

# DOE-ID NEPA CX DETERMINATION

## Idaho National Laboratory

### SECTION A. Project Title: I-Loop Deployment in the Advanced Test Reactor

### SECTION B. Project Description and Purpose:

The safe, reliable, and economic operation of the nation's nuclear power reactor fleet has always been a top priority for the U.S. nuclear industry. Continual technology improvement, including advanced materials and nuclear fuels, remains central to the industry's success. The U.S. Department of Energy (DOE) aims to develop nuclear fuels and claddings with enhanced accident tolerance for use in the current fleet of commercial light water reactors (LWRs) and in advanced reactor concepts. Accident tolerant fuels (ATFs) are defined as fuel systems that, when compared to existing Zircaloy (zry) clad UO<sub>2</sub> designs, can tolerate loss of active cooling while maintaining or improving the fuel performance during normal operations, operational transients, design-basis events, and beyond design-basis events. An extensive series of experiments and irradiations have been planned and performed under the ATF Program with the goal of inserting a lead fuel rod or assembly into a commercial power plant by 2022. Idaho National Laboratory (INL) supports research and development (R&D) efforts for the ATF Program by furnishing supplying fuel testing infrastructure, testing ATF concepts, and supporting collaborative efforts among industry, university, and other partners.

To achieve high-performance similar to modern LWR fuels, ATF materials require highly prototypic testing environments coupled with state-of-the-art and advanced diagnostics and modeling and simulation tools. This includes testing environments with pressurized water loops that simulate reactor coolant designs, including specific thermodynamic and chemistry conditions. Pressurized water loops have provided the primary capabilities for highly prototypic LWR fuel testing for the past decade, and domestic LWR loops for ATF Program fuel testing are needed. The only domestically-available prototypic water environment testing facilities are the Advanced Test Reactor (ATR) at INL and the Massachusetts Institute of Technology Reactor (MITR). The MITR has operational LWR loop facilities already being used by ATF vendors, but access is limited for prototypic fuel rod experiments. The ATR is currently the only facility (outside of Russia) that holds an in-pile pressurized water loops for integral irradiation testing of fuel rods for civilian programs. In addition, the ATR is collocated with the Transient Reactor Test (TREAT) Facility at INL, and a suite of post-irradiation examination (PIE) capabilities, to support related ATF Program test activities.

The ATF Program is currently developing experiments for the TREAT Facility and the ATR at INL. The purpose of the proposed action is to supply needed irradiation capabilities in pressurized water loops to support ATF Program needs and objectives. Specifically, the proposed action would reconfigure existing experiment space in the ATR by providing standardized instrumented test trains in existing "I-positions" to perform operational transient testing on integral fresh and previously-irradiated fuel rods. These are referred to as "I-Loops." Along with ATR Loop 2A, a minimum of two additional I-Loops will provide options for (1) power ramp testing and (2) testing in Boiling Water Reactor (BWR) conditions. These capabilities are proposed to be installed during the ATR core internals changeout (CIC) in 2021. As discussed in more detail below, the ATR reconfiguration includes replacing the reactor pressure vessel top head closure plate to include additional equipment penetrations and modifying the I-positions by installing equipment to operate the I-Loops).

