

DOE-ID NEPA CX DETERMINATION

Idaho National Laboratory

SECTION A. Project Title: NRIC Irradiated Fuel Salt Characterization Modular Hot Cell

SECTION B. Project Description and Purpose:

Revision 1. Revisions are included throughout the body of the document. The revisions include the addition of MFC-789, MFC-768B, and MFC-1742 for commissioning equipment; the deletion of the 2021-2023 schedule of activities; and a brief discussion of salt synthesis activities that may occur in other MFC buildings.

To advance the technical readiness level of advanced molten salt reactors (MSR), the Nuclear Reactor Innovation Center (NRIC) is pursuing the Molten Salt Thermophysical Examination Capability (MSTEC). MSTEC includes the infrastructure and equipment needed to measure the thermal, chemical, and physical properties of irradiated and unirradiated molten salt systems, including fuel and coolant salts with prototypical concentrations of actinide, fission product, and corrosion product elements. Currently, the next generation of MSR designs are theoretical and there exists a large knowledge gap on the behavior of multi-component salt systems under reactor conditions, and how their behavior changes as a function of fuel burnup and irradiation exposure. It is equally important to understand how physical and mechanical properties of construction materials within an MSR change as a function of temperature, composition, irradiation, and salt exposure.

It is proposed to install the MSTEC modular hot cell in MFC-765, the Fuel Conditioning Facility (FCF) to support the described objectives. The modular hot cell is heavily shielded and requires placement on grade (not above a basement level). Whereas gloveboxes can be placed in several locations inside FCF, the IBC washroom (FCF-35A & 35B) was constructed to handle casks with freshly irradiated EBR-II fuel and is capable of supporting large floor loads. This location is also near the truck lock for receipt of test materials in shielded drums or casks. The current conceptual design of the modular hot cell is shown in Figure 1 in this ideal space. This modular hot cell would have manipulators and significant shielding on one side to provide a low dose rate environment for typical activities. The back side would have less shielding and would include glove ports for equipment installation, repair, and other activities when high dose rate materials are appropriately stowed. The proposed modular hot cell is approximately 24 feet in length in order to provide sufficient space for the proposed functions.

