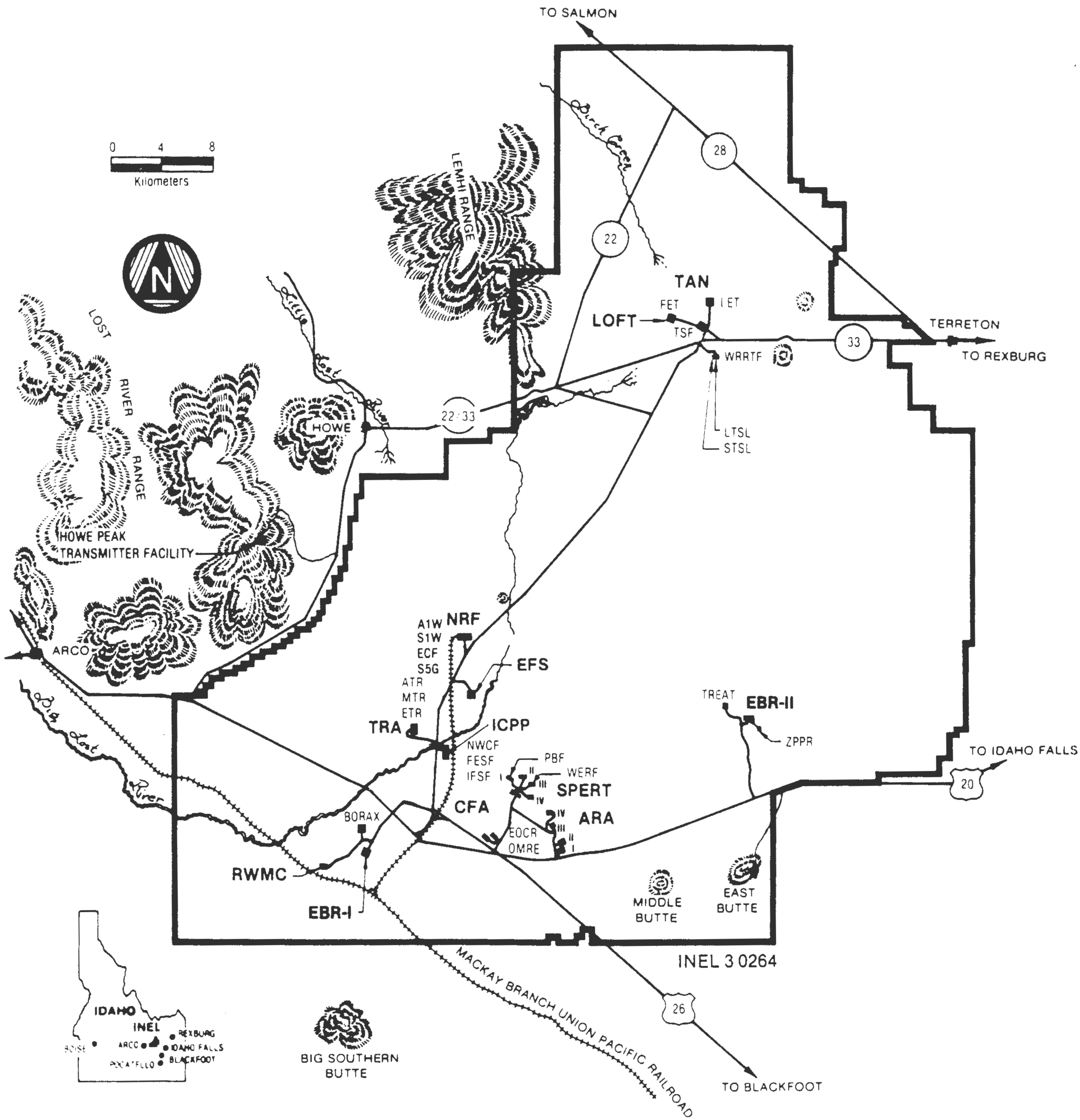
Idaho National Engineering Laboratory

Department of Energy
Idaho Operations Office

Idaho National Engineering Laboratory



622-9371

Introduction

Marcia James
P.O. Box 656
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83353

Needs by 2 May -
Tabloid

Black & White
glossy

ROD HUNT,
M-K PUBLIC AFFAIRS
BOX 7808
BOISE, ID 83729

about 12
sophisticated shots of
work on site, people

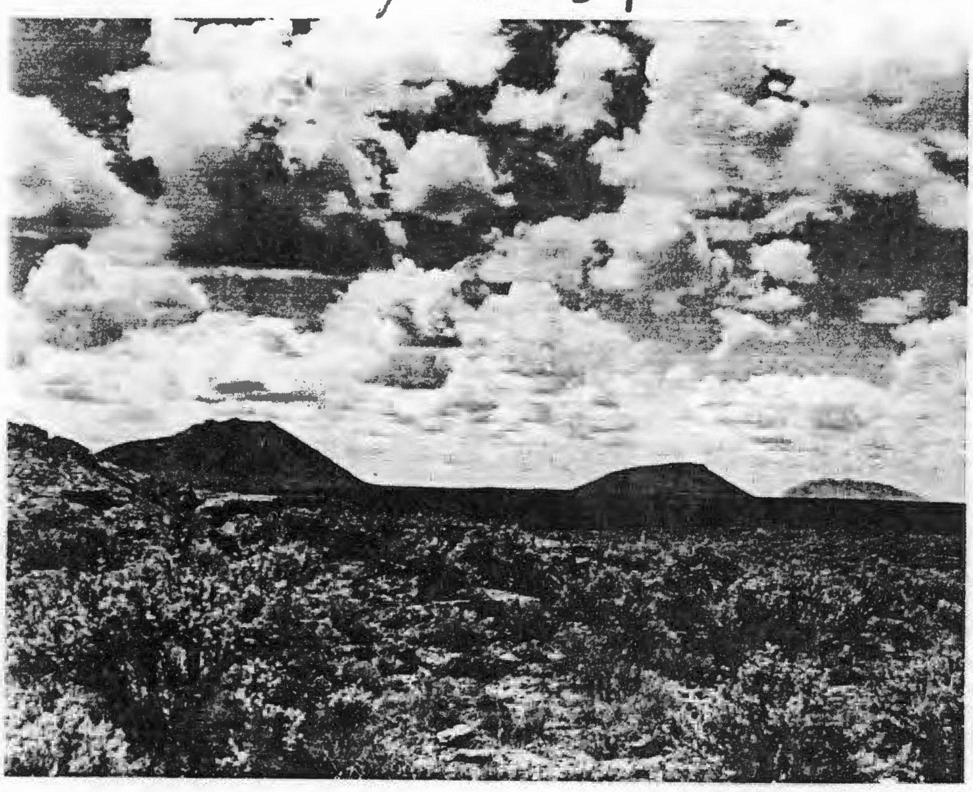
The vast sagebrush desert of Southeastern Idaho, between Idaho Falls and Arco, is the scene of some of the most advanced energy research programs in the modern world.

Situated there, on a tract of land more than three-quarters the size of Rhode Island, is the U.S. Department of Energy's Idaho National Engineering Laboratory (INEL). More nuclear reactors—and more different kinds of reactors—have been built at the INEL than at any other place in the world. Of the 52 INEL reactors, 15 are operable, the others having been phased out on completion of their missions.

The INEL Site covers nearly 570,000 acres or 890 square miles of typical western sagebrush flats a mile above sea level. The land is bordered on the north and west by snow-topped mountains and on the south by three towering buttes.

Today, in addition to nuclear reactor and fuel cycle technology, INEL's work involves industrial conservation, environmental research, and other nonnuclear energy development.

83-469-2-1 *General view of the INEL site.*



For more than 25 years, the Site, as INEL is known locally, was called the National Reactor Testing Station (NRTS). It was established in 1949 to provide an isolated station where various kinds of nuclear reactors and support facilities could be built and tested. Testing primarily demonstrated nuclear power could be safely used for generating electricity and other peaceful uses. Three of the nation's commercial power reactor concepts—pressurized water reactor, boiling water reactor, and the liquid-metal-cooled breeder reactor—were first prototyped at the Site.

The name was changed in August 1974 to Idaho National Engineering Laboratory to better characterize current activities, including research and engineering for nonnuclear as well as nuclear energy programs.

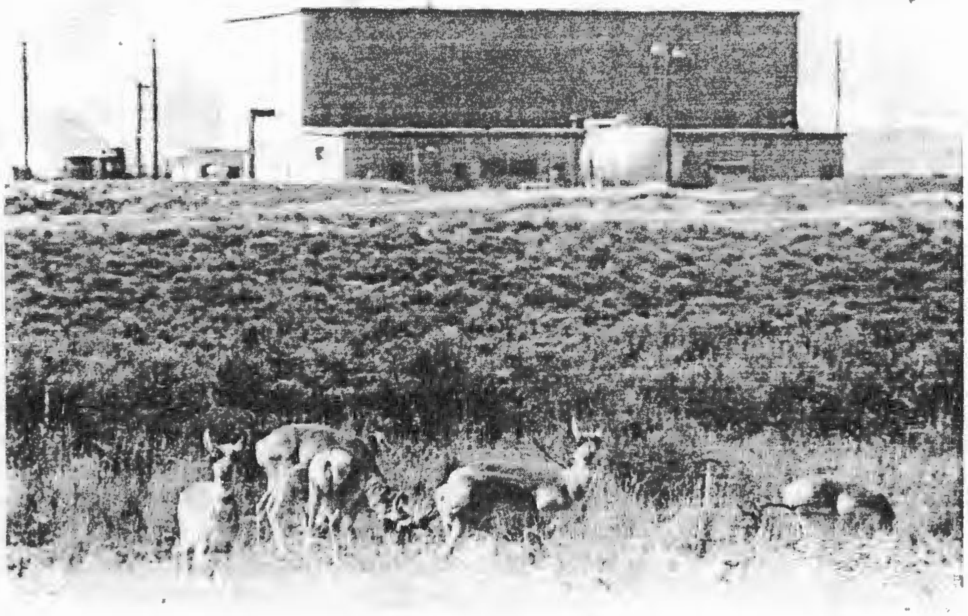
Because of the varied and highly technical developmental research missions in Idaho, its work requires an unusually high proportion of engineers and scientists. Engineering degrees are held by more than 1,200 of some 8,000 employees. Approximately 600 others have degrees in science, mostly physical science. More than one employee in three has a college degree.