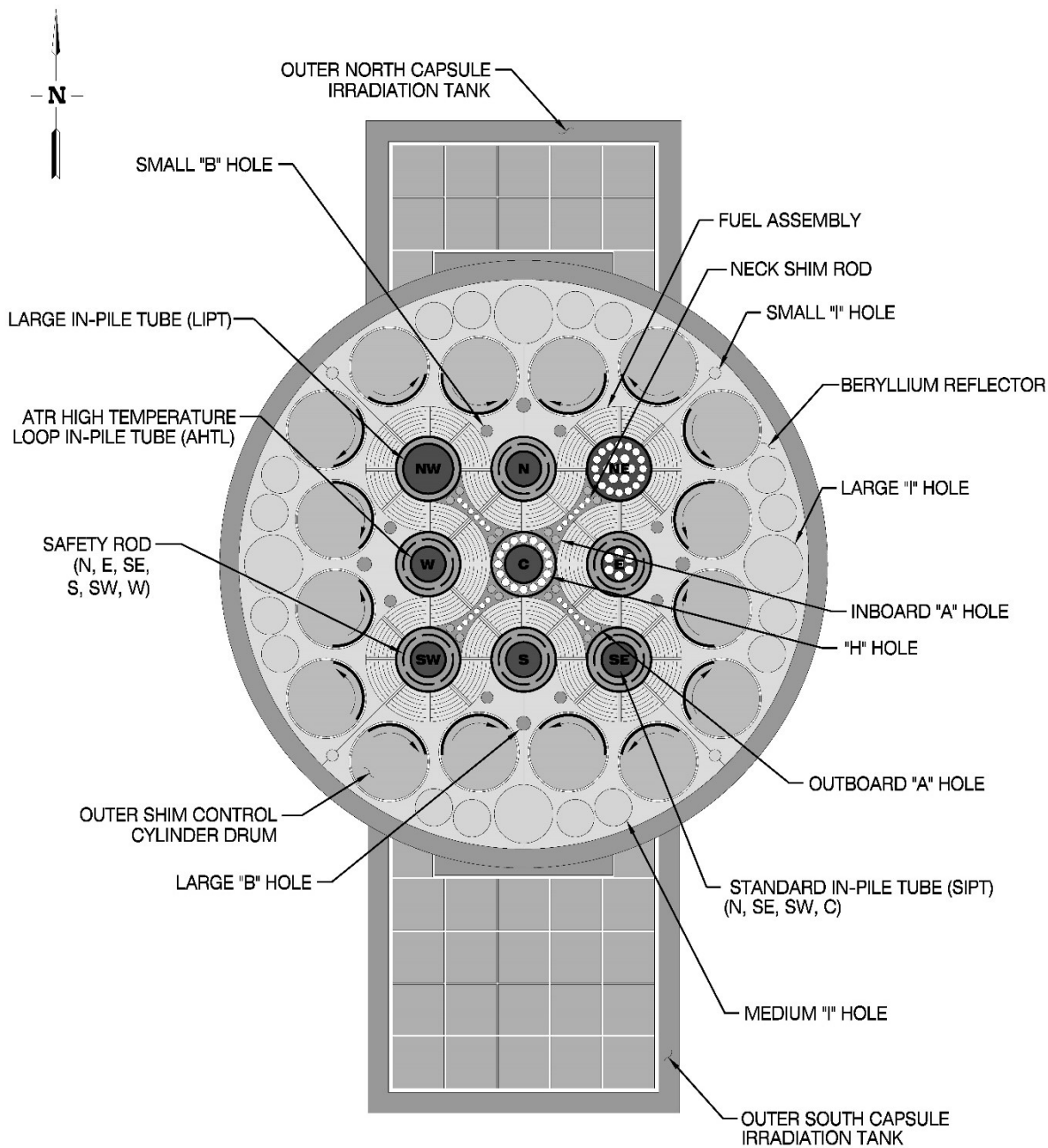
The ATR has been operating continuously since 1967 and is used for a wide variety of government- and privately-sponsored research. In 2007, DOE designated the ATR and INL's PIE capabilities as a Nuclear Science User Facility (NSUF), emphasizing the reactor's role in supporting research led by universities in collaboration with other laboratories and industry. The available ATR experimental space is shared by DOE, industry partners, other nations, NSUF members, and the US Navy.

