DOE-ID NEPA CX DETERMINATION
Idaho National Laboratory

CX Posting No.: DOE-ID-INL-17-002 R3

SECTION A. Project Title: Irradiation Testing of Accident Tolerant Fuels (ATF) Revision 4

SECTION B. Project Description and Purpose:

Revision 4:
The proposed Accident Tolerant Fuels (ATF)-R experiment in the Transient Reactor Test (TREAT) Facility uses a pre-irradiated specimen and requires hot cell assembly and disassembly. The experiment anticipates using hardware previously used for fresh fuel specimens and needs to characterize the gamma radiation resistance of these components to verify the hardware meets requirements for TREAT experiments.

The proposed action completes gamma irradiation testing on these hardware components at the Materials and Fuels Complex (MFC) to characterize gamma radiation resistance. The proposed action irradiates specimens in the Fuels and Applied Science Building (FASB) gamma irradiator to achieve a specified dose. Depending on the specimen, the proposed action includes follow-on tests. None of the components form a leak-tight seal or pressure boundary with any component during the gamma irradiation test. The proposed action irradiates the items in Table 1.

Table 1. Specimens proposed for irradiation in the FASB gamma irradiator.

Specimen Identifier	Specimen Description	Minimum Test Quantity	INL Drawing-Item (If Applicable)	Follow-on Tests	Additional Specimen Information
FKO-##	FFKM O-rings	3	810827-16	Visual, Functional Leak Test	
PTO-##	Pressure Transducer O-ring	6	818422-18	Visual, Functional Leak Test	MMC P/N 5233T114
TIC-##	Conax Teflon-Insulated Cable (TIC)	3	NA	Visual, Functional Leak Test	This cable will be pre-routed through a stainless steel MHM2 Conax compression fitting.
BDC-##	Boiling Detector Coating	3	818423-23	Visual	This item may be coated on a thin sheet of metal per 818423-3
PFR-##	Pyrometer Fiber	3	818423-14	Visual, Functional Test	Each pyrometer fiber will have an SMA connector (818423-28) epoxied on each end.
RTV-##	Room Temperature Vulcanizing (RTV) Gasket Maker	3	818422-36	Visual, Functional Leak test	Permatex Model ULTRA GREY RTV. This will be applied and pre-torqued to a hold-down gland (see Autoclave Engineers P/N 1040-7434) to form a seal with a burst disc.
GST-##	Grafoil National Pipe Thread (NPT) Sealant Tape	3	NA	Visual, Functional Leak Test	See Conax compression fitting catalog P/N 47-0040-001. These will be pre-wrapped to the external pipe threads of a Conax MHM2 compression seal fitting. These fittings will then be threaded into a SETH capsule top (810830).
CKV-##	Check valve	3	818422-16	Visual, Functional Leak Test	
CGS-##	Conax Grafoil Sealants	6	818422-19, -20	Functional Leak Test	These will be pre-assembled in a Conax MHM2 fitting per 818422-19.
KPW-##	Kapton Wire	6	NA	Visual, Functional Leak Test	CNC TECH P/N 600222 MW35-C
VEX-##	Vacuum Epoxy	6	818423-26	Functional Leak Test	This epoxy will be a subcomponent of the Pyrometer Fiber assembly. This epoxy will be applied within a capillary tube (818423-29) per Note 7. These capillary tubes will be passed through a Conax MHM2 compression seal fitting.

Gamma Irradiation Dose Parameters: Under the proposed action, the ATF-R components receive gamma radiation from the pre-irradiated rodlet and the hot cell environment. The project estimates on-contact exposure from the pre-irradiated rodlet to be about 70 R/hr. To account for the hot cell environment, the project adds an additional 50% to the exposure rate, which results in 105 R/hr. The proposed action adjusts the dose rate 1,050 R/hr (x10). Assuming practical conversion rates between exposure and dose, the proposed test has the following dose rate and dose:

- Test #1 Dose Rate: 1050 rad/hr
- Test #1 Dose: 453,600 rad
- Test #1 Duration: ~18 days

The first test has the longest duration and highest dose rate. The project documents failed items and selects new ones for additional gamma irradiation tests at lower dose rates and doses, as needed, based on results from the follow-on tests.