No one resides at the Site. Permanent employees live in more than 30 adjacent communities, with the largest percentage in Idaho Falls. Project-operated bus service is provided from the major communities. The nearest Site boundaries are 29 miles west of Idaho Falls, 32 miles northwest of Blackfoot, 50 miles northwest of Pocatello, and 17 miles southeast of Arco.

INEL Mission, Administration

The U.S. Department of Energy's Idaho Operations Office (ID) administers the Idaho National Engineering Laboratory.

Four major operating contractors are involved in Department of Energy (DOE) program activities at the site. They are: EG&G Idaho, Inc.; Exxon Nuclear Idaho Company, Inc. (ENICO); Argonne National Laboratory West (ANL-W); and Westinghouse Electric Corporation.



Antelope on INEL Site near PBF.

Operations

The operations responsibilities for DOE's Idaho Office embrace three broad categories of reactor development: power, testing, and research. DOE-Idaho also provides support services for programs administered at the INEL by DOE's Chicago and Pittsburgh field offices.

In addition, DOE-ID administers research work at the following offsite locations across the country:

1. A project office is studying the damage caused by an accident in 1979 to a commercial power reactor at Three Mile Island, Pennsylvania. Research is aimed at removing the core, immobilizing the waste, and recovering reactor components.

2. The West Valley Project Office, near Buffalo, New York, will demonstrate solidification and disposal of high-level radioactive liquid wastes stored there.

3. The Magnetohydrodynamic Project Office in Butte, Montana, is developing components for generating electricity from coal-fired gases.

DOE programs in Denver and Grand Junction, Colorado, are also the responsibility of DOE's Idaho Office.

Employment, Financial Figures

Monthly employment for INEL/program activities during fiscal year 1982 was about 9,000, most of them with firms under contract to the government. More than 6,000 work at the INEL site. The balance work mostly in Idaho Falls. DOE federal personnel account for about 350 of the total work force. Project construction employment ranges between 500 and 1,000.

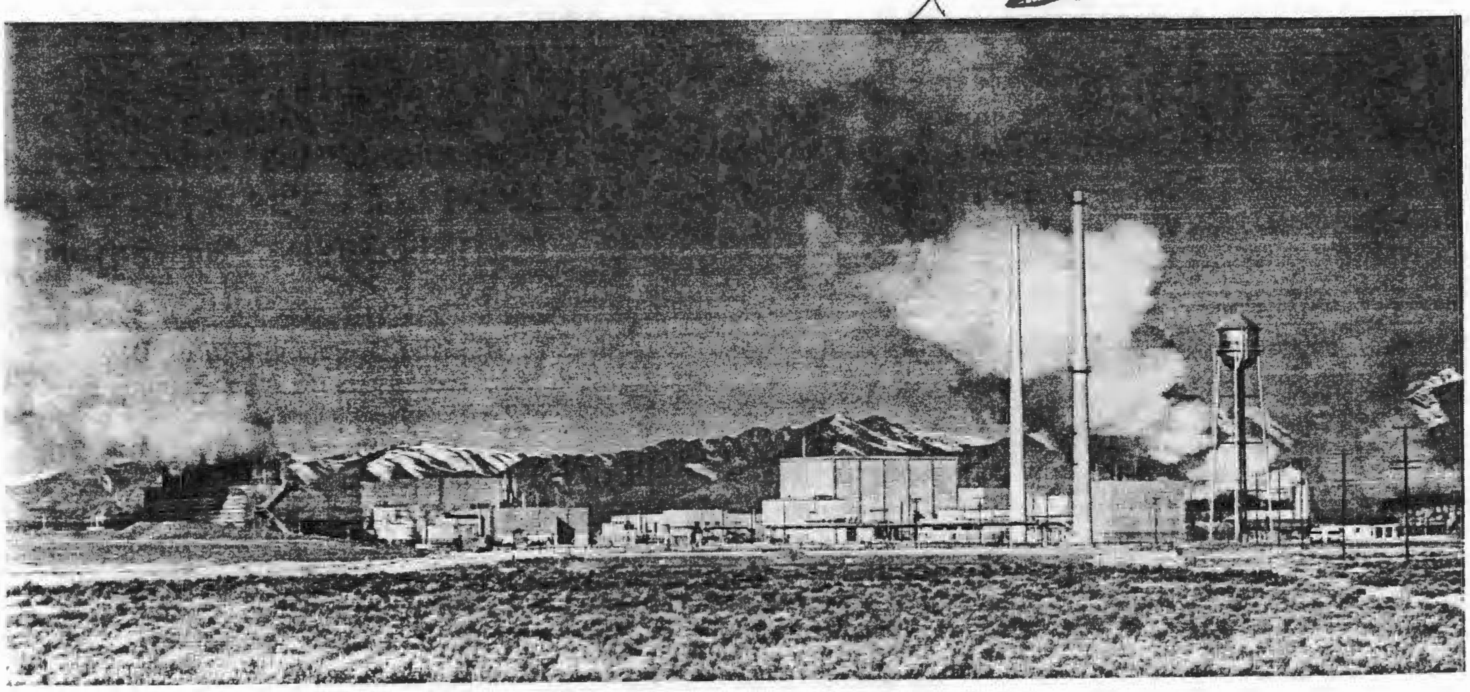
Total INEL payroll was an estimated $239 million for fiscal year 1982. INEL operating and capital improvement costs for FY 1982 are estimated at $519 million, compared with $392 million in FY 1981. The estimated replacement value of INEL facilities is approximately $2.2 billion.

Physical Characteristics

The INEL is on the Snake River Plain at an average elevation of 4,865 feet. The Site itself is nearly 39 miles long from north to south, and about 36 miles wide in its broader southern part.

Annual precipitation has averaged only 8.5 inches in the last 15 years. Underlying the area is a huge natural underground reservoir of water in the basaltic lava rock. Average annual temperature at the Site is 42°F, with extremes of 102 and -43°F.

Water vapor rises from cooling towers at TRA.



Radiological and Environmental Sciences Laboratory

DOE's Radiological and Environmental Sciences Laboratory (RESL) at the INEL is renowned for its pioneering work in the fields of:

- Radiation monitoring devices
- Ultrasensitive methods for radiochemical analyses
- Radiation safety research and development.

The RESL's specialized individual health protection functions include personnel and environmental radiation dosimetry (for detecting external radiation), whole body counting, and radiochemical analyses (for measuring possible internal deposition of radionuclides in workers).

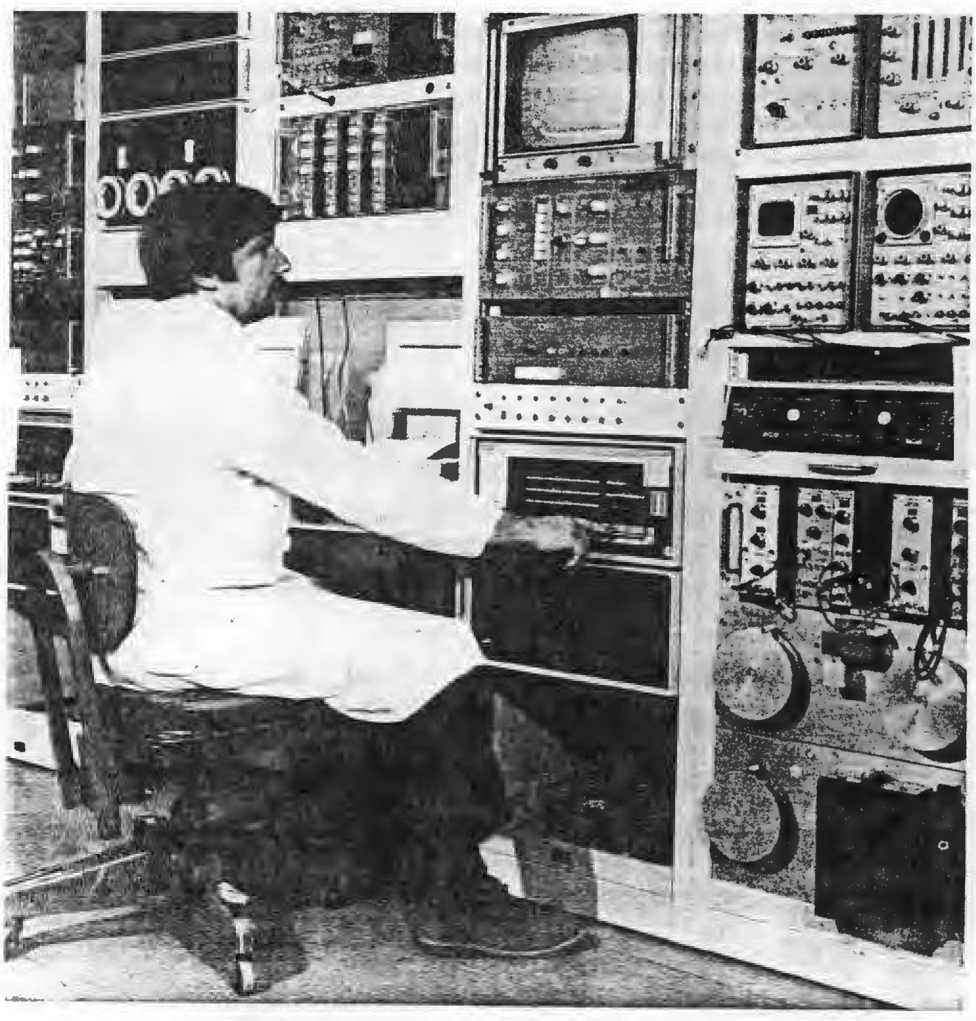
DOE laboratory scientists carry on a year-round program for studying and monitoring water, air, soil, and area farm produce (both on and offsite), covering an area of about 5,000 square miles. Data obtained from this work substantiate safe INEL operations for Site employees and the public. Offsite monitoring results are published annually.