The ATR is designed for irradiating experiments, and many different experiment programs have been and can be conducted at the facility. The reactor includes an array of core and capsule irradiation tank locations specifically designed to accommodate a variety of experiment assemblies including (1) pressurized water loop in-pile tube (IPT) experiment assemblies, (2) drop-in capsule irradiation assemblies, and (3) instrumented lead capsule assemblies. The first experiment type is positioned in an IPT that isolates the experiment from the reactor coolant and provides a way to control the experiment environment in terms of pressure, temperature, coolant flow, and chemistry. The second is a drop-in capsule fixed in a core or a capsule irradiation tank position and cooled by reactor primary coolant. The third type is a lead capsule experiment fixed in a core or a capsule irradiation tank position with instrumentation lines that exit the experiment and the reactor vessel and are connected to a control system for monitoring and controlling operating parameters. Specific experiment locations within the core change as needed to meet different program needs.

The ATR supplies a high neutron flux (up to  $1 \times 10^{15}$  n/cm<sup>2</sup>/sec thermal) environment for flux traps that may contain in-pile tubes for high-pressure loops or other flux trap irradiation facilities, and, as noted, already supports ATF efforts and experiments. ATR is a light-water-cooled and moderated reactor with a design thermal power of 250 megawatts (MW). The reactor vessel is entirely stainless steel and the core internals are replaced every 7 to 9 years. ATR currently operates at about 150 MW or less. Typical operating cycles are two to eight weeks at power followed by a 7-day outage for refueling and changeout of experiments and isotope production targets. The core is 1.2 meters (4 feet) high and is surrounded by a 1.3-meter-diameter (4.25-foot-diameter) beryllium reflector.

Figure 1 shows the ATR core configuration with pressurized water loop facilities located in six of the flux traps, and non-loop irradiation facilities in the remaining three flux traps. This configuration of the reactor reflects the 1994 CIC and the 2012 standard in-pile tube (SIPT) installation in the center flux trap. Historically, the core has undergone several reconfigurations supporting irradiation programs. For example, in 1997 the capsule irradiation facility in the northeast flux trap was replaced by the Irradiation Capsule Experiment (ICE) facility. The core was reconfigured in 1999 with the installation of the Irradiation Test Vehicle (ITV) in the center flux trap, and the Multiple Irradiation Capsule Experiment (MICE) facility replaced ICE in the northeast. In 2004 the ITV was removed, and in 2011 the MICE was removed. Last, in 2012 the Advanced Gas Reactor 3/4 was installed in the northeast, and the center irradiation facility was replaced with the 2A C SIPT. The proposed action represents an additional reconfiguration to support testing needs.

Figure 1. Typical ATR core cross-sectional diagram.