The project assembles the following components and performs a baseline helium leak test of each component as described in TPR-13438 before shipping them to FASB:

a. TIC (qty: 3) – Route Teflon wires through Conax compression fitting and torque Conax cap according to manufacturer specifications. See attached sketch.
b. PFR (qty: 3) – Assemble pyrometer fiber, capillary tube, vacuum epoxy and connector similar to INL Dwg. 815701, -7 assembly and attached sketch.
c. RTV (qty: 3) – Assemble leak test fitting, silicone RTV gasket maker, hold down ring, burst disc and hold down gland in accordance with attached sketch. Hold down gland will be torqued in accordance with manufacturer instructions.

d. GST (qty: 3) – Assembly Conax compression seal fitting and grafoil sealant tape in accordance with attached sketch. Grafoil sealant tape will be applied to external threads of Conax fitting body (similar to PTFE tape) per Conax manufacturer instructions.
e. CGS (qty: 3) – Assemble Conax MHM2 compression seal fittings with blank sealants. Torque Conax cap in accordance with manufacturer instructions.
f. KPW (qty: 3) – Route Kapton cable through Conax compression seal fitting per attached sketch. Torque Conax fitting cap per manufacturer instructions.

The project leak tests the remaining unassembled components by arranging them on a M-SERTTA capsule top or bottom per INL Dwg 818422 and visually inspects the boiling detector plates for gamma irradiation damage.

Following irradiation at FASB, the project ships the specimens to the Energy Innovation Laboratory (EIL) for inspection.

The proposed testing has the potential to generate industrial waste.

Revision 3:
The purpose of this revision is to capture additional scope for the Accident Tolerant Fuel (ATF)-2 experiments. General Electric Global Research (GE) is proposing to continue development efforts for the development of Light Water Reactor Fuels with Enhanced Accident Tolerance. The proposed action expands and continues ATF related concepts in U.S. DOE facilities (the Advanced Test Reactor (ATR), Transient Reactor Test (TREAT) Facility), and out of pile tests) and commercial reactors with prototypic segments and rods. The project also proposes to develop a licensing plan for future Nuclear Regulatory Commission (NRC) approval for initial commercial partial core loading in the mid-2020s. The following tasks will be performed:

1. Fundamental research, characterization and testing
2. Irradiation studies
3. Fabrication of tubing and rods
4. Modeling and simulation
5. Interface with utilities
6. Regulatory activities.

The project includes GE Global Research, Global Nuclear Fuels (GNF), and several national laboratories such as Oak Ridge National Laboratory (ORNL), Idaho National Laboratory (INL), and Los Alamos National Laboratory (LANL). The GE ATF concept has been mainly focused on the development of iron-chromium-aluminum (FeCrAl) cladding for urania fuel. GE FeCrAl cladding has been trade named IronClad. The project has been expanding to include coatings for zirconium alloys, trade-named ARMOR (initially developed for fretting resistance), and silicon carbide (SiC) ceramics for fuel channels.

GE and GNF aim to install a second lead test assembly (LTA) into a commercial power reactor (Clinton Unit 1 plant) in the fall of 2019 and to obtain neutron irradiation data for FeCrAl material to advance manufacturing processes for ferritic alloys. Project activities at INL do not involve fuel irradiated at commercial facilities. During this proposal period, GE is planning to expand the scope of the project to coating of Zircaloy tubes to increase fretting and corrosion resistance and to develop silicon carbide compatible with 300 °C water to be used for the fuel channels. The national laboratories (Idaho, Los Alamos, and Oak Ridge) will provide academic insight on nuclear materials behavior including manufacturing, resistance in reaction with superheated steam, and neutron irradiation damage. The national laboratories will also perform modeling and simulation to predict changes in the reactor core as a consequence of using IronClad in place of a zirconium alloy.