The 570,000-acre INEL Site became the nation's second National Environmental Research Park in 1975. Since then, all lands within the INEL boundaries have been a protected outdoor laboratory where scientists from DOE, other federal and state agencies, universities, and private research foundations conduct ecological studies.

RESL scientists and technicians provide personnel radiation dosimetry services to all Site workers (except the naval operations) and environmental radiation dosimetry both on and offsite. Each employee's radiation exposure history is permanently filed using advanced computer techniques.

Wholebody counter at RESL.

Working at the INEL in conjunction with, but independent of DOE employees at RESL, are some 15 highly trained atmospheric, geological, and hydrological experts employed by the U.S. Geological Survey and the Air Resources Laboratories Field Research Office of the National Oceanic and Atmospheric Administration.



RESL employee operates computerized gamma spectrometer.

Water Reactor Safety Research Program

The bulk of the federal government's longtime program for investigating the safety of water-cooled reactors has been centered at the INEL since 1955. In that year, the first reactor safety studies were conducted in the Special Power Excursion Reactor Test No. 1 facility.

Early research centered chiefly on the behavior and consequences of the so-called runaway power (or reactivity) accident. Ultimately, testing in four SPERT reactors led to the understanding of several natural mechanisms resisting runaway power conditions. SPERT tests also contributed to the development and better understanding of engineered reactor safety control systems.

EG&G Idaho, Inc. operates the INEL's Water Reactor Safety Research Program (WRSRP) for the Department of Energy. Much of the funding comes from the NRC. The program studies the behavior of a nuclear power plant, its fuel, and its safety systems in off-normal conditions. These conditions include the loss-of-coolant accident (LOCA). Equipment or operator errors are studied to reduce the possibility of LOCAs and reduce the extent of damage should one occur.

The WRSRP work is in accordance with the nation's policy to continue seeking information to resolve safety issues related to reactor design, licensing, and operation. The program is furthered at the INEL by the Accident Analysis Program, 3-D Program, Power Burst Facility (PBF) testing, Semiscale Integral Test Program, and Loss-of-Fluid Test (LOFT) Facility Integral Test Program.

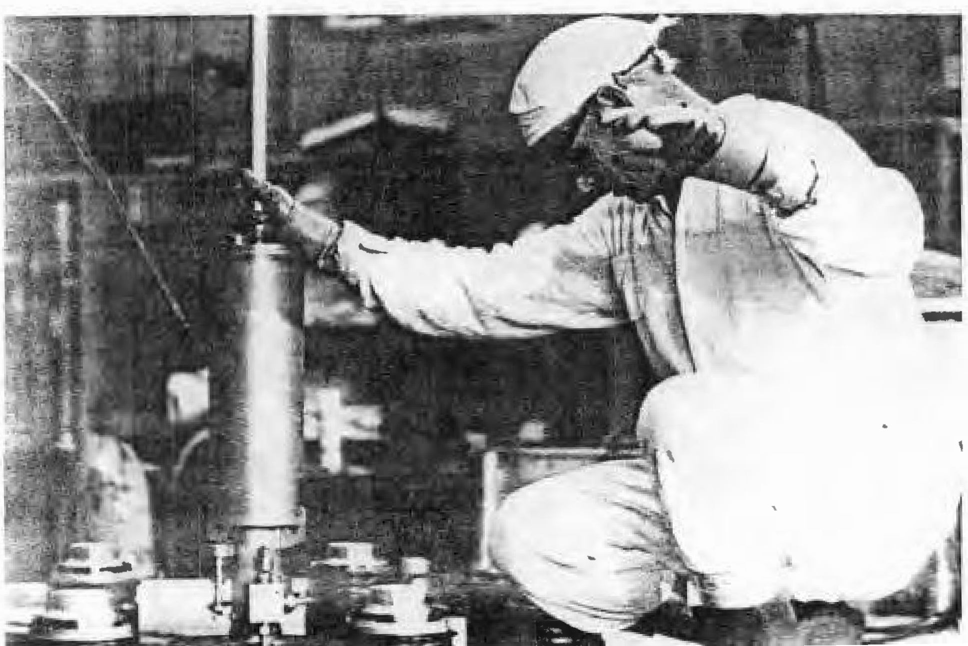
Code Development and Assessment Program

These studies involve developing and verifying mathematical equations and corresponding computer programs. These equations and computer programs are then used to predict the step-by-step sequence and behavior of hypothetical loss-of-coolant accidents.

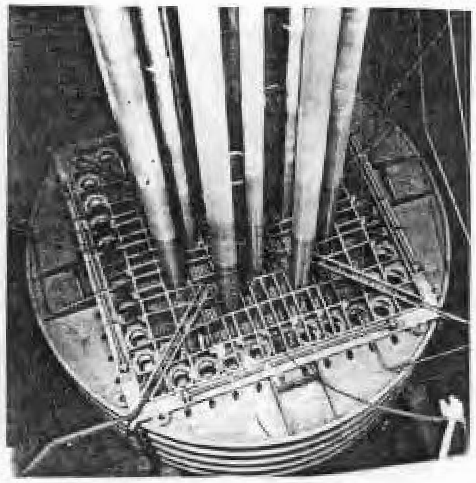
The accident analysis work can be directly applied by the NRC for licensing large power reactors and establishing licensing codes and standards.

The 3-D Program

The 3-D Program is an NRC-sponsored international cooperative program studying refill and reflood phenomena in pressurized water reactors. The United States, Japan, and the Federal Republic of Germany water reactor safety research agencies have combined efforts to study the phenomena occurring after a loss-of-coolant accident.



PBF technician loads experiment into reactor.



PBF core.

Power Burst Facility

The Power Burst Facility (PBF) first achieved nuclear criticality September 22, 1972. It provides experimental data on how fuel rods respond to postulated accident conditions.

Experiment data are obtained from instruments on the PBF loop, coolant system, the test fuel and hardware, and from extensive hot cell fuel examination after testing. Additional information is obtained from a fission product detection system on the PBF loop. The detector provides information on material released from the rods when they are intentionally caused to fail during tests.

The PBF consists of an open-tank reactor vessel, a driver core region with an active length of three feet, a central flux trap region with an in-pile tube where the test fuel is located, and a loop coolant system to provide required systems conditions in the test space. The loop coolant system was designed to provide typical PWR system conditions of temperature, pressure, and flow, and will also be capable of providing boiling water reactor system conditions during a postulated LOCA.

The reactor can be operated at a steady-state power of up to 28 MW or with either shaped or natural power transients, providing representative power and energy densities in test fuel clusters containing as many as 45 fuel rods. Testing is currently being performed in the severe fuel damage assessment area.

Semiscale Program

This program performs thermal-hydraulic tests and analyses supporting the NRC. Test results are used to evaluate reactor licensing regulations and to develop and assess the accuracy of computer codes used to ensure regulation compliance. A number of nonnuclear test facilities at the INEL's Test Area North (TAN) are used for the tests. These facilities include: Semiscale integral test system, Blowdown Facility, Full Area Steady State Test Loop, Steam-Air-Water Loop, and Two-Phase Test Facility.

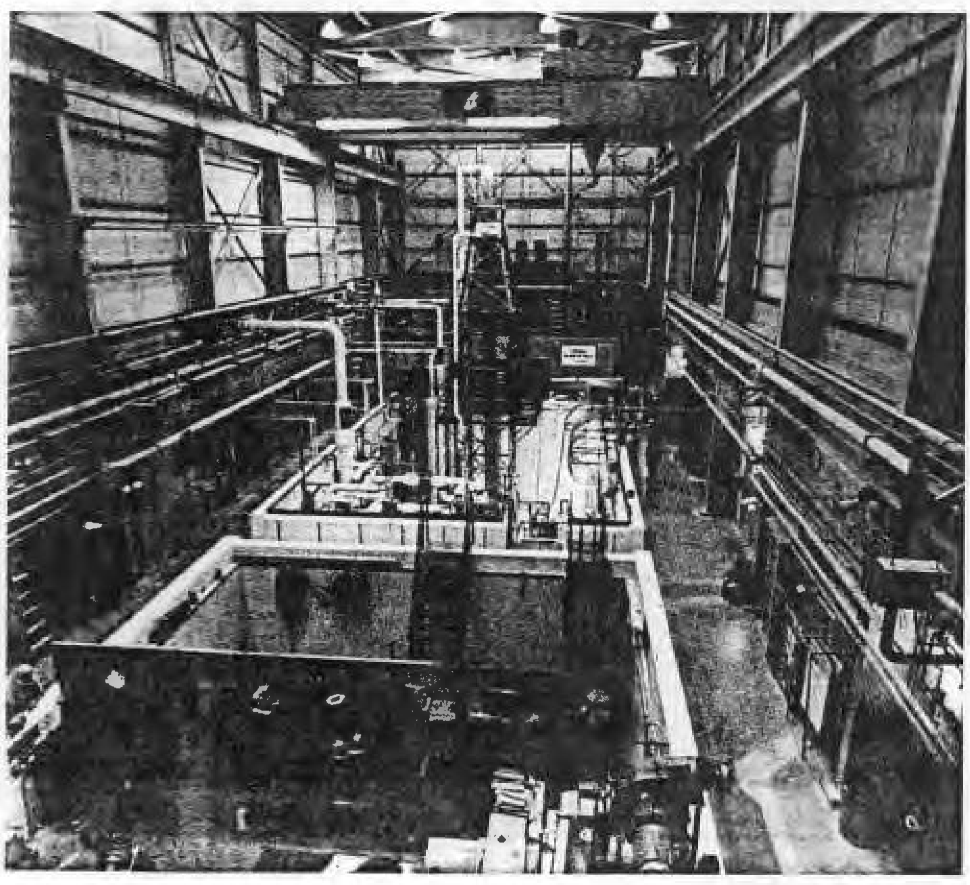
The facilities are also used to support instrument development and testing for other NRC programs. They were instrumental in developing the Loss-of-Fluid Test (LOFT) experimental program.

