural or Biological Resources

NA

Generating and Managing Waste

Small amounts of hazardous waste may be generated during this work. Waste streams may include solvent wipes/rags, metal-containing residues, and unused materials. No mixed waste is expected. All hazardous waste will be characterized and managed by WGS. Industrial waste, in the form of test residues or materials, may be generated. All Solid Waste will be characterized and managed by WGS. Cleaning of research equipment and containers will result in small amounts of wastes discharged to the sewer system. All discharges must comply with limits established in the Idaho Falls sewer regulations.

Releasing Contaminants

Testing of explosive and pyrophoric materials is expected to release air pollutants.

Using, Reusing, and Conserving Natural Resources

NA

DOE-ID NEPA CX DETERMINATION
Idaho National Laboratory

Page 3 of 3

CX Posting No.: DOE-ID-INL-25-021

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.

References: B1.12 "Detonation or burning of explosives or propellants after testing", B3.6 "Small-scale research and development, laboratory operations, and pilot projects", DOE/EA-2063 "Final Environmental Assessment for Expanding Capabilities at the National Security Test Range and the Radiological Response Training Range at Idaho National Laboratory "

DOE evaluated the environmental impacts of the National Security Test Range (NSTR) ,in DOE/EA-2063: Final Environmental Assessment for Expanding Capabilities at the National Security Test Range and the Radiological Response Training Range at the Idaho National Laboratory, and the proposed scope of work is bounded by the analysis in the EA.

For the DOE procedures regarding categorical exclusions, including the full text of each categorical exclusion, see 10 CFR 1021.102 and Appendix B to 10 CFR Part 1021, and also Section 5.4 (Applying one or more categorical exclusions to a proposal) and Appendices B and C of DOE's National Environmental Policy Act Implementing Procedures (June 30, 2025). Requirements and guidance in 10 CFR 1021.102 and DOE's NEPA Implementing Procedures: (See full text in regulation and in Implementing Procedures)

The proposal fits within a class of actions that is listed in Appendix B to 10 CFR Part 1021 or Appendix B and C of DOE's NEPA Implementing Procedures (June 30, 2025). To fit within the classes of actions listed in Appendix B to 10 CFR Part 1021, or Appendix B of DOE's NEPA Implementing Procedures, a proposal must satisfy the conditions that are integral elements of the classes of actions in Appendix B of both 10 CFR Part 1021 and DOE's NEPA Implementing Procedures.

There are no extraordinary circumstances related to the proposal that may affect the significance of the environmental effects of the proposal. DOE or an applicant may modify the proposal to avoid reasonably foreseeable adverse significant effects such that the categorical exclusion would apply. The proposal has not been segmented to meet the definition of a categorical exclusion. [Note: For proposals that fit within the categorical exclusions listed in Appendix C of DOE's NEPA Implementing Procedures, see DOE's notice of adoption for the subject Appendix C categorical exclusion for additional considerations. DOE notices of adoption for other agency categorical exclusions may be found on DOE's Section 109 webpage.]

Based on my review of the proposed action, as NEPA Compliance Officer, I have determined that the proposed action fits within the specified class(es) of action, the other requirements and guidance set forth above are met, and the proposed action is hereby categorically excluded from further NEPA review.

Approved by Robert Douglas Herzog, DOE-ID NEPA Compliance Officer on: 6/25/2025