Table 1 summarizes the main tasks of this revision.

Table 1. Main Tasks for GE ATF

Tasks	Responsibility
1—Fundamental Research, Characterization and Testing	
1.1 Nuclear grade closed metal confinements (CMCs) for channels	GE Global Research
1.2 Isothermal corrosion of CMCs, IronClad, welds and tubes	GE Global Research
1.3 Zircaloy channel coating development	GE Global Research
1.4 Crud Deposition on rods	GE Global Research
1.5 Material properties and deformation and tube fabrication studies	GE Global Research
1.6 Method optimization for weld inspection	GE Global Research
1.7 Project management and technical support to commercial sector	GE Global Research
1.8 Development of a UO_2 -cermet fuel	LANL
1.9 Corrosion/oxidation investigations	ORNL
1.10 Normal operation cladding performance	ORNL

Tasks	Responsibility
2—Irradiation Studies	
2.1 ATF-1 and Post Irradiation Examination (PIE) of early rodlets	INL
2.2 ATF-2 testing at ATR and TREAT	INL, GNF
2.3 ATF-3 TREAT testing	INL, GNF
3—Fabrication of tubing and rods	
3.1 Additive manufacturing of caps and other components	GE Global Research
3.2 Laser welding method development	GE Global Research
3.3 Tubing production development	GNF
3.4 Fuel rod fabrication development	GNF
3.5 NDT Inspection Development	GNF
4—Modeling and Simulation	
4.1 Conceptual fuel assembly design	GNF
4.2 Prototype mechanical design	GNF
4.3 Plant safety and performance analysis	GNF
4.4 Properties for fuel modeling	ORNL
4.5 Thermal mechanical methods and advanced modeling	GNF
4.6 Computational materials modeling	GNF
4.7 Thermal-hydraulic testing	GNF
5—Interface with Utilities	
5.1 Insertion of a fueled LTA in Cycle 20 at Clinton	GNF & Exelon
5.2 IronClad poolside irradiated fuel inspections	GNF & Southern Nuclear
5.3 PIE of IronClad Tube	GNF
5.4 Transportation	GNF
6—Regulatory Activities	
6.1 LTA licensing	GNF
6.2 Licensing plan	GNF

Activities for ATF-1 were analyzed in environmental checklist INL-13-059 "Irradiation of Accident Tolerant Fuels."

INL support to GE for ATF-2 includes:

1. Rodlet design and experiment reconsiderations (FY19).
2. Receive, from GNF, and pre-irradiation test 6 ATF-2 UO2 fueled GE rodlets (FY19).
3. Transport 4 pins batch (ATF-1) from ATR to HFEF (FY19).
4. Transport 4 pins (ATF-1) from ATR to HFEF (FY20 and FY21) for PIE analysis or TREAT for transient studies.
5. Baseline PIE testing of ATF-1 rodlets (FY19).
6. Dry capsule test, in a Separate Effects Test Holder (SETH) capsule, 3 cladding types (Zircaloy Clad, FeCrAL Clad, and ARMOR Clad) in FY19. Each test is five separate transients to determine the enthalpy needed to cause cladding breach. Tests will be followed by PIE to determine the radiation effect from each transient (FY18 & 19).
7. Wet capsule test, in Minimal Activation Retrievable Capsule Holder (MARCH)-Static Environment Rodlet Transient Test Apparatus (SERTTA) capsules, 3 cladding types (Zircaloy Clad, FeCrAL Clad, and ARMOR Clad) with DOE-owned fresh fuel. Each test will be 5 transients and simulate reactivity insertion accidents (RIA) for different cladding to determine the enthalpy needed for cladding breach. Tests will be followed by PIE to determine radiation effect from each transient (FY20 and FY21).
8. Natural circulation flow test, in Super-SERTTA capsules, 1 of three cladding types (Zircaloy Clad, FeCrAL Clad, and ARMOR Clad) with DOE-owned fresh fuel in FY21. Each test will be 2 transients. These tests simulate Loss of Coolant Accidents (LOCA) and will be followed by PIE to determine the radiation effect from each transient (FY21).
9. Redesign, analyze, and fabricate new ATF-2 tier and pin holders for switching from the baselined .374 size pins to .404 pins (FY19)