The Semiscale integral test system is a highly instrumented system of pipe valves and pumps assembled to resemble a pressurized water reactor. It is heated electrically to provide water temperatures and pressure conditions typical of a pressurized water reactor during normal and abnormal operating conditions.

The nonnuclear facility began experiments in 1965. Over the years the system underwent numerous design improvements making performance more typical of commercial reactor operation in off-normal occurrences. These improvements culminated in the present "Mod-2A" Semiscale system. All major reactor system components are simulated. The electrical power simulation of a reactor core contains 25 full-length heater rods simulating reactor core fuel rods.

Over 100 tests have been performed in the Semiscale facility since August 1974. The tests have helped improve NRC confidence in the efficiency of emergency core cooling (ECC) systems used in commercial reactors. Semiscale testing has also improved computer models for evaluating reactor safety. Instrumentation originally patterned for Semiscale is now being applied in reactor safety tests around the world.

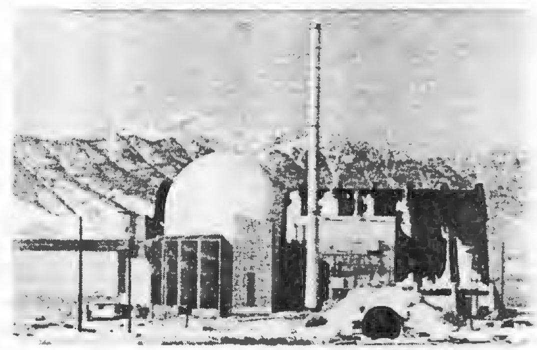
Semiscale test system.



LOFT Integral Test Program

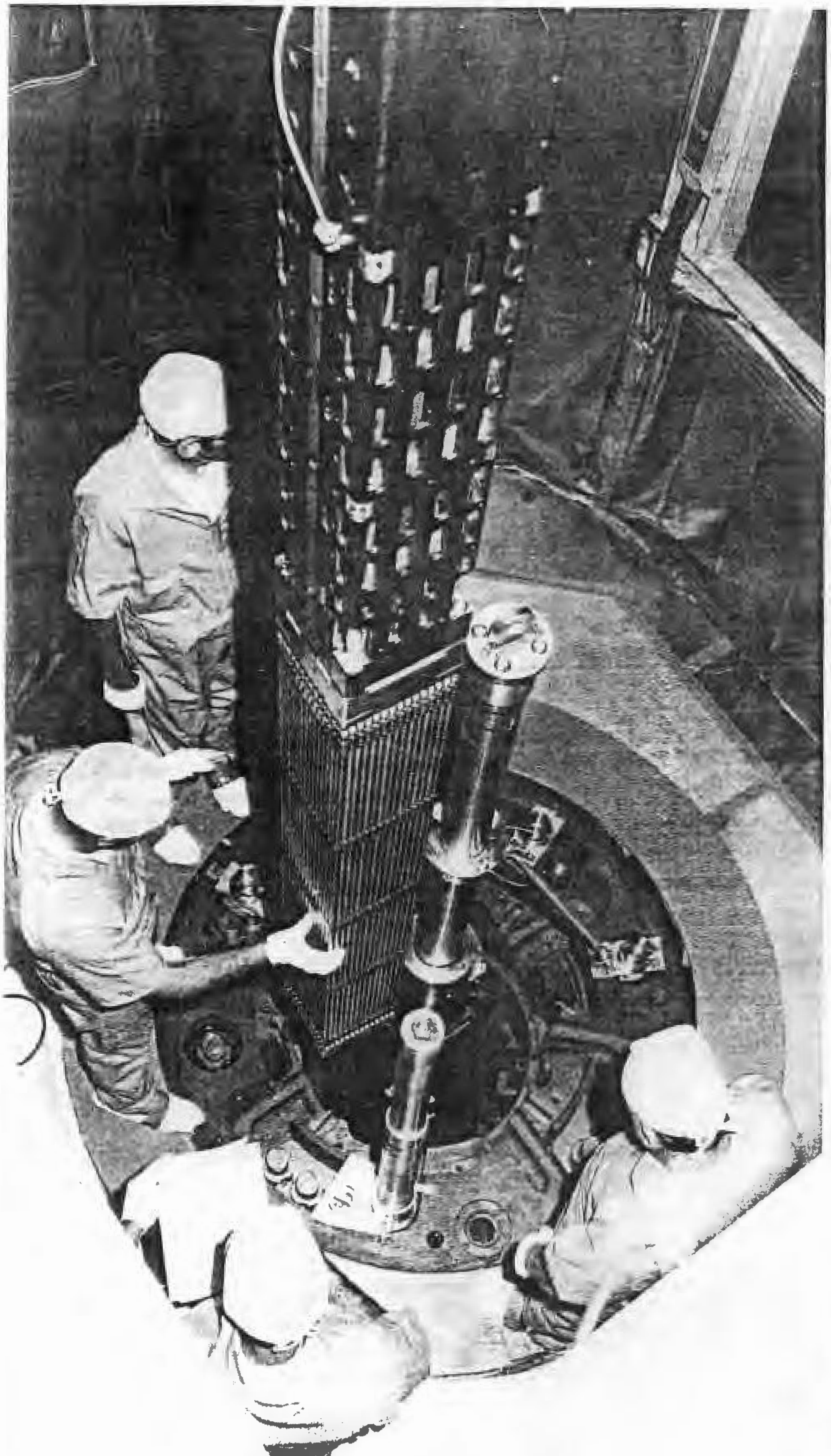
LOFT was dedicated to NRC research in 1975. Tests focused on NRC's needs to confirm acceptability of the commission's commercial reactor safety requirements. A major aspect of the program is to investigate the capability of an emergency core cooling system to prevent core damage during experiments where the reactor coolant is expelled from the pressure vessel through an embalanced break in primary system piping.

LOFT facility.



The first LOFT nuclear test occurred in December 1978, with a second test five months later that simulated total rupture of a primary coolant pipe in a commercial reactor. Favorable test results and the TMI-2 accident shifted LOFT Program emphasis to more probable but longer lasting, small break loss-of-coolant accidents. Twenty-four such nuclear tests examining different reactor components and responses to postulated accidents occurred at LOFT from 1980 to 1982. NRC test funding stopped in 1983 due to funding constraints and program redirection. The last NRC funded test occurred in September 1982.

An international consortium was formed through the Organization for Economic Cooperation and Development to fund tests through 1985. These tests evaluate non-U.S. plant design features and study more probable events representing economic concerns for plant owners. OECD countries helping to fund the LOFT Program include: West Germany, Great Britain, Japan, Italy, Sweden, Finland, Switzerland, Belgium, Spain, Portugal, and Taiwan.



Fuel assembly being inserted into LOFT reactor.

LOFT Test Assembly

The major component of LOFT is the Test Assembly (TA), which consists of a 55-thermal-megawatt reactor system and primary coolant system mounted on a double-width, rail-transportable test dolly. The TA is installed in a high-pressure containment building that has auxiliary systems for reactor plant support and a contiguous underground control room. In the event of major unexpected problems or at the completion of a series of tests, the TA could be moved by rail from the containment building into a nearby large hot shop for remote disassembly and maintenance.

The reactor core is 5-1/2 feet long, 2 feet in diameter, and contains about 1300 PWR-type fuel rods. The core is profusely instrumented with high-temperature thermocouples and other specially developed in-core instrumentation to measure temperatures, flow pressures, and coolant levels inside the reactor vessel.

The reactor coolant system has one active, heat-dissipating, operating loop—modeling the three unbroken loops of a four-loop plant—and a special blowdown loop that can simulate a ruptured loop in a large PWR. The blowdown loop contains special quick-opening valves to simulate rupture of a large pipe in a large commercial plant. This blowdown loop discharges into a suppression tank, simulating the back pressure conditions of the containment for a large PWR.

Test Area North

The Loss-of-Fluid Test (LOFT) Facility and Semiscale Test Facility are located at the INEL's Test Area North, a large test and support area near the Site's northern boundary. TAN's extensive facilities were originally constructed for the Aircraft Nuclear Propulsion Program. Now they serve principally the Water Reactor Safety Research Program.

TAN also houses the Technical Services Facility or TSF. This includes several large shops, including a high-bay area having unique capabilities for remotely handling radioactive materials.

Breeder Reactor Research Program

Breeder reactor reasearch is conducted at the Argonne National Laboratory-West (ANL-W) area. The area is located near the eastern boundary of the INEL, about 35 miles west of Idaho Falls. The University of Chicago operates ANL-W under a contract with DOE's Chicago Operations Office.

This area includes three principal reactor facilities: Experimental Breeder Reactor-II (EBR-II), the Transient Reactor Test Facility (TREAT), and the Zero Power Plutonium Reactor (ZPPR). Two smaller reactor facilities, the Argonne Fast Source Reactor (AFSR) and the Neutron Radiography Facility (NRAD), and two large facilities for examining radioactive materials, Hot Fuel Examination Facility North (HFEF/N), and Hot Fuels Examination Facility South (HFEF/S), comprise the remaining area facilities.