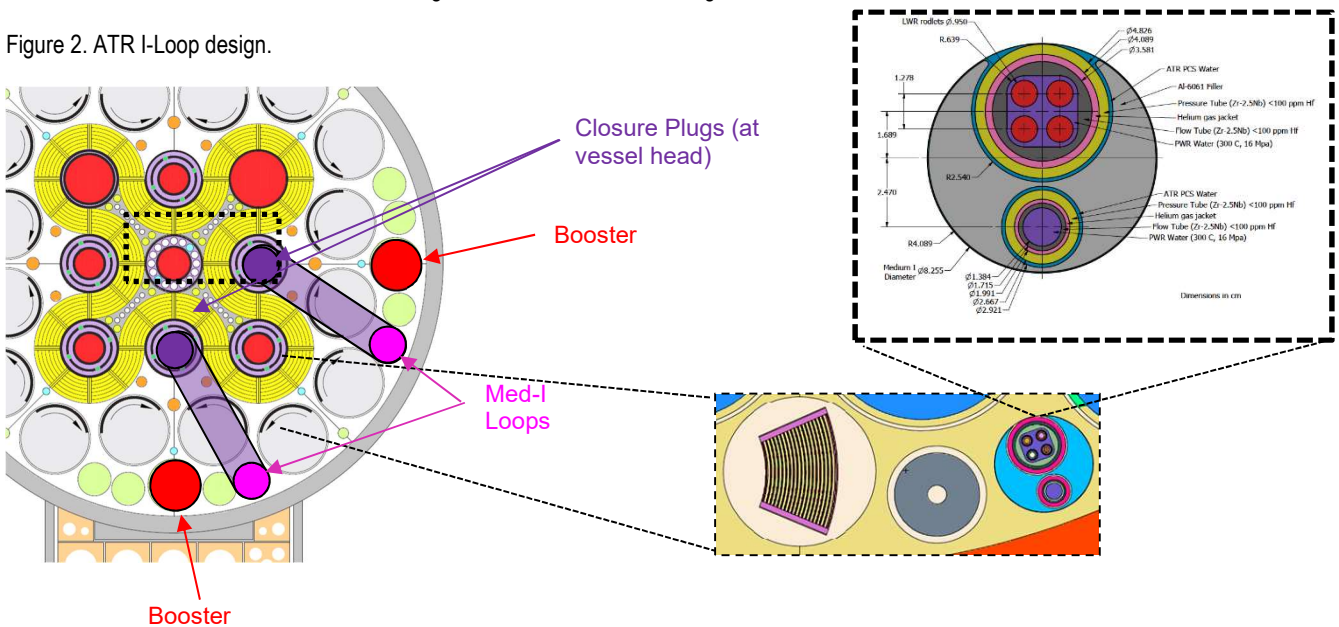
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The I-positions included in have been a part of ATR since it first went critical. Typically, loops have been placed in flux traps to take advantage of the high flux in those areas. The I-positions have a lower flux than the flux traps and other irradiation positions closer to the center of the core and have been used less frequently. Nevertheless, they have been used many times, and recently, researchers developing new power reactor fuels have desired lower fluxes that are more typical of Pressurized Water Reactors and BWRs. Past lead-out experiments conducted in the I-positions include Tritium Producing Burnable Absorber Rod (TPBAR) Materials Irradiation Separate Effects Test (TMIST) experiment 3A and 3B, and University of California Santa Barbara (UCSB) experiment 2. Past fueled and material drop-in experiments conducted in the I-positions include the ATF-1 experiments, Boise State University research, and the U.S. High Performance Research Reactor Mini Plate Experiment. The Flux Enhanced Large I (FELI) experiment was a fuel element designed specifically for the large I-positions.

Monte Carlo investigations demonstrate that the proposed inclusion of a standard ATR driver fuel assembly in a large-I position can increase neutron population in the outer reflector while placing a standard beryllium plug between this “booster fuel” and the I-Loop moderates the spectrum for a 10-15% thermal neutron flux increase in the fuel specimen. This approach can elevate thermal neutron flux to that needed for the ATF Program during routine ATR cycles. This flux level also scales with adjacent lobe powers; enabling it to be at least doubled during high-power cycles. These high-power cycles typically last ~10 days and occur roughly once or twice per year at 50-60 MW lobe power.