After PIE, irradiated test pin segments and PIE remnants will be stored with other similar DOE-owned irradiated materials and experiments at MFC, most likely in the HFEF or the Radioactive Scrap and Waste Facility (RSWF) in accordance with DOE's Programmatic SNF Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement (FEIS) and ROD (DOE/EIS-0203, 1995) and supplemental analyses (DOE/EIS-0203-SA-01 and DOE/EIS-0203-SA-02) and the Amended Record of Decision (February 1996). Ultimate disposal of the irradiated test pin segments and PIE remnants will be along with similar DOE-owned irradiated materials and experiments currently at MFC. Categorizing this material as waste is supported under Department of Energy Order (DOE O) 435.1, Att. 1, Item 44, which states "…Test specimens of fissionable material irradiated for research and development purposes only…may be classified as waste and managed in accordance with this Order...".

In addition, to complete proposed work activities, it is necessary for the project to use the HFEF hot cell which contains both defense and nondefense related materials and contamination. Project materials will come into contact with defense related materials. It is impractical to clean out defense related contamination, and therefore, waste associated with project activities is eligible for disposal at the Waste Isolation Pilot Plant (WIPP). National Environmental Policy Act (NEPA) coverage for the transportation and disposal of waste to WIPP are found in Final Waste Management Programmatic Environmental Impact Statement [WM PEIS] (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 transuranic (TRU) waste at the generator-storage facilities would be conducted. The Department has analyzed transuranic (TRU) waste management activities in the Final Waste Management Programmatic Environmental Impact Statement (WM PEIS) (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

Packaging, repackaging, transportation, receiving, and storing used nuclear fuel and R&D for used nuclear fuel management is covered by DOE's Programmatic Spent Nuclear Fuel (SNF) Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement (EIS) and Record of Decision (DOE/EIS-0203, 1995) and supplemental analyses (DOE/EIS-0203-SA-01 and DOE/EIS-0203-SA-02) and the Amended Record of Decision (February 1996). The analyses include those impacts related to transportation to, storage of, and research and development related to used nuclear fuel at the INL (see Tables 3.1 of the SNF Record of Decision (May 30, 1995) and Table 1.1 of the Amended Record of Decision [February 1996].

The environmental impacts of transferring low level waste from the INL to the Nevada National Security Site were analyzed in the 1996 Nevada Test Site EIS (DOE/EIS-0243) and supplemental analysis (SA) (DOE/EIS-0243-SA-01) and DOE's Waste Management Programmatic EIS (DOE/EIS-200). The fourth ROD (65 FR 10061, February 25, 2000) for DOE's Waste Management Programmatic EIS established the Nevada National Security Site as one of two regional low level waste (LLW) and mixed low level waste (MLLW) disposal sites. The SA considers additional waste streams, beyond those considered in the 1996 NTS EIS, that may be generated at or sent to the Nevada National Security Site for management.

The potential for transportation accidents was analyzed in the SNF EIS (Section 5.1.5 and Appendix I-5 through I-10) and in the FRR EIS (Sections 4.2.1 and 4.2.2).

In addition to disposal of the irradiated fuel that will be generated as described above, industrial, mixed, and low level waste will be generated throughout the R&D process. This waste will be classified and disposed in accordance with INL procedures and DOE regulations/requirements.

Revision 2:
Revision 2 of this EC includes the scope from the original EC and adds activities for preparing test train assemblies for the Accident Tolerant Fuel program.