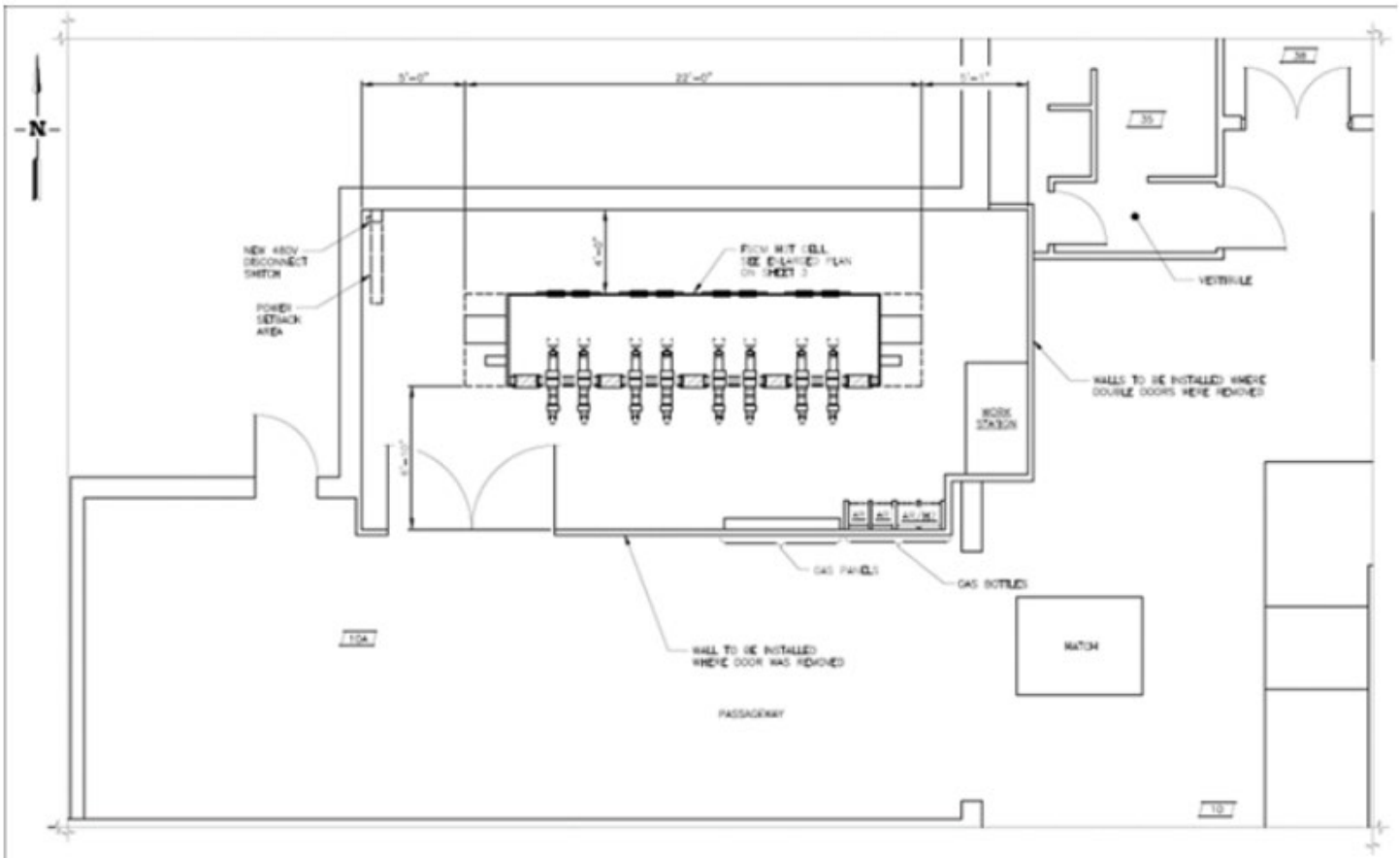


Figure 1. MSTEC Modular Hot Cell Concept in FCF IBC Washroom

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The characterization equipment that will be installed within the modular hot cell will initially be commissioned at laboratories in the Energy Innovation Laboratory (EIL), Engineering Development Laboratory (EDL) building MFC-789, Water Chemistry Laboratory (WCL) building MFC-768B, and the Research Collaboration Building (RCB) MFC-1742. Starting at EIL, EDL, WCL, and RCB will allow researchers to perform initial tests with molten salts in a non-radioactive environment. Once testing has been performed with molten salts in the non-radioactive atmosphere, the characterization equipment will undergo modification for remote use within the modular hot cell at FCF. Future projects that utilize MSTEC may have salt synthesis or preparation activities take place in the Fuel Manufacturing Facility (FMF) building MFC-704, the Fuels & Applied Science Building (FASB) building MFC-787, and the Hot Fuels Examination Facility (HFEF) building MFC-785.

MSR designs could employ a variety of salt systems using transuranic elements such as Pu. Nearly all plutonium at MFC was supplied by defense programs. MFC involvement with defense-related programs and materials has been continuous since the earliest days of operation. MFC facilities that are qualified for plutonium handling, including FMF and HFEF, are contaminated with transuranic from these programs.

In addition, after Post-Irradiation Examination (PIE) in the modular hot cell in FCF, irradiated molten salt systems and PIE remnants will be stored with other similar DOE-owned irradiated materials and experiments at MFC, most likely in the Hot Fuels Examination Facility (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 molten salt systems 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...".

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 the 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.

There is the potential to generate low level waste (LLW). The environmental impacts of transferring LLW from the INL Site to the Nevada National Security Site were analyzed in the 2014 Final Site-Wide Environmental Impact Statement for the Continued Operation of the Department of Energy/National Nuclear Security Administration Nevada National Security Site and Off-Site Locations in the State of Nevada (DOE/EIS-0426) 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.

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).

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SECTION C. Environmental Aspects or Potential Sources of Impact:

Air Emissions

The proposed activities could result in an increase in radioactive air emissions from FCF main stack. The FCF suspect exhaust system is equipped with filtration and monitoring systems to limit the release of these materials into the atmosphere. An APAD has been completed (INL-20-004); the APAD documents that this modification does not require either an approval to construct as defined in 40 CFR 61.96 or a revision to the FEC-PTC (PER-152).

Discharging to Surface-, Storm-, or Ground Water

NA

Disturbing Cultural or Biological Resources

The proposed action is a federal undertaking defined in 36 CFR 800.16(y), and although it is the type of activity that has the potential to cause effects to historic properties, it is excluded from Section 106 review per MCP-8008, Appendix B. The proposed action is excluded under Activity Type 8: internal reconfiguration of active laboratories, because the hot cell installation in FCF will expand and improve MFC-765's experimental and testing capabilities. Therefore, there are no further obligations under Section 106. No CRR is required.

Generating and Managing Waste

The proposed activities will generate remote-handled mixed low-level waste and mixed TRU waste. The TRU waste would be classified as Defense-related waste and be eligible for disposal at WIPP. The estimated amount of TRU waste generated will be < 0.5 ft³. Installation of the identified equipment has the potential to generate radiologically contaminated industrial waste such as scrap metal. Polychlorinated biphenyl (PCB) waste could be generated when modifying buildings built before 1982 or working with pre-1982 equipment/materials. Examples include electrical equipment/components, painted surfaces, light fixtures, caulking, joint sealer, ventilation duct gaskets, and insulation.

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 MFC 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 MFC 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. Project personnel may not knowingly vent or release refrigerants to the environment.

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.

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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:

B1.31 "Installation or relocation of machinery and equipment", B3.6 "Small-scale research and development, laboratory operations, and pilot projects", DOE/EIS-0203 "", DOE/EIS-0026-FS "", DOE/EIS-0026-S-2 "", DOE/EIS-0426 ""

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."

The proposed activity 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."

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Is the project funded by the American Recovery and Reinvestment Act of 2009 (Recovery Act) Yes No

Approved by Jason L. Anderson, DOE-ID NEPA Compliance Officer on: 4/17/2023.