Energy and Environment

Storage of DOE SNF at the Idaho National Laboratory

For more information

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The Idaho National Laboratory (INL) maintains a variety of wet and dry spent fuel storage facilities at its Idaho Nuclear Technology and Engineering Center (INTEC), Material and Fuels Complex, and Reactor Technology Complex (RTC). The INL also stores fuel at two NRC-licensed independent spent fuel storage installations (ISFSI), the Fort Saint Vrain (FSV) facility in Colorado and the Three Mile Island facility at INTEC. A 20 year license renewal application for the FSV facility was submitted to the NRC in November 2009.

The INL stores 275 MTHM of spent nuclear fuel (SNF) consisting of 150 MTHM of commercial fuel including core debris from the Three-Mile Island Unit 2 (TMI-2); 56 MTHM of sodium-bonded fuels from EBR-II, FFTF, and Fermi reactors; and an additional ~69 MTHM from a variety of defense, government research, and commercial demonstration programs. Although INL fuels account for only ~12% of the MTHM in DOE's SNF inventory, they are expected to account for over half of the spent fuel canisters.

Spent fuel at the MFC is stored at the Radioactive Scrap and Waste Facility (RSWF). The RSWF, The RSWF operates under a HWMA/RCRA mixed waste storage permit. Other fuels at MFC are stored within a variety of hot cells.

INTEC contains several SNF storage facilities, each with a monitoring and surveillance plan for ensuring the facility remains within its safety authorization basis. A summary of each of the spent fuel storage facilities at INTEC is provided below.

CPP-1774 is an above-ground storage facility containing 30 concrete vaults storing ~82 MTHM of TMI-2 fuel and core debris. It is an NRC-licensed ISFSI and its current license is valid through 2019.

Top:Three Mile Island NRC Licensed ISFSI.

Below: CPP-749 Underground Vaults.

CPP-2707 is a concrete pad storing six casks, with room available for another ~14. Two rail casks filled with SNF from the West Valley site, presently on a rail spur near CPP-603, may be relocated to CPP-2707 in the future.

CPP-2707 Cask Pad

CPP-749 is a series of underground storage vaults consisting of an array of 214 carbon steel pipes inserted into the ground with grouted bottoms. The first generation vaults were constructed in the early 1970s. The first fuel was loaded in September 1971 and remains in storage. Accelerated corrosion of stored fuels has occurred as a result of moisture intrusion. The second generation vaults were designed to prevent water intrusion and maintain an inert internal atmosphere. Some moisture has been observed even in these second generation vaults. About 80 positions are available in the 2nd generation vaults.

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CPP-603 Irradiated Fuel Storage Facility (IFSF) is a shielded cell containing 636 vertical tube storage positions. The storage vault was added on to a 1950s vintage fuel storage pool in the early 1970s to receive fuels from the Fort St. Vrain reactor. However, because much of the Fort St. Vrain fuel has remained in storage in Colorado, the IFSF has been used to store domestic and foreign research reactor fuels and to support consolidation of other INL fuels into dry storage. Approximately 90% of the 636 storage positions will be filled by the end of 2010.

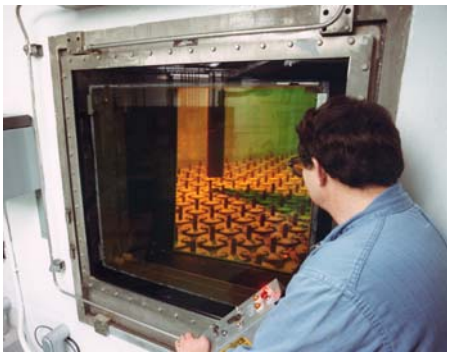
CPP-666 is a third generation wet basin with a stainless steel liner and leak detection system. It was placed in service in 1984 and contains 2911 fuel storage ports of 5 different sizes. CPP-666 also contains two deep unloading pools that provide the capability for cask unloading and transfer of commercial-length fuels.

In addition to DOE owned fuel, CPP-666 stores spent fuel from the Naval Reactors Program. The Naval Reactors Program and DOE-EM are currently retrieving their SNF from CPP-666. DOE-EM will complete relocating their fuels from CPP-666 wet storage to other INTEC dry storage facilities by June 30, 2010. As part of this initiative, a number of miscellaneous fuels being removed from the CPP-666 basins will be placed into two NU-PAC 125B casks that will be stored at CPP-666 until relocated to CPP-603 (~2012). Naval fuels are being returned to the Naval Reactors Facility for on-site dry storage, with completion expected ~2017 to 2020. Following removal of Naval and EM-owned fuels, the basin mission will continue for storage of the EBR-II sodium-bonded fuel and NE-owned fuels from the Advanced Test Reactor (ATR).

CPP-666 will reach the end of its 40-year design life in 2024. If properly maintained, it is reasonable to assume that life extensions would be achievable.

If fuel is not being shipped from the INL by 2020, additional dry spent fuel storage capacity will be required. If needed, additional wet storage capacity may be available by completing an appropriate evaluation and developing a basis for extending the operating life of CPP-666.

Fuel-related records and equipment relied upon to ensure safety are maintained under an auditable quality assurance program that meets the requirements of the Quality Assurance Requirements Document (DOE-RW-0333P).



Left: CPP-603 Idaho Fuel Storage Facility

Right: CPP-666 Storage Basin

All of the fuel at Idaho will require repackaging before it is sent off site or to final disposal. The fuel will be packaged in the DOE Standardized Canister. The National Spent Nuclear Fuel Program (NSNFP) has an ongoing technology development program to complete the remote closure and non-destructive examination systems for the standardized canister. This technology will be deployed at Idaho to repackage fuel and possibly the HIP calcine cans.

Staff members from the NSNFP are also participating in storage initiatives by the Office of Nuclear Energy's Used Fuel Campaign and the EPRI/NRCs' efforts to develop a technical justification for very long term storage of used fuel. The NSNFP participation in these initiatives will ensure DOE EM is fully integrated and informed of material degradation and ageing management issues for fuel elements and storage systems. NSNFP intends to share information, regulatory issues, and other technical issues from these meetings with the Idaho facilities for their use in planning for very long term storage.