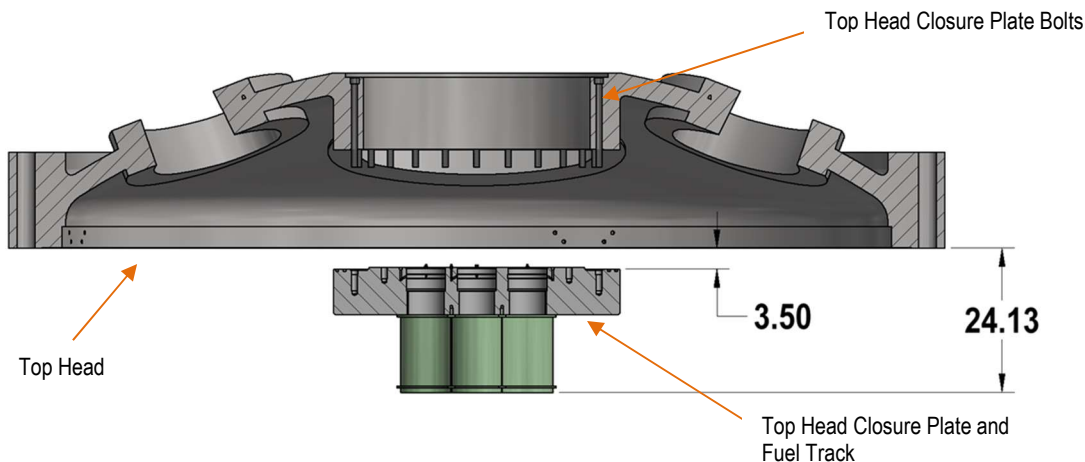
Typical flux trap-based loops have annular return flow paths in the core and are composed primarily of stainless steel IPTs, and yet still often require flux shrouds in test train hardware (e.g. hafnium) to reduce flux to achieve LWR prototypic heating rates. For I-positions the objective is different and requires greater neutron economy. A non-annular loop layout with the test section oriented toward the core and using nuclear grade Zr-2.5Nb alloy (which has been used extensively in high fluence pressurized water conditions in CANDU reactors) work to accomplish this aim in the proposed I-Loop design (see Figure 2). Thermal neutron flux in medium-I positions are slightly higher than the large-I positions during typical ~50 day ATR power cycles, which makes the medium-I positions the preferred location for I-Loops. Each I-Loop enables a 2x2 rodlet array (giving up to 16 total 30 cm rodlets across the ATR active core length per loop). The proposed I-Loop design shown in Figure 2 is also compatible with other test train configurations such as a cross section with two or three individual rodlets in discrete flow tubes for varying thermal hydraulic conditions within a single test assembly, or a single rodlet cross section to reduce rod-to-rod self-shielding for increased nuclear heating with additional volume for instrumentation.

Figure 2. ATR I-Loop design.



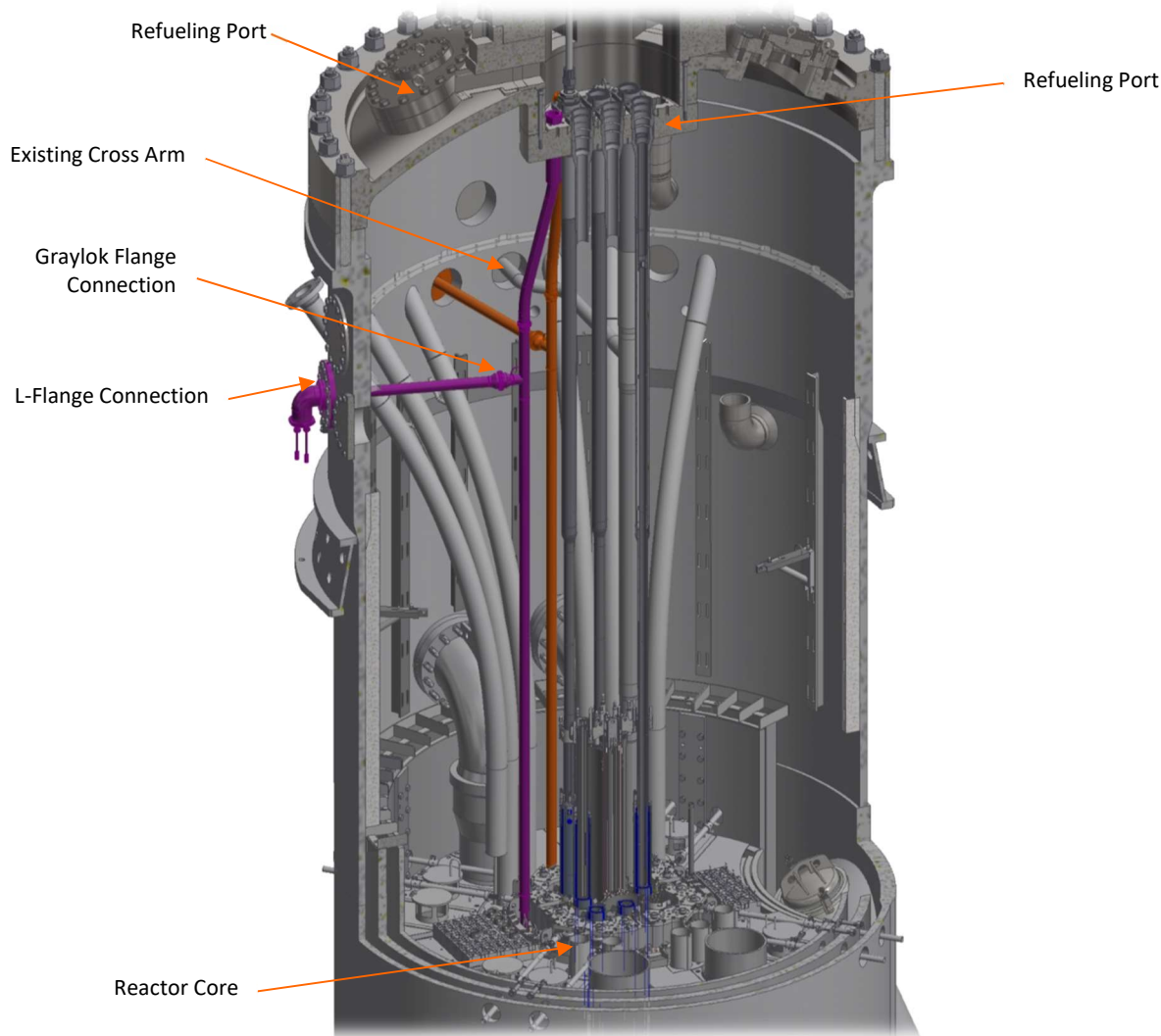
Existing penetrations through the pressure vessel top head closure plate and shielding structures for high-pressure plumbing and test train extraction via overhead casks reflect the ATR design being based around the nine flux traps. To facilitate irradiation testing using the proposed I-Loop configuration, INL proposes to replace the reactor pressure vessel top head closure plate with a new plate containing eight additional new peripheral penetrations. This closure plate is a relatively small part of the pressure vessel head (four feet in diameter) as shown in Figure 3 and is planned to be replaced during the 2021 CIC. Completing the retrofit during CIC reduces the risk of interrupting other planned operations. Structural calculations show the new penetrations will not compromise the reactor pressure boundary.