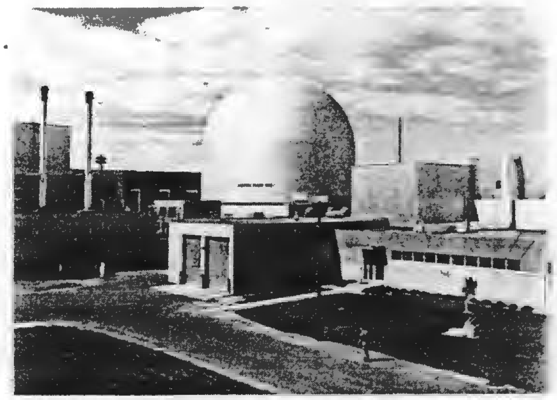
Experimental Breeder Reactor-II

EBR-II achieved initial criticality on September 30, 1961. It is an unmoderated, sodium-cooled reactor and power plant. The reactor, originally designed as an engineering demonstration plant, is used for irradiating samples of reactor fuels and structural materials for the breeder reactor base research and development program.

Breeder reactor reliability and safety are researched at EBR-II for the Operational Reliability Testing Program, with an emphasis on determining inherently safe design features and operational guidelines for future large breeder reactor plants.

EBR-II achieved "wet" criticality (with the core submerged in liquid sodium coolant) on November 11, 1963, and went to power on August 13, 1964.

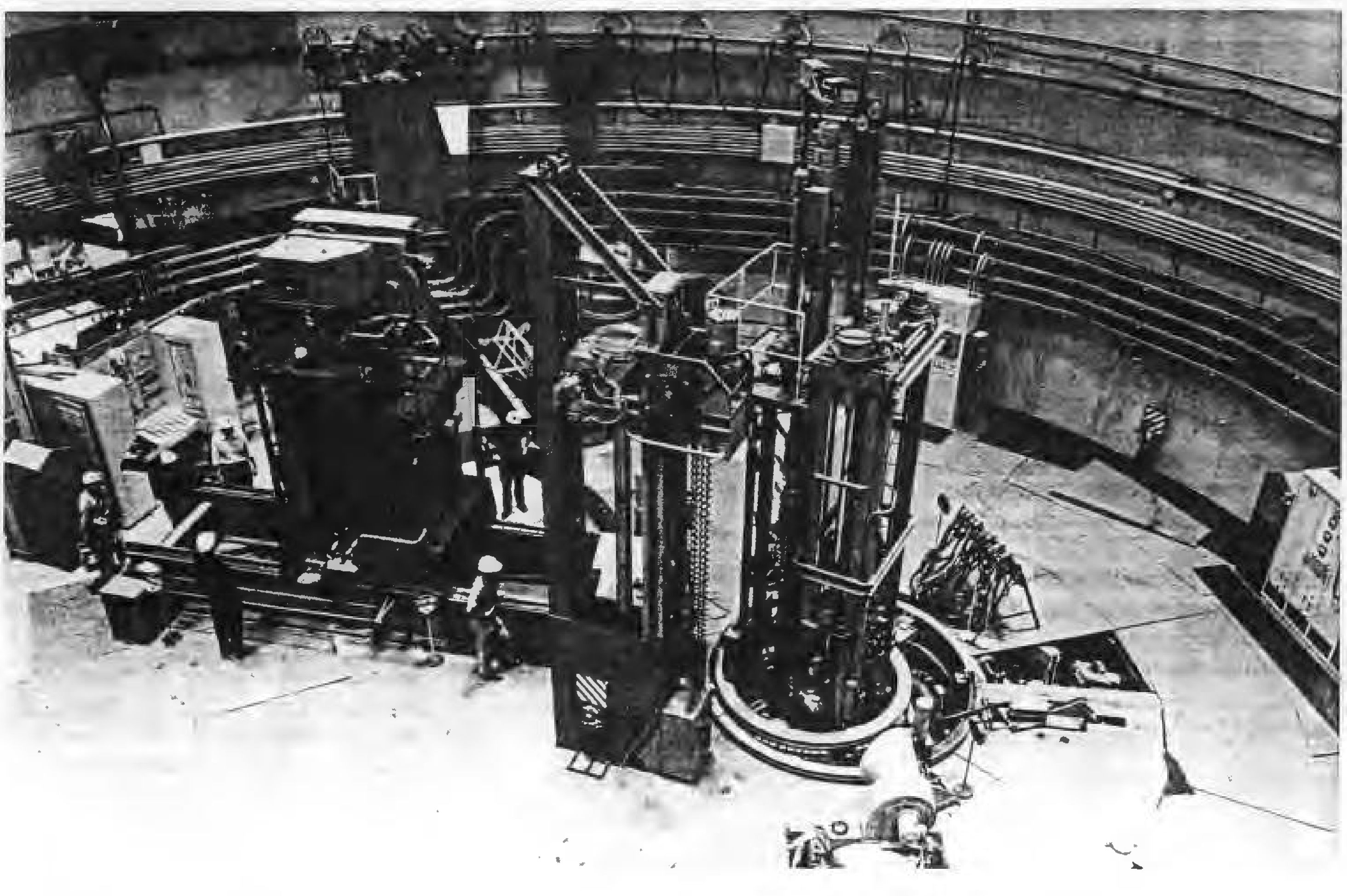
More than 10,000 specimens of various materials have been irradiated in EBR-II to gain information to improve fuel and material performance for future breeder reactors.



EBR-II.

As well as operating as a fast-reactor fuels testing facility, EBR-II has generated 1,400,254 megawatt hours of electrical power as of September 1, 1982. Power from EBR-II is fed to the INEL grid, supplementing power from private utilities to serve all INEL facilities, including those in the ANL-W area. EBR-II was designed for a thermal output of 62,500 kilowatts and a gross electrical capacity of 20,000 kilowatts.

EBR-II operating floor.



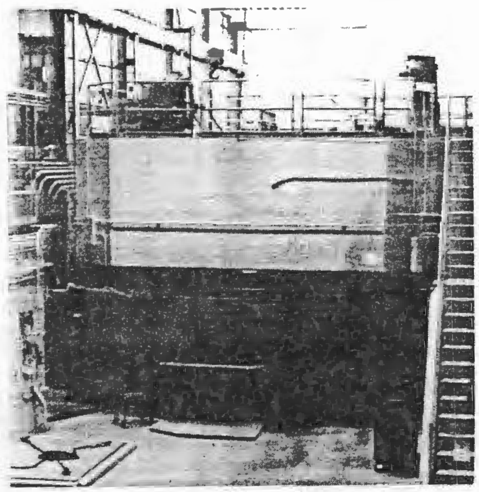
Operating corridor of HFEF/N.

Zero Power Plutonium Reactor

Another ANL-W area reactor is the ZPPR. Experiments conducted in ZPPR provide reactor physics information to support designing and developing large breeder reactors. The reactor consists of a lattice framework in two halves for constructing fuel core mockups of large (up to 14 feet in diameter) fast breeder reactors. To operate, drawers loaded with actual reactor fuels and other materials are inserted into honeycomb lattices in each of the separated halves. To initiate a chain reaction, the two halves are brought together. ZPPR construction started in August 1966 and was completed in September 1968. First nuclear operation was on April 18, 1969. The total estimated construction cost was $3.7 million.

Transient Reactor Test Facility

TREAT, in operation since February 1959, is a reactor designed to produce short, extreme nuclear energy pulses with resultant temperatures high enough to permit meltdown studies of fuel element samples used in fast and thermal reactors. The surges are useful in simulating abnormal reactor operating conditions and permit reactor designers to observe, on a small scale, the effect of such conditions on prototype fuel elements intended for use in fast and thermal reactors.

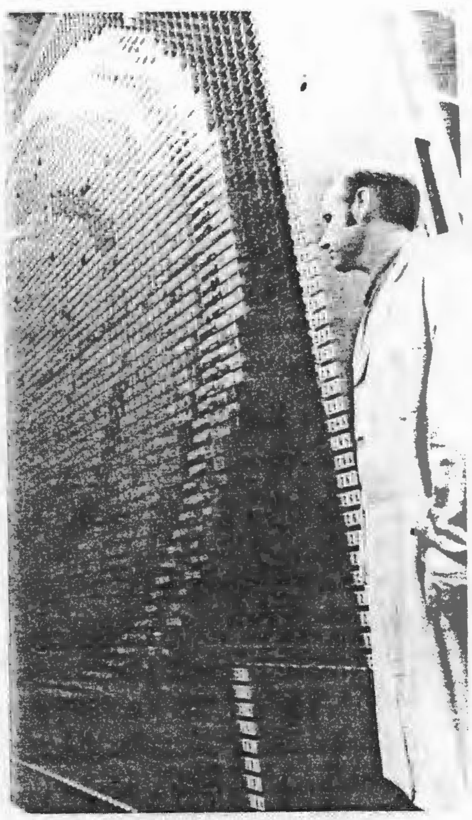


Interior view of TREAT facility.

Hot Fuel Examination Facilities (HFEF) Complex

Irradiation tests of reactor fuel and structural materials are essential for breeder reactor development. Test specimens irradiated in the EBR-II, the Transient Reactor Test Facility (TREAT) reactor at ANL-W, or elsewhere must be remotely handled and examined in appropriately shielded and equipped hot cells. The Hot Fuel Examination Facility (HFEF) at ANL-W provides a complex of hot cells, support facilities, and equipment to handle and examine irradiated fuels and materials or prepare them for shipment to other laboratories for more detailed examinations.

The HFEF complex comprises two facilities—HFEF/South and HFEF/North. Each facility contains two heavily shielded hot cells, one with an inert-gas atmosphere essential for all examinations and operations that expose sodium or other reactive materials. Equipment in the hot cells is operated by master-slave manipulators through the cell walls, or electrically controlled mechanical manipulators and cranes.



ZPPR.

Argonne Fast Source Reactor

The AFSR is an experimental reactor used as a tool to study fast breeder reactor physics. The reactor was placed in operation in October 1959 with a design power of one kilowatt. It is essentially a neutron source for developing improved instruments and techniques to make measurements in the neutron energy range characteristic of fast reactors.

Neutron Radiography Facility

This small research type reactor used two beams of neutrons produced by a 250-kilowatt reactor facility to produce neutron radiographs of test specimens. The technique allows nondestructive examination of a specimen's internal condition even if the specimen is highly radioactive. NRAD was started up in 1977.

