

ARGONNE NATIONAL LABORATORY-WEST

C_{urrent Mission}

Argonne National Laboratory — West is the prime testing center in the United States for demonstration and proof-of-concept of nuclear energy technologies. Operated by the University of Chicago, Argonne-West is fully integrated with Argonne National Laboratory — East in Illinois. The mission at Argonne-West emphasizes technologies associated with nuclear fuel, including advanced fuel treatment methods, fuel efficiency enhancements, and fuel performance testing. This mission also includes nuclear material characterization technologies, environmental

technologies, and technologies and processes requiring remote handling of nuclear materials. ANL-W provides strong technical and scientific research support to DOE's mission to provide the nation with safe, clean, economical energy sources for the future.

Employees

Approximately 700 employees work at Argonne-West, with a broad range of skills and expertise in nuclear energy technology research and development. These include expertise in nuclear materials, nuclear fuels, analytical chemistry, nuclear fuel treatment, materials

characterization, and remote handling and operations with nuclear materials.

Programs and Facilities

The major program at ANL-West — **electrometallurgical treatment** — relies on each of these areas of expertise. Electrometallurgical treatment is an advanced method of preparing unstable nuclear fuels for permanent geologic disposal. Developed through research integrated at both Argonne-West and Argonne-East, electrometallurgical treatment uses an electrolysis-based process to reduce the volume of material to be disposed while sealing the

Scientists at ANL-W have developed an electrometallurgical process to separate fission products which are waste, from the still-useful uranium in spent nuclear fuel. Argonne's process is safer than previous methods of separation, and results in less waste to dispose.



waste materials in a ceramic that is impermeable to air and water. It was developed for application to the spent fuel from Experimental Breeder Reactor-II (EBR-II), the fuel from which is unstable both mechanically and chemically without treatment.

The Fuel Conditioning Facility (FCF) is where electrometallurgical treatment is performed. It consists of two heavily shielded hot cells, one with an air atmosphere and one with an inert argon

atmosphere. Process operations are conducted remotely using manipulators that allow operators outside the hot cell to work with materials in the cell. In this way, work can be done on extremely radioactive materials with no radiation exposure to workers or visitors. There is no human entry into the hot cell, and all operations are performed remotely.

The Hot Fuel Examination Facility (HFEF) is a large, highly versatile hot cell facility. It features an air cell and argon cell, superb overhead crane

capacity, large floor space with high ceiling clearance, and versatile access ports.

In-cell equipment includes a wide variety of machining equipment used for destructive testing of nuclear materials, as well as a wide variety of non-destructive testing equipment. HFEF also has neutron radiography capability with a functioning TRIGA reactor as the neutron source. The high bay area of HFEF is home to the Waste Characterization Area which performs remote characterization of material to

be shipped to the Waste Isolation Pilot Plant in New Mexico for disposal. In the WCA, transuranic nuclear waste is removed from drums it currently is stored in, examined and sampled, and repackaged for shipment to WIPP. This work is being done in support of INEEL's efforts to remove its transuranic waste from the state of Idaho.

The Transient Reactor Test Facility (TREAT) is a pulse reactor designed to produce short, controlled bursts of



Argonne National Laboratory-West is situated west of Idaho Falls on the high desert sagebrush country of the Snake River Plain. The EBR-II Reactor here demonstrated that with proper application of natural physical principles, a reactor can be self-protecting against overheating and meltdown.

nuclear energy. It is used for testing the performance parameters of materials in a reactor. It is in stand-by status. The TREAT facility is home to MDAS, a joint project with INEEL scientists which uses a small accelerator to achieve non-evasive assay of nuclear material.

The Zero Power Physics Reactor (ZPPR) is an extremely low power test reactor used to test various reactor design features with different materials and configurations. It is in stand-by status.

The Sodium Processing Facility is where the primary and secondary coolant from EBR-II is converted from its elemental, chemically unstable form, to a chemically stable compound suitable for landfill disposal.

Taken together, these and the other ancillary facilities at Argonne-West provide all the necessary steps to take a nuclear reactor power station from design to demonstration. For nearly 50 years, this was the primary function of ANL-West. Beginning with EBR-I and the first electricity generated from nuclear power, Argonne-West has been the world leader in reactor design and demonstration. What is now known as the INEEL began when the University of Chicago came to the Idaho desert in 1949 to begin this important work. Now, every major

reactor type in use in the world today traces its design through Argonne-West.

The centerpiece of this history is EBR-II. This reactor operated successfully for 30 years prior to its being shut down in 1994. Prior to that, it provided reliable electrical power for all of Argonne-West's needs, as well as a substantial portion of the electricity for the INEEL. EBR-II's greatest contribution came in the spring of 1986, when it demonstrated that with the proper application of natural physical principals a reactor can be self-protecting against overheating and melt down.

Following the US government's decision not to pursue advanced reactor research, EBR-II was shut down in 1994. Since then

it has been placed in a radiologically and industrially safe condition, a several-year process which prepares the reactor and its systems for decontamination and decommissioning. EBR-II has been honored as a historic landmark by the American Nuclear Society.

Distances

Argonne-West is 38 miles (61 kilometers) west of Idaho Falls, 50 miles (80 kilometers) northwest of Blackfoot, and 38 miles (61 kilometers) south east of Arco.