Figure 3. Existing ATR top head



In addition, the proposed action installs new IPTs so that test train extraction and instrument leads route through the top head closure plate and permanent plumbing penetrates through existing flanges through the side of the reactor pressure vessel in the manner typical for lead-out experiments. The slight offset of these IPTs requires test trains designed to facilitate insertion and extraction (see Figure 4). Test train extraction in this fashion facilitates transporting the irradiation tests to ATR's storage pool, the adjacent dry transfer cubicle hot cell, or to hot-cells for a variety of post-irradiation examinations.

Figure 4. I-Loop in-pile tubes in the ATR.



INL also anticipates removing several experiments and support equipment currently in the ATR during the CIC (e.g. Advanced Gas Reactor test support equipment). Removing and repurposing this equipment enables I-Loop hydraulic support equipment (e.g. pressurizers, line heaters, pumps, heat exchangers, ion exchangers, and coolant chemical conditioning) to be installed in shielded cubicles for connection to the I-Loop IPTs. I-Loop hydraulic support equipment will be designed, constructed, and installed in accordance with equivalent specifications, and in many cases identical equipment, as the presently installed flux trap-based pressurized water loops. While the new top head closure plate will be radially symmetric, creating penetration ports for up to eight lead-out and loop types experiments, the current plan utilizes two I-Loops in order to allocate test capabilities adequate for the ATF Program and the ability to control two coolant conditions for various tests. Preliminary design and safety evaluations have been performed and show that this effort is a viable strategy to address the need for LWR fuel irradiation testing capabilities for the ATF Program.

The proposed action would not compromise the existing structural or architectural capabilities with respect to the original ATR design criteria. Applicable DOE orders and ATR technical specifications would be used to establish construction criteria for materials, design and safety analyses, fabrication examination, and testing. System instrumentation would be designed to provide measurements and controls necessary for public and personnel safety.