Naval Reactors Facility

Four major installations comprise the Naval Reactors Facility (NRF). These are the Submarine Prototype (S1W), the Large Ship Reactor (A1W), the Natural Circulation Submarine Prototype (S5G), and the Expended Core Facility (ECF). The facility is operated for DOE and the U.S. Navy by Westinghouse Electric Corporation under jurisdiction of DOE's Pittsburgh Naval Reactors Office.

It was in the S1W, originally called the Submarine Thermal Reactor or STR, that the United States' Nuclear Navy was born. The project, aimed at freeing our naval vessels from their need for refueling at sea or frequent returns to port, achieved success with an initial power run in the Nautilus prototype on May 31, 1953. Later followed attainment of a simulated nonstop voyage from Newfoundland to Ireland, "submerged" and at full power. This proved atomic propulsion of ships was feasible, and that the Nautilus, long before it set out to sea, could do remarkable things, such as a later accomplishment of subnavigating the polar cap from the Pacific to the Atlantic.

The next logical step was to develop a prototype for surface ships. However, other problems, including the necessity of proving reactors can be teamed up to drive one turbine, remained to be solved. In the late 1950's, the A1W attained criticality and full-power operation of both reactors. The aircraft carrier Enterprise and the missile cruiser Long Beach were the first ships powered by the A1W-type plants. One of the A1W reactor plants was modified in 1972 to provide test and prototype operation of a new type reactor design which has since been used in the newest aircraft carriers, the Nimitz, Eisenhower, and Vinson.

In addition to the major technological studies made at NRF, the three Nuclear Prototype Plant Facilities (S1W, A1W, S5G) are used to provide a comprehensive nuclear plant operational training program. Numerous naval officers and enlisted personnel have received training in operation of nuclear power plants at this site.

S1W Prototype Plant

Started up in 1953, the S1W facility still houses the prototype of the Nautilus, although the testing program has changed from one of simulating the Nautilus power plant to one of testing advance design equipment, prototyping new systems for current nuclear projects, and obtaining data for future naval vessel power plants. In addition, the S1W plant continues to be a training center for navy personnel who will man present and future naval nuclear-powered ships.

A1W Prototype Plant

The A1W is a prototype facility consisting basically of a dual pressurized water reactor plant within a portion of a steel hull, built to prototype the aircraft carrier Enterprise. All components are of a type to withstand seagoing use. Started up in 1958, this is the first nuclear plant to have two reactors powering one ship propeller shaft. The prototype powers the plant's propeller shaft through a single geared turbine propulsion unit. New advanced cores and equipment have replaced many of the original components. This plant has the capability of, and is presently operating with, reactor plants of two different reactor designs operating independently, thus providing a great deal of flexibility and operational experience for both testing purposes and for training naval personnel.

From continuing tests are coming new and advanced reactors and cores for naval surface ships.

S5G Prototype Plant

Started up in 1965, the S5G Prototype is a pressurized water reactor having the capability to operate in either a forced circulation or a natural circulation flow mode where cooling flow through the reactor is caused by thermal circulation, rather than by pumps. Using the natural circulation capability improves plant safety, simplifies plant design, increases reliability, and reduces the plant noise level.

In order to prove the new design concepts would work in an operating ship at sea, the prototype plant was installed in an actual submarine hull section capable of simulating the rolling motions of a ship at sea.

Expended Core Facility

The ECF, also operated for DOE and the U.S. Navy by Westinghouse, receives, examines, and prepares naval expended cores for shipment to the Idaho Chemical Processing Plant to recover enriched uranium in the spent fuel. Another ECF activity is to handle and examine irradiation tests (small-scale representations of current or future core designs) in the INEL's Advanced Test Reactor, providing test information for design personnel at the Bettis and Knolls Atomic Power laboratories. Part of the building contains deep, water-filled pits for safe underwater disassembly, examination, and preparation for analysis of radioactive components and irradiation tests. Portions of the disassembled components are sent to hot cells within the building for further examination and testing.

Materials Testing Reactors

The INEL's Test Reactor Area (TRA) provides extensive facilities to study reactor fuels, materials, and equipment performance in high-neutron-field experiments. Information for improved reactor design obtained at TRA in weeks or months would require years to gather if the testing were conducted in ordinary reactors.

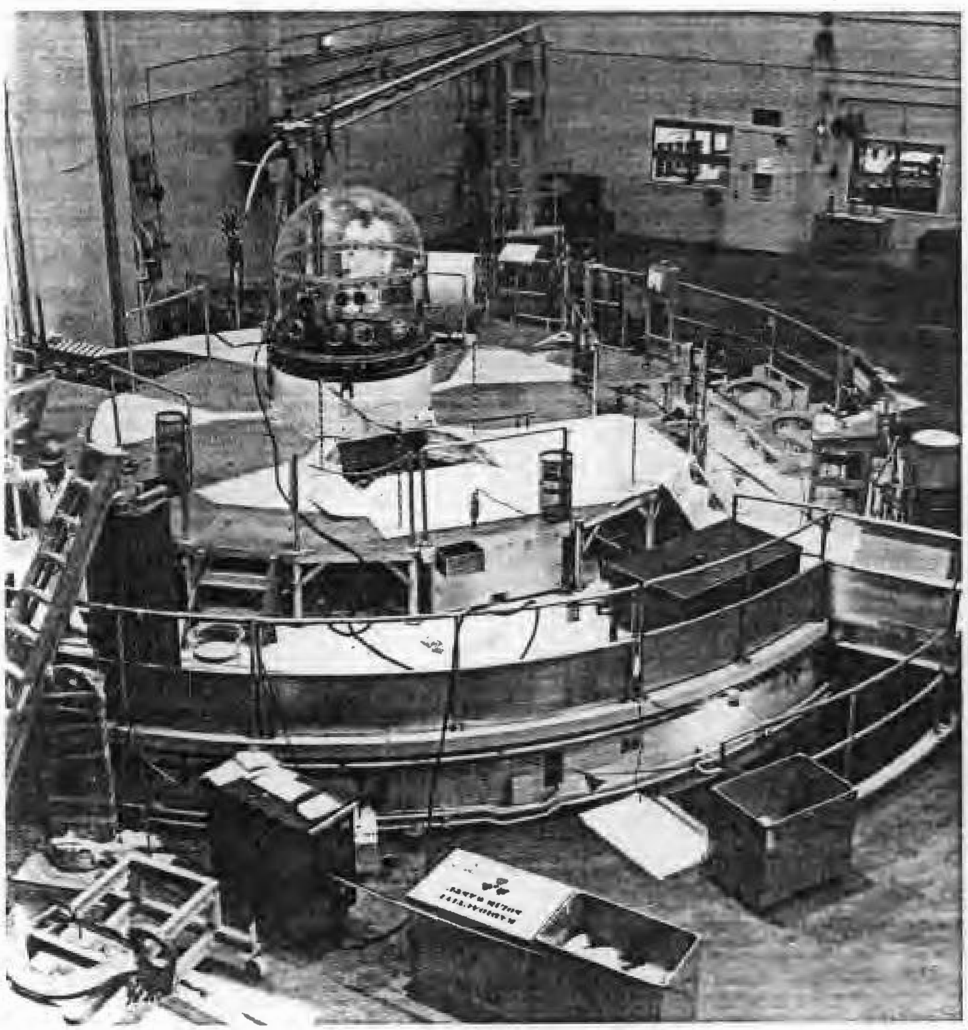
Advanced Test Reactor

Construction began in November 1961 on the world's largest reactor for testing fuels and component materials, the ATR. The ATR reached initial nuclear criticality on July 2, 1967 and achieved full power for the first time on August 16, 1969. Nuclear experiment operations began on December 25, 1969.

The ATR is designed to develop advanced nuclear fuel systems and materials for light-water-cooled reactors. Its unique core design can accommodate nine separate experimental facilities simultaneously. Each loop has its own pressurizer, pump, heat exchanger, and purification system separate from the main reactor cooling system. There are also additional nonloop irradiation spaces surrounding the loops also serviced by reactor coolant.

A light-water-moderated and -cooled reactor, the ATR employs a neutron flux concentration principle (flux traps). Very high flux levels in its test spaces are achieved without excessive power densities in the fuel elements. ATR's core geometry is similar to a four-leaf clover with four internal flux traps in the leaves, one where the leaves join and four external to the fuel in the spaces between the leaves.

ATR operating floor.



Advanced Test Reactor Critical Facility

The ATRC, which first achieved startup on May 19, 1964, is a full-scale, low-powered nuclear facsimile of the Advanced Test Reactor. Primarily, the ATRC is used for advanced measurements of programmed ATR experiment nuclear characteristics. As no ATR loadings are identical, it is difficult to predict the nuclear environment when completed experiments or fuel loadings are removed and new ones are added. This information, necessary to ensure safe ATR operation and calculate the irradiation the experiments will receive in the facility, is provided by this support facility. The ATRC saves both time and money by providing low-power testing without interrupting ATR operations. Designed to permit continuous operation at 5,000 watts, the ATRC is routinely operated at about 500 watts.

Test Reactor Area Hot Cell Facility

A hot cell facility at TRA supports Advanced Test Reactor irradiation programs. Three hot cells inside the facility are equipped with remotely operated machine tools, measuring instruments, and master-slave manipulators. These tools allow metallurgical study and irradiated sample testing.

Cerenkov effect illuminates ATR core.

TRA complex.

Nuclear Physics Research Programs

EG&G Idaho, Inc. conducts special research programs at TRA for DOE. These research programs are currently focused on measuring and evaluating physics parameters required for advanced reactor concepts.

The nuclear physics tasks at the INEL are now aimed at the need to know spectrum-averaged cross sections for certain isotopes important in fast reactor systems. The major effort is for fission product isotopes and mixed oxide fuels, with secondary emphasis on structural and fissile materials.