Unsealed/non-encapsulated radioactive materials are evaluated on a case-by-case basis to allow storage and handling in the Test Train Assembly Facility (TTAF). The Accident Tolerant Fuels Program (ATF-2) plans to ship ceramic fuel pellets packaged in unsealed/non-encapsulated fuel pins to the TTAF. The fuel pins are made of varying types of metallic thin-walled tubing with two end caps press fit into place. One end cap has a small weeper hole to reduce the heat introduced to the fuel rod during laser welding. The first press fit end cap is laser welded onto the fuel pin at the TTAF prior to fuel loading at the Materials and Fuels Complex (MFC). The prepared and empty fuel pins are then shipped to MFC for fuel loading. The fuel pellets are wiped clean (radiologically) prior to insertion into the fuel pin and then the last end cap press fit. The loaded fuel pins are then shipped to the TTAF for laser welding the non-welded end cap. The fuel pin is then loaded into a specially-designed pressurized weld fixture, where the fuel pin is purged of oxygen and backfilled with inert gas and pressurized. A TIG torch welder is then used to perform the final seal weld on the small weeper hole.

A test train assembly may consist of individual capsules or multiple capsules. The irradiation capsule, depending on experimenter specifications, may be fitted with multiple thermocouples and with separate gas supply and return lines. As applicable, each test train is pressure tested and leak tested during and after assembly. Each test train is assembled in accordance with specific work control documents, in addition to this EC, that identify additional equipment used. Assembly of the test trains involves machining, welding, brazing, plating, micro sandblasting, thermocouple potting, and thermocouple splicing (typical shop activities).

Major equipment used in the TTAF includes:

- Induction braze machine
- Resistance spot welder
- Tube welder
- GTAW Automated lathe welder
- Gas tungsten arc welder
- Laser Welder
- Oxyacetylene hand torch
- Electroplating Machine
- Vacuum Chamber Furnace
- Laser Micrometer
- Machining Mill
- Machining Lathe
- Drill Press.

Revision 1:
The Accident Tolerant Fuels (ATF) Project is in the pre-irradiation design validation phase for a water loop experiment, designated as ATF-2, to be irradiated in the Idaho National Laboratory (INL) Advanced Test Reactor (ATR) in 2018 as analyzed in the original EC. Prior to insertion of the ATF-2 experiment in the ATR, a Sensor Qualification Test (SQT) is required to validate sensor performance and structural stability. In order to validate the calculated /expected operation of the ATR SQT, the ATF Project has determined that an SQT mock-up assembly should be conducted out-of-pile (i.e., not in a nuclear reactor) under similar pressures and temperatures to verify the test can withstand the required test conditions prior to ATR insertion. This out-of-pile test will be conducted at the Westinghouse Advanced Loop Tester (WALT Loop) at the Westinghouse mechanical testing facility, located in Churchill, PA. This mock-up test has been designated as the WALT Loop SQT. Results from the WALT Loop SQT will provide data and input for performing the ATR SQT.

Idaho National Laboratory (INL) will conduct the activities listed below as part of this additional scope:

- Purchase and deliver coolant pump for use in the WALT Loop and perform and verify flow rate calculation of pumps
- Fabricate and ship top and bottom loop heads to bolt on to the WALT Loop
- Perform structural analysis to verify top and bottom loop heads meet requirements
- Assemble the WALT SQT test train at INL and ship test train along with a gas panel, cables, test control systems, and instrument data collection systems to the WALT Loop facility
- Maintain ownership of equipment and ship all equipment back to INL after the WALT Loop SQT experiment
- Examine structural integrity of sensors upon completion of the WALT Loop SQT
- Analyze water samples collected during WALT Loop SQT at the Westinghouse location (Westinghouse will dispose of water samples).

This additional scope will not involve radioactive shipments and does not change environmental aspects or work activities identified in the original EC.