The proposed action does not change the function or design capacity of the ATR, nor does it extend the life of the ATR. All experiment locations currently exist in the ATR, and there will be no additional positions added. ATR's current safety basis (SAR-153) discusses the configurable nature of loop

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experiments and supports the conclusion that these I-Loops will not increase ATR's total loop inventory beyond the facility's original basis. All experiments conducted in these loops will undergo the established experiment safety analysis process to verify compliance with the current safety envelope.

Experiments and testing activities anticipated to be conducted in the I-Loops include operational limits testing, secondary degradation testing, ramp testing, and in-pile instrumentation testing. These types of tests have been and will continue to be performed using ATR's flux trap-based pressurized water loops.

The ATF Program encompasses a wide range of Technical Readiness Levels (TRL) and, therefore, also a broad range of associated timelines for R&D needs. When considering potential testing activities to be performed in the I-Loops, specific data streams, experiment and data objectives, strategies, and processes are difficult to predict. Specimen quantities (total experimental capacities) for ATF are an important consideration that also cannot be fully predicted. This analysis does not provide detailed specifications for all experimental programs needed by all ATF developers. Rather, the scope of this analysis is to supply the primary testing capabilities to meet the need for in-pile pressurized water loops for integral irradiation testing required by the ATF program. The environmental impacts of other experimental programs needed by ATF developers will be evaluated in separate analyses in compliance with the National Environmental Policy Act (NEPA).

INL leads the planning, design, and analyses of irradiation experiments in coordination with the various institutions that are engaged in developing the ATF concepts. The INL performs irradiation experiments in the ATR and coordinates the PIE on the discharged materials. The discharged materials are shipped from the ATR to the Hot Fuels Examination Facility (HFEF) and/or the TREAT Facility at the Materials and Fuels Complex (MFC). The process typically involves the following activities:

- Generating experiment hardware design drawings
- Defining experiment Technical and Functional Requirements (T&FR) to meet ATR safety basis and ATF Program objectives
- Conducting experiment design review and obtaining ATR design acceptance
- Fabricating basket assemblies to house experiments in the ATR during irradiation
- Performing neutronic analyses of the aggregate capsules (this activity includes providing enrichment specifications to ATF fabricators)
- Performing thermal-hydraulic analyses of the experiment assembly
- Performing structural analyses of the capsules acting as ASME-standard pressure vessels and ATF test rodlets
- Receiving test articles (i.e., ATF test rodlets) from development teams
- Fabricating capsules
- Encapsulating test materials in the capsules
- Preparing the Experiment Safety Assurance Package (ESAP) and obtaining its approval from the Safety Operations Review Board (SORC), which authorizes irradiating experimental capsules in the ATR
- Shipping the finished capsules to the ATR
- Receiving the capsules at ATR and loading the basket assembly
- Inserting the basket assemblies into the ATR and irradiating the capsules to their specified burnup levels
- Handling experiment and basket change-outs during ATR outages as needed
- Storing discharged experiments (as necessary) in the ATR canal for cooling
- Shipping the discharged capsules to HFEF at MFC
- Performing PIE at HFEF and supporting laboratories at MFC and coordinating the shipment of selected samples to other examination facilities as appropriate, contingent on the availability of an acceptable shipping cask/container.

After PIE, irradiated test pin segments and PIE remnants are 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, the ATF Program uses the HFEF hot cell which contains both defense and nondefense related materials and contamination. Project materials 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). 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 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

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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 material generated as described above, industrial, mixed, and low level waste may be generated throughout the R&D process. This waste will be classified and disposed in accordance with INL procedures and DOE regulations/requirements.

### **SECTION C. Environmental Aspects or Potential Sources of Impact:**

#### **Air Emissions**

Air emissions include minor amounts of radionuclides and toxic air pollutants.

