

1984 recap shows employees actively engaged in site projects, community activities

New Programs

The first steps toward an important new research program, the Integral Fast Reactor, were made in 1984. This program, conducted in existing facilities, could some day lead to constructing a large new reactor at the ANL-West site.

The IFR would be a sodium-cooled reactor producing about 300 megawatts of electricity. It would be fueled with a new version of the metallic fuel that has been developed during the past 20 years at EBR-II and is expected to have important safety and security improvements over previous breeder reactor designs.

The Electric and Hybrid Vehicle Testing Program started this year. INEL engineers built a dynamometer testing laboratory in the ILF, completed a testing program to qualify the laboratory and started testing of experimental vehicles and battery systems. Another program testing aspect is the Versatile Data Acquisition System, an onboard computer system for electric vehicles. VDAS collects information on performance of the vehicle's electrical and mechanical systems.

Near the last year's end, an Experimental Fuels Laboratory started operating at ANL-West to cast uranium-plutonium-zirconium fuel pins for the IFR program. These pins will begin experimental irradiation in EBR-II in early 1985.

Nuclear Activities

Three tests were carried out at the Loss-of-Fluid Test Facility as part of the OECD (Organization for Economic Cooperation and Development) LOFT Project.

In February, a full powered simulated, large-pipe break accident was performed providing data evaluating the accuracy of codes, or computer models, used to predict the behavior of full-scale pressurized water reactors during postulated accidents.

This was followed in March by a small-break test during which the nuclear core was allowed to be partially uncovered.

In late December, the first total systems reactor experiment purposely damaging fuel rods and releasing fission products from the fuel was conducted. This experiment provided information on the release and transport of fission products for actual reactor accidents of this nature.

Data will be used to review licensing criteria for nuclear power plants and determine the radiological release potential to the public.

A simulated Canadian nuclear plant loss-of-coolant-accident (LOCA) was carried out at PBF in February. Information gathered will verify accuracy of Canadian computer models to predict nuclear fuel performance during postulated accidents.

In August, PBF was used for the third in a series of NRC Severe Fuel Damage tests. The test provided data on fission product and hydrogen release and transport from the test fuel bundle.

At Semiscale (a non-nuclear pressurized water system with an electrically heated core), the last in a series of nine NRC tests on ruptures of steam generator tubes in commercial nuclear power plants, occurred last year. The series examined ways nuclear power plant operators recognize and respond to steam generator tube ruptures which potentially can release radiation into the environment.

In 1984 the INEL also began operating the Advanced Test Reactor Large Gamma Facility to help answer questions about effects of high gamma radiation fields on the performance of many electrical components and materials.

The Transient Reactor Test Facility (TREAT) reactor, at ANL-W, used to simulate nuclear accidents, studied tests to gather data on release of fission products in reactor accidents. Data are expected to lead to more realistic rules for evacuation zones during an accident. TREAT also did some preliminary studies on the safety of IFR fuel.

The Zero Power Plutonium Reactor (ZPPR) at ANL-W concluded a study of large breeder cores cooperating with the Japanese, and began preparing studies of IFR core designs.

ANL-W's large hot cell facility, Hot Fuel Examination Facility/North, began a new non-destructive examination procedure called neutron tomography. Using a process similar to a medical CAT scan, ANL and EG&G experimenters were able to look inside fuel bundles that had been intentionally damaged in

reactor safety experiments.

At the Three Mile Island reactor in Pennsylvania, INEL personnel made progress in a number of areas, bringing the reactor vessel several steps closer to disassembly. The vessel's head was safely removed, and five months later, the plenum raised above the core. Tools and equipment development and testing got underway to remove and begin shipping the damaged TMI-2 core in the spring of 1986.

Waste Management

The site's Waste Management Program recorded a number of achievements last year.

The first production run of the New Waste Calcining Facility was completed and during 1984, approximately 438,000 gallons were solidified.

Reprocessing fuel from the Rover Jet Propulsion Program was completed at ICPP several months ahead of schedule. This effort resulted in reclaiming uranium valued at more than \$100 million.

Construction was completed on the Stored Waste Examination Pilot Plant and work started on the Process Experimental Pilot Plant.

Both facilities will demonstrate state-of-the-art inspection and processing techniques for transuranic waste, a type of radioactive waste requiring long-term isolation destined for permanent storage at the DOE's Waste Isolation Pilot Plant in New Mexico.

Experiments continued at the Waste Experimental Reduction Facility, the facility developed to improve methods of processing low-level radioactive waste.



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