Original EC:
Idaho National Laboratory (INL) has been tasked with the responsibility for conducting irradiation experiments in the Advanced Test Reactor (ATR) for the purpose of assessing the performance of Accident Tolerant Fuels (ATF) concepts under prototypic Pressurized Water Reactor (PWR) operating conditions. INL will lead the planning, design, and analyses of these irradiation experiments in coordination with the various institutions that are engaged in developing the ATF concepts. The INL will perform these irradiation experiments in the ATR water loop 2A and will coordinate the post-irradiation examination (PIE) on the discharged fuels. The discharged fuels will be shipped from ATR to the Hot Fuels Examination Facility (HFEF) and/or the Transient Reactor Test (TREAT) facility at the Materials and Fuels Complex (MFC) of the INL. Although the majority of the PIE is expected to be performed at HFEF and supporting laboratories at MFC, selected samples may be shipped to other hot cell facilities or laboratories for complementary or additional examinations, contingent on the availability of an acceptable shipping cask/container.

Early in the planning phase, the INL design team identified that a Sensor Qualification (SQ) test should be performed in the ATR loop 2A (planned for cycle 162A-1) to validate in-line sensor functionality under ATR reactor/loop PWR operating conditions prior to assembly of the ATF-2 fueled test train. Two normal operating cycles prior to the SQ test (cycle 160A-1), the chemistry in the ATR water loop 2A will be adjusted to meet prototypic PWR conditions. This cycle and the following cycle (160B-1) are considered to be PWR chemistry conditioning cycles necessary to form a baseline prior to inserting the SQ and ATF-2 fueled test trains. The Loop 2A chemistry Experiment Safety Analysis (ESA) will be revised to include the addition of boric acid (H3BO3) to a concentration of 1200 ppm boron. In preparation for the ATR chemical conditioning cycles and subsequent SQ test, an ATR-Critical (ATRC) run will be performed using the ATR loop 2A stainless steel backup (BU) assembly (DWG#1928F23).The ATRC run will be performed utilizing a sealed can filled with PWR chemistry (i.e., borated water) in place of the ATRC flow tube. The can will have the same dimensions in the core region as the flow tube and will more closely represent the ATR water loop 2A conditions. The ATF-2 fueled test will also require an ATRC run. However, the run will utilize the ATF-2 fueled test train assembly (without sensor leads) instead of a backup test assembly.

After successful completion of the SQ test, a fueled test train will be inserted into the ATR water loop 2A using sensors qualified during the SQ test.

The proposed action would use existing facilities and would not expand Department of Energy (DOE) infrastructure.

After the SQ test ATRC run is performed, the borated water cans will be deconned and stored at the ATRC for potential future use. The backup test assembly will be deconned and stored at ATRC for potential future use. No waste will be generated for the ATF-2 fueled ATRC run (will utilize the ATR test assembly). After PIE, the irradiated sample segments and PIE remnants would be stored with other similar DOE-owned irradiated materials and experiments at MFC, most likely in the HFEF or the Radioactive Scrap and Waste Facility (RSWF). Ultimate disposal of the irradiated sample segments and PIE remnants would occur along with similar DOE-owned irradiated materials and experiments currently at MFC which are generated from other research and development activities. Categorizing this material as waste is supported under DOE Order (O) 435.1, Att. 1, Item 44, which states "…Test specimens of fissionable material irradiated for research and development purposes only…may be classified as waste and managed in accordance with this Order... ."

To complete proposed work activities, it is necessary for the project to use the HFEF hot cell which contains both defense and nondefense related materials and contamination. Project materials will come into contact with defense related materials. It is impractical to clean out defense related contamination, and therefore, waste associated with project activities is eligible for disposal at the Waste Isolation Pilot Plant (WIPP). National Environmental Policy Act (NEPA) coverage for the transportation and disposal of waste to WIPP are found in Final Waste Management Programmatic Environmental Impact Statement [WM PEIS] (DOE/Environmental Impact Statement [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 Record of Decision (ROD) also stated that a more detailed analysis of the impacts of processing and handling transuranic (TRU) waste at the generator-storage facilities would be conducted. The Department has analyzed TRU waste management activities in the Final Waste Management Programmatic Environmental Impact Statement (WM PEIS) (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.