Supporting the nuclear physics tasks, INEL scientists have continued to compile data on the decay schemes of radioactive nuclides. Over the years, scientists around the world have used a gamma-ray spectrum catalogue published at the INEL as the source of base data for studying gamma-ray decay nuclides.

Advanced Reactivity Measurement Facility

The ARMF-I and the ARMF-II reactors are the most sensitive devices in existence for determining the reactivity effect materials may have on reactor system performance. These facilities are used to provide information that will improve operating effectiveness of reactors. This is done by determining the nuclear properties of both reactor fuels and control materials.

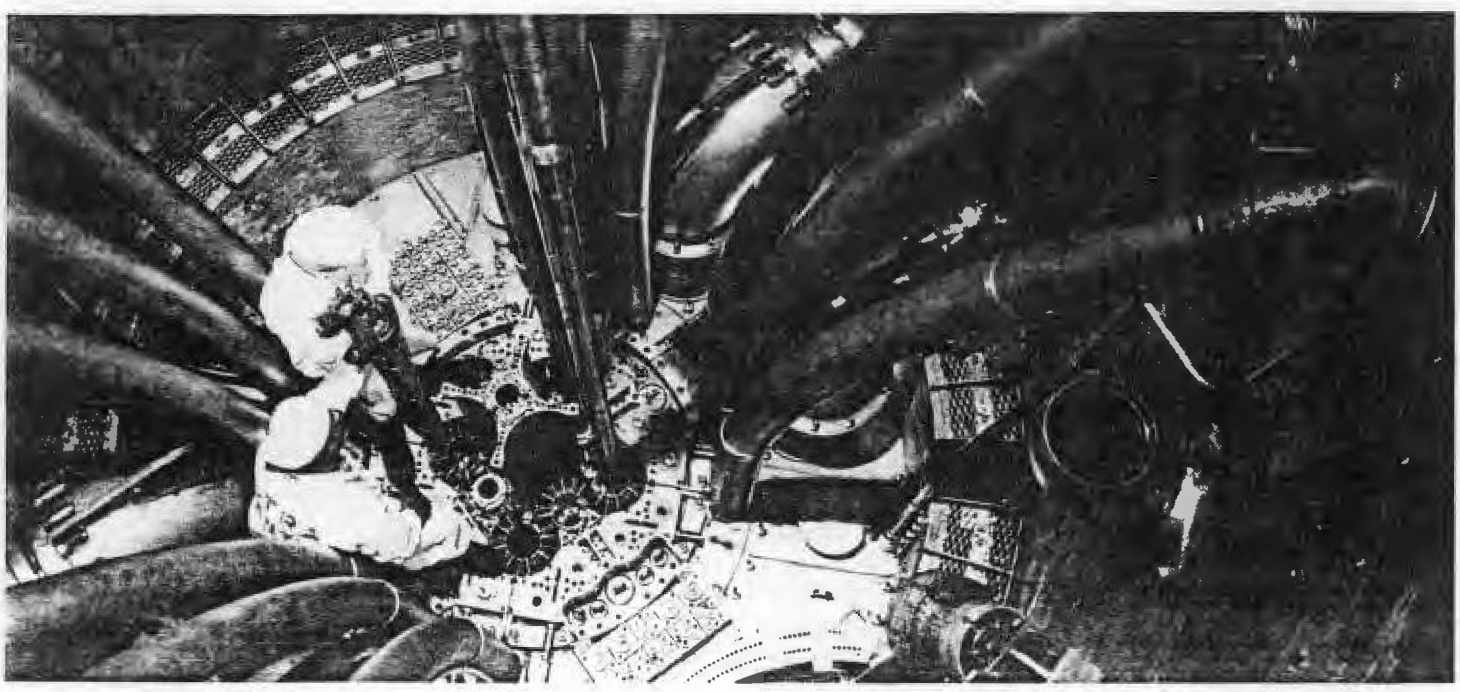
CFRMF Neutron Radiography Facility

Much as a hospital uses an x-ray machine to study the human structure without damaging the body, neutrons can be used to study the structure of reactor fuels and materials without damaging the reactor materials. This tool uses the CFRMF as the neutron source and produces high quality neutron radiographs.

Radiation Measurements Laboratory

One way to help operators determine a reactor's proper operation is to check for signs of effluents or radiation being released abnormally. The computerized Radiation Measurements Laboratory (RML), incorporating state-of-the-art techniques in radiation measurements, supports INEL programs.

ATR core.



Auxiliary Reactor Area

Since 1966, work in the Auxiliary Reactor Area (ARA) has involved a variety of technical support services performed for INEL developmental and research programs. EG&G Idaho, Inc. operates the area for DOE.

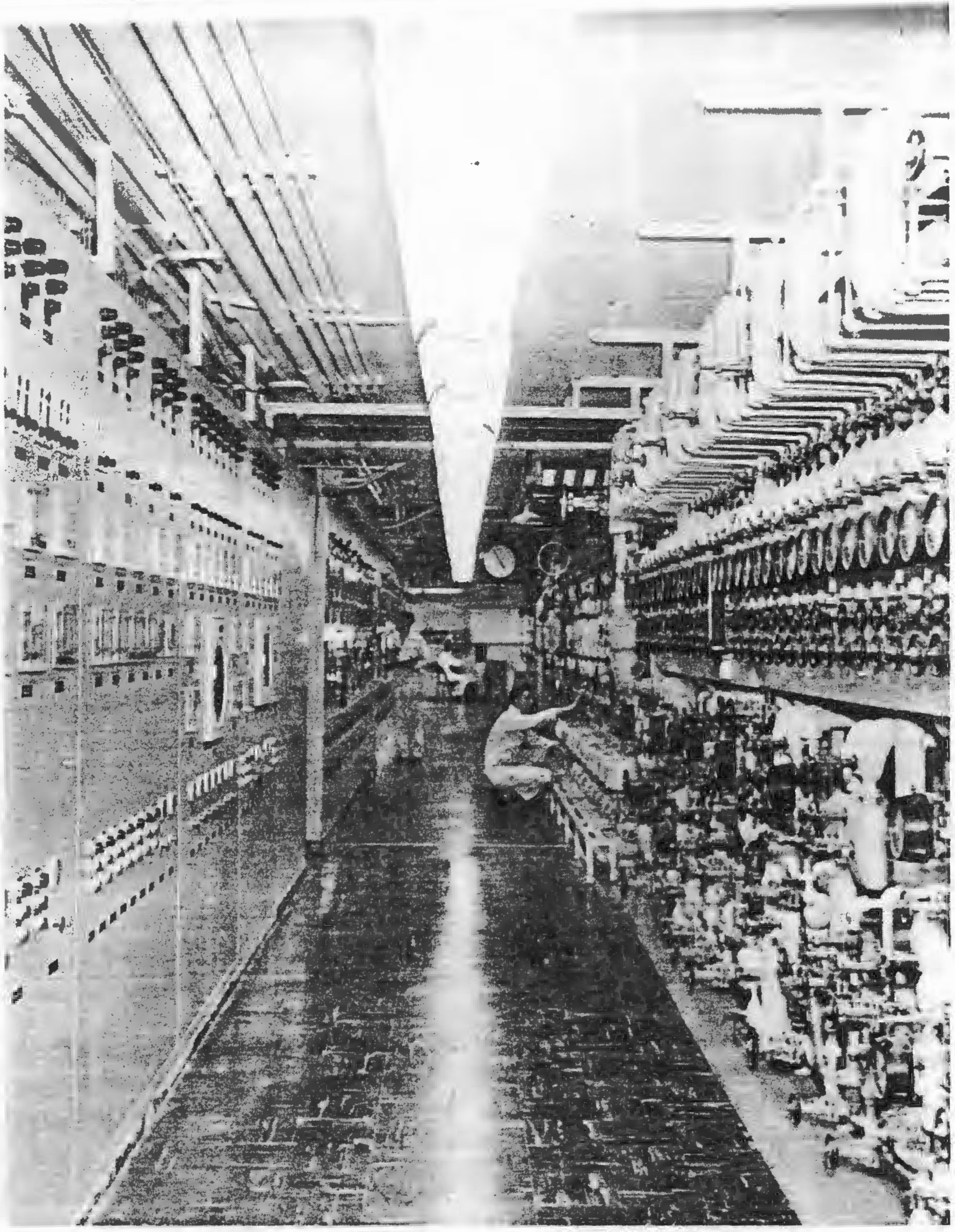
Metallurgical Research Facilities

Extensive metallurgical facilities and personnel are available to develop, research, and analyze both nuclear and nonnuclear materials. Strong capabilities exist at ARA for welding research and development, mechanical properties testing, spectrochemical analysis, materials structure determinations, and simulated environmental testing.

Fuel Processing Area

The Idaho Chemical Processing Plant (ICPP) is operated for DOE by Exxon Nuclear Idaho Company, Inc. (ENICO). The plant recovers uranium from spent (used) nuclear fuels, largely from government-owned reactors. Secondary purposes include recovering valuable rare gases and developing improved fuel processing and waste management methods.

The basic plant was completed in 1951, and first operated in 1953. The fuel processed to date totals 18 metric tons of uranium-235 (U-235), worth—at today's values of $50 per gram ($1400 per ounce)—two-thirds of a billion dollars. This amount of U-235 is equivalent to that in more than 3 million metric tons of uranium ore or greater than two years of production from U.S. mills.



ICPP operating corridor.

Uranium Recovery

When a reactor is operated, uranium atoms in the fuel split, or fission, to create energy. Fissioning also creates radioactive waste products inside the fuel elements. After a time, but before all the uranium atoms are consumed, enough radioactive waste builds up inside the fuel that it no longer can be used efficiently. At this point, spent fuel is removed from the reactor and new fuel installed. The valuable unused uranium, recovered from the spent fuel, is used in new fuel.

Chiefly, ICPP processes recover uranium from reactor fuels clad (or encased) in aluminum, zirconium, or stainless steel alloys. Radioactive waste products in the fuel are separated from the uranium during processing.