Experiment irradiation and PIE will be performed at the ATR, HFEF, and TREAT facilities. The proposed irradiations in the ATR primary coolant and TREAT 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. APADs will be completed to document these exemptions. Normal operation of sealed experiments in ATR primary coolant and TREAT irradiation is not expected to contribute to or cause an increase in air emissions. ATR radionuclide and TREAT emissions are sampled and reported in accordance with Laboratory-wide Procedure (LWP)-8000 and 40 CFR 61 Subpart H. The irradiated experiments will be delivered to the MFC HFEF for disassembly and then undergo routine PIE. All radionuclide release data associated with the PIE portion of the proposed action will be recorded as part of the HFEF continuous stack monitor and calculated and provided to Programs Environmental Support organization by January 31 of each year for the preceding calendar year as part of the INL Annual National Emission Standards for Hazardous Air Pollutants (NESHAPs) report to DOE. Releases of radioactive airborne contaminants from this process are not expected to result in an increase to the annual HFEF dose to the Maximum Exposed Individual. Therefore, no Air Permit Applicability Determination is required for the project. All experiments will be evaluated by ATR Environmental Support and Services staff, prior to insertion in the ATR. All radionuclide release data (isotope specific in curies) directly associated with this experiment will be calculated and provided to the ATR Programs Environmental Support organization by January 31 of each year for the preceding calendar year.

For calendar year 2018, the effective dose equivalent to the maximally exposed individual (MEI) member of the public was 1.02E-02 millirem (mrem) per year, which is 0.10 percent of the 10 mrem per year standard, for the INL Site. The additional increment in emissions from the proposed action would not significantly change the total site-wide MEI dose.

#### **Disturbing Cultural or Biological Resources**

ATR (building TRA-670), HFEF (MFC-785), and TREAT (MFC-720) are eligible for nomination to the National Register of Historic Places. Modifications have the potential to impact historic resources.

#### **Generating and Managing Waste**

The I-Loops can house at most 20 rodlets (~6 inch long each), but fewer are anticipated, because instrumentation takes up some space. It is estimated that a total of about ~10 rodlets/year would be discharged from the I-Loops. The following waste streams are anticipated:

Irradiated sample debris and PIE waste are expected to generate research and development-related TRU waste and mixed TRU waste. TRU waste generated from the proposed action is anticipated to be less than 1 m<sup>3</sup>. 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...".

The project has the potential to generate hazardous waste in the form of cleaning solvents, solders, metals, and scrap metal (held for recycle whenever appropriate).

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.

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Project personnel must 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 PEL. If the PEL 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 materials will be reused and recycled where economically practicable. All applicable waste will be diverted from disposal in the landfill where conditions allow.

**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 B1.31, "Installation or relocation of machinery and equipment" and 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 for the Multipurpose Haul Road Within the Idaho National Laboratory Site (DOE/EA-1772, 2010)

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)

Final Environmental Assessment (EA) and Finding of No Significant Impact (FONSI) for the Resumption of Transient Testing of Nuclear Fuels and Materials (DOE/EA-1954, February 2014).

**Justification:** The proposed facility modifications and R&D activities are consistent with CX B1.31 "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 and 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," and 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);

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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.

The impacts of transporting spent fuel, special nuclear materials, and research fuels between MFC and other INL Site facilities using the Multi-Purpose Haul Road were analyzed Final Environmental Assessment for the Multipurpose Haul Road Within the Idaho National Laboratory Site (DOE/EA-1772).

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).

DOE evaluated the environmental impacts of transient irradiations in the TREAT reactor, including 1) transporting experiment materials between MFC and TREAT, 2) pre- and post-irradiation radiography, 3) PIE of test components at HFEF or other MFC facilities, and 4) waste generation and disposal in the Environmental Assessment (EA) and Finding of No Significant Impact (FONSI) for the Resumption of Transient Testing of Nuclear Fuels and Materials (DOE/EA-1954, February 2014).

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: 9/25/2019