SECTION C. Environmental Aspects or Potential Sources of Impact:

Air Emissions

The proposed action has the potential to generate radiological and chemical emissions from irradiation in TREAT and the destructive and non-destructive PIE at MFC. Air emissions are anticipated to be minor, and concentrations would not exceed the current monitored air emissions from these facilities. An Air Permit Applicability Determination (APAD) may be required.

The TREAT irradiation activities are not modifications in accordance with Idaho Administrative Procedures Act (IDAPA) 58.01.01.201 and 40 Code of Federal Regulation (CFR) 61 Subpart H. TREAT radionuclide emissions are sampled and reported in accordance with Laboratory Wide Procedure (LWP)-8000 and 40 CFR 61 Subpart H. All experiments will be evaluated by Environmental Support and Services staff. All radionuclide release data (isotope specific in curies) directly associated with this proposal will be calculated and provided to the Environmental Support organization.

The irradiated specimens will be delivered to the MFC HFEF for disassembly and then undergo routine PIE. All radionuclide release data associated with the PIE portion of this experiment will be recorded as part of the HFEF continuous stack monitor. The PIE examination in HFEF is not a modification in accordance with Idaho Administrative Procedures Act (IDAPA) 58.01.01.201 and 40 Code of Federal Regulation (CFR) 61 Subpart H.

In 2018, the effective dose equivalent to the offsite maximally exposed individual (MEI) from all operations at the INL Site was calculated as 1.02 E-02 mrem/yr, which is 0.10% of the 10-mrem/yr federal standard and was calculated using all sources that emitted radionuclides to the environment from the INL site. The additional increment in emissions from the proposed action would not significantly change the total site-wide MEI dose. Therefore, the emissions are bounded by the analysis in the 1995 EIS, which estimated the annual cumulative doses to the maximally exposed worker, offsite maximally exposed individual (MEI), and the collective population from DOE's decision to implement the preferred alternative (DOE/EIS-0203). The potential air emissions and human health impacts associated with the proposed action would be smaller than and are bounded by the impacts presented in the 1995 EIS.

Operation of the TTAF will produce emissions from welding, brazing, and plating type activities. Emission limits for non-radioactive pollutants were established in APAD 09-005. A new APAD is being developed to cover potential non-radioactive and radioactive emissions.

Generating and Managing Waste

Irradiated sample debris and PIE waste are expected to generate research and development-related TRU waste and mixed TRU waste. TRU waste generated for the ATF-2 experiments will be less than 50 cubic inches (conservative estimate assuming all UO2 fuel will be converted to TRU). Categorizing this material as waste is supported under DOE O 435.1, Att. 1, Item 44, which states "…Test specimens of fissionable material irradiated for research and development purposes only…may be classified as waste and managed in accordance with this Order...".

Operation of the TTAF may result in the generation of small amounts of hazardous waste in the form of cleaning solvents, solders, metals; scrap metal (held for recycle whenever appropriate). Waste Generator Services (WGS) will evaluate, characterize, and manage potential TTAF waste. In addition, WGS may establish satellite accumulation areas to manage hazardous waste.

Small amounts of low-level waste would be generated in the form of personal protective equipment (PPE) and towels used for cleaning and polishing.

Project activities would also result in the generation of small amounts of industrial waste.

Project personnel would work with WGS to properly package and transport regulated, hazardous or radioactive material or waste according to laboratory procedures.

Releasing Contaminants

Chemicals will be used and will be submitted to chemical inventory lists with associated Safety Data Sheets (SDSs) for approval prior to use. The Facility Chemical Coordinator will enter these chemicals into the INL Chemical Management Database. All chemicals will be managed in accordance with laboratory procedures. When dispositioning surplus chemicals, project personnel must contact the facility Chemical Coordinator for disposition instructions.

Although not anticipated, there is a potential for spills when using chemicals or fueling equipment. In the event of a spill, notify facility environmental staff. If environmental staff cannot be contacted, report the release to the Spill Notification Team (208-241-6400). Clean up the spill and turn over spill cleanup materials to WGS.