The ICPP processes relatively highly enriched fuels—those where the fissionable U-235 isotope concentrate has been artificially increased from the 0.7 percent found in natural uranium ore to between 20 and 90 percent.

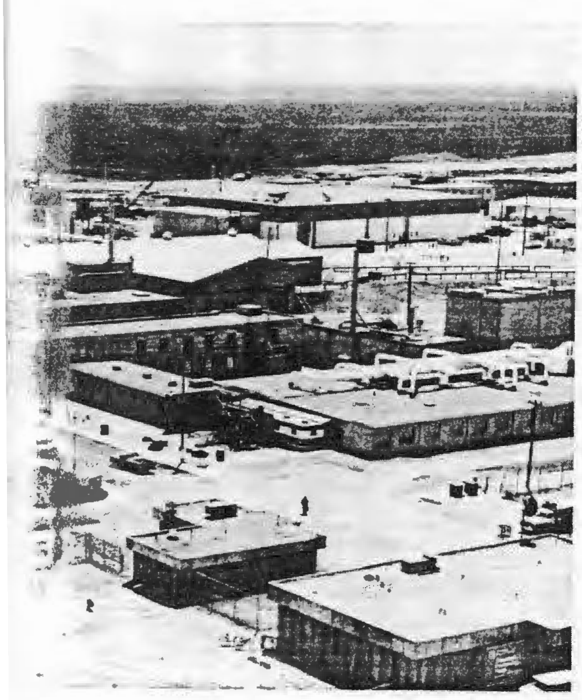
The processing sequence begins with spent reactor fuels received at the ICPP. The fuels arrive by truck or rail in shielded casks and are removed from the casks for storage under water at the Fuel Receiving and Storage Building. Some fuels, such as graphite-matrix types, are stored either above or below ground in special dry storage facilities.

From the storage facilities, fuels are transported to the Fuel Process Building in a shielded 15-ton cask. The cask is placed above the appropriate Fuel Processing Cell and fuel is released through the cask's bottom into the dissolver.

The fuel is dissolved in liquid acid solution, the acid type depending on the fuel's cladding. Aluminum type fuels, for example, are dissolved in nitric acid, producing a solution containing the uranium and the waste products. Next, the solution passes through an organic solvent (tributyl phosphate in kerosene) selectively extracting the uranium and separating it from the waste radioactive fission products. The uranium is then stripped from the solvent by water and further purified by passing it through two additional solvent extraction cycles using another organic solvent (methyl-isobutyl-ketone, or hexone).

Uranium trioxide ready for shipping.

ICPP.



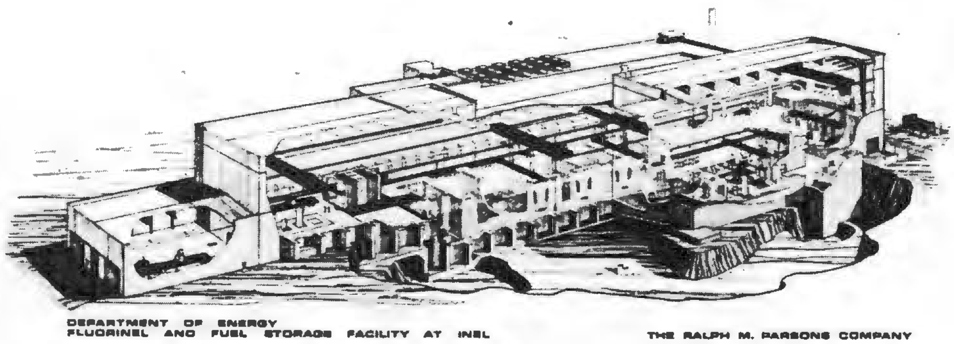
The highly radioactive liquid wastes from fuel reprocessing are stored for an interim period in stainless steel tanks inside underground concrete vaults. This liquid is converted to solid granules (calcine) in the New Waste Calcining Facility (NWCF) and stored in large stainless steel bins inside concrete vaults.

The purified uranium product stream is uranyl nitrate solution, essentially free of all waste fission products and other impurities. The uranyl nitrate is denitrated (dried) to uranium oxide powder and shipped to government facilities at Oak Ridge, Tennessee. Further processing follows and the uranium is ultimately remanufactured into reactor fuel.

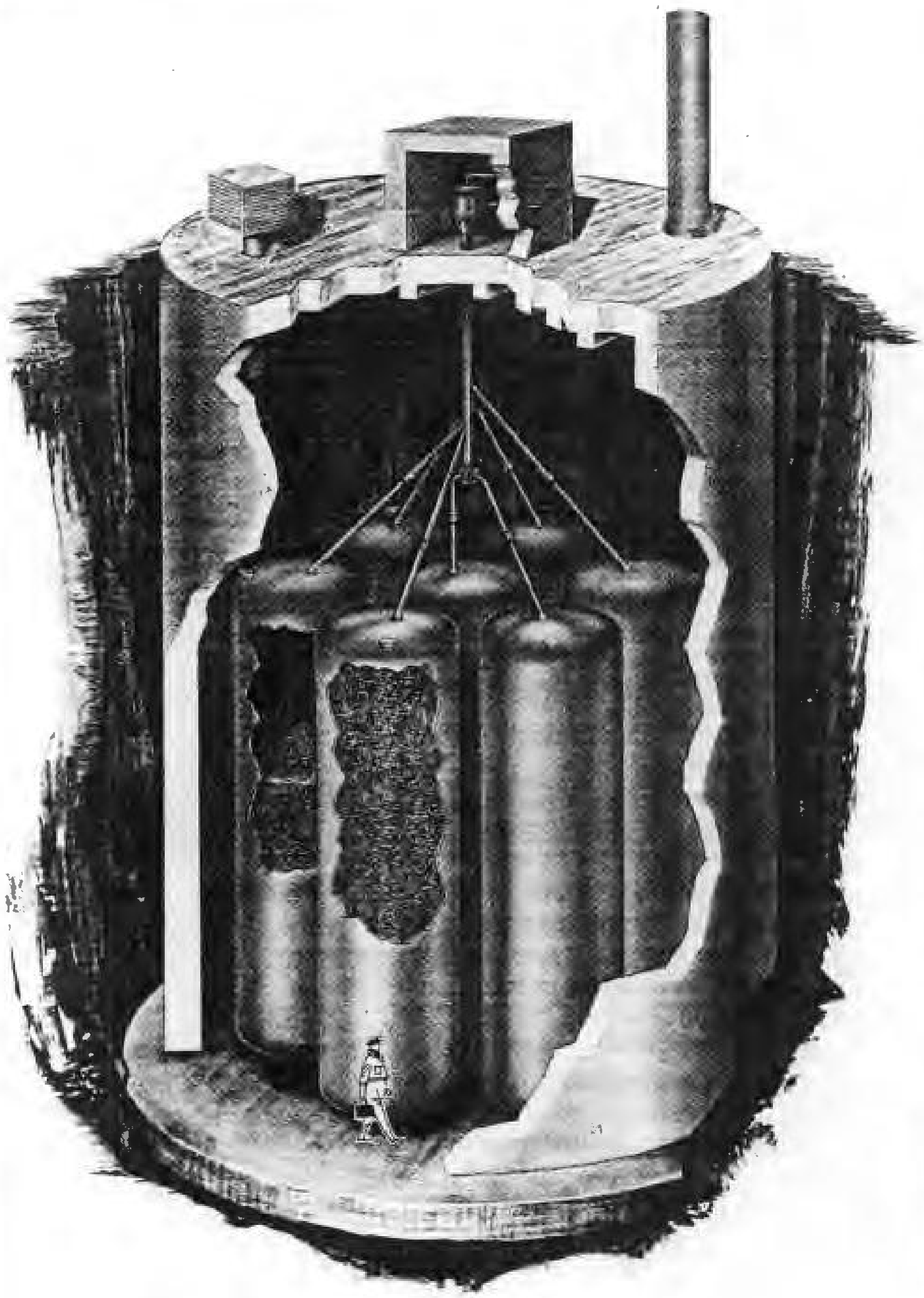
New Processing Facility—Fluorinel and Fuel Storage Facility

In 1985, a fuel dissolution method in FAST will be operational to process zircaloy-clad fuels, such as Shippingport PWR Core 2 fuels. That fuel is enriched uranium oxide pellets clad in zirconium alloy (fuel processed in the present zirconium dissolver is a zirconium-uranium alloy).

FAST will also use the newest technology for fuel receiving and storage basins.



FAST.



WCF storage bins and vault.

New Waste Calcining Facility

In 1963 the Waste Calcining Facility (WCF) became the first plant-scale facility to convert highly radioactive liquid wastes to a safer, solid form requiring about one-seventh the storage space of liquids. Designed as a pilot demonstration plant, it proved so successful that it was used for more than 18 years as a production waste solidification facility.

Over the years, about five million gallons of waste liquids have been generated and stored temporarily in ICPP tanks. More than four million gallons of those wastes were converted to solids in the WCF by means of its "fluidized" bed process.

In September 1982, a replacement plant, the New Waste Calcining Facility (NWCF), was brought on line. This $90 million plant is the nation's first full-scale production facility for converting highly radioactive waste to a solid form. The NWCF increases the ICPP's radioactive waste management capabilities while incorporating the latest available technologies in the areas of fluidized-bed calcination, off-gas cleanup, remote operations, and decontamination processes.

Calcined waste.

Radioactive Waste Management Complex

The Radioactive Waste Management Complex (RWMC), a 144-acre, fenced waste storage area for low-level radioactive solid wastes, has existed since 1952. It lies in the southwestern part of the INEL and is operated for DOE's Idaho Operations Office by EG&G Idaho, Inc.

The RWMC is divided into a Transuranic Waste Storage Area (TSA) and a Subsurface Disposal Area (SDA).

Transuranic Waste Storage Area