Using, Reusing, and Conserving Natural Resources

All applicable waste will be diverted from disposal in the landfill when possible. Project personnel will use every opportunity to recycle, reuse, and recover materials and divert waste from the landfill when possible. The project will practice sustainable acquisition, as appropriate and practicable, by procuring construction materials that are energy efficient, water efficient, are bio-based in content, environmentally preferable, non-ozone depleting. have recycled content and are non-toxic or less-toxic alternatives. New equipment will meet either the Energy Star or SNAP requirements as appropriate (see http://www.sftool.gov/GreenProcurement/ProductCategory/14).

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, items B3.6, "Small-scale research and development, laboratory operations, and pilot projects"

Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement and Record of Decision (DOE/EIS-0203, 1995) and supplemental analyses (DOE/EIS-0203-SA-01 and DOE/EIS-0203-SA-02) and the Amended Record of Decision (1996)

Final Environmental Impact Statement for the Waste Isolation Pilot Plant (DOE/EIS-0026, October 1980) and Final Supplement Environmental Impact Statement for the Waste Isolation Pilot Plant (SEIS-I) (DOE/EIS-0026-FS, January 1990)

Final Waste Management Programmatic Environmental Impact Statement [WM PEIS] (DOE/EIS-0200-F, May 1997) and Waste Isolation Plant Disposal Phase Supplemental EIS (SEIS-II) (DOE/EIS-0026-S-2, September 1997)

Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada (DOE/EIS-0243) and supplemental analysis (SA) (DOE/EIS-0243-SA-01).

Final Environmental Assessment and Finding of No Significant Impact for the Replacement Capability for Disposal of Remote-Handled Low-Level Radioactive Waste Generated at the Department of Energy's Idaho Site (DOE/EA-1793, December 2011)

Justification: The proposed R&D activities are consistent with CX 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); 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 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 deployment."

Transportation, receiving, and storing used nuclear fuel, as well as, research and development for used nuclear fuel management is covered by DOE's Programmatic Spent Nuclear Fuel (SNF) Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement and Record of Decision (DOE/EIS-0203, 1995) and supplemental analyses (DOE/EIS-0203-SA-01 and DOE/EIS-0203-SA-02) and the Amended Record of Decision (February 1996). The analysis includes those impacts related to transportation to, storage of, and research and development related to used nuclear fuel at the INL (see Tables 3.1 of the SNF Record of Decision (May 30, 1995) and Table 1.1 of the Amended Record of Decision [February 1996]. The EIS limits the number of shipments to the INL, and the proposed activities would fall within the limits of the EIS.

The potential for transportation accidents has already been analyzed in the SNF EIS (Section 5.1.5 and Appendix I-5 through I-10). NEPA coverage for the transportation and disposal of waste to WIPP are found in Final Waste Management Programmatic Environmental Impact Statement [WM PEIS] (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. The Department has analyzed TRU waste management activities in the Final Waste Management Programmatic Environmental Impact Statement (WM PEIS) (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.

The environmental impacts of transferring low level waste from the INL to the Nevada National Security Site were analyzed in the 1996 Nevada Test Site EIS (DOE/EIS-0243) and supplemental analysis (SA) (DOE/EIS-0243-SA-01) and DOE's Waste Management Programmatic EIS (DOE/EIS-200). The fourth Record of Decision (ROD) (65 FR 10061, February 25, 2000) for DOE's Waste Management Programmatic EIS established the Nevada National Security Site as one of two regional LLW and MLLW disposal sites. The SA considers additional waste streams, beyond those considered in the 1996 NTS EIS, that may be generated at or sent to the Nevada National Security Site for management.

Onsite disposal of RH-LLW was analyzed in the Final Environmental Assessment for the Replacement Capability for Disposal of Remote-Handled Low-Level Radioactive Waste Generated at the Department of Energy's Idaho Site (DOE/EA-1793, 2011).

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: 03/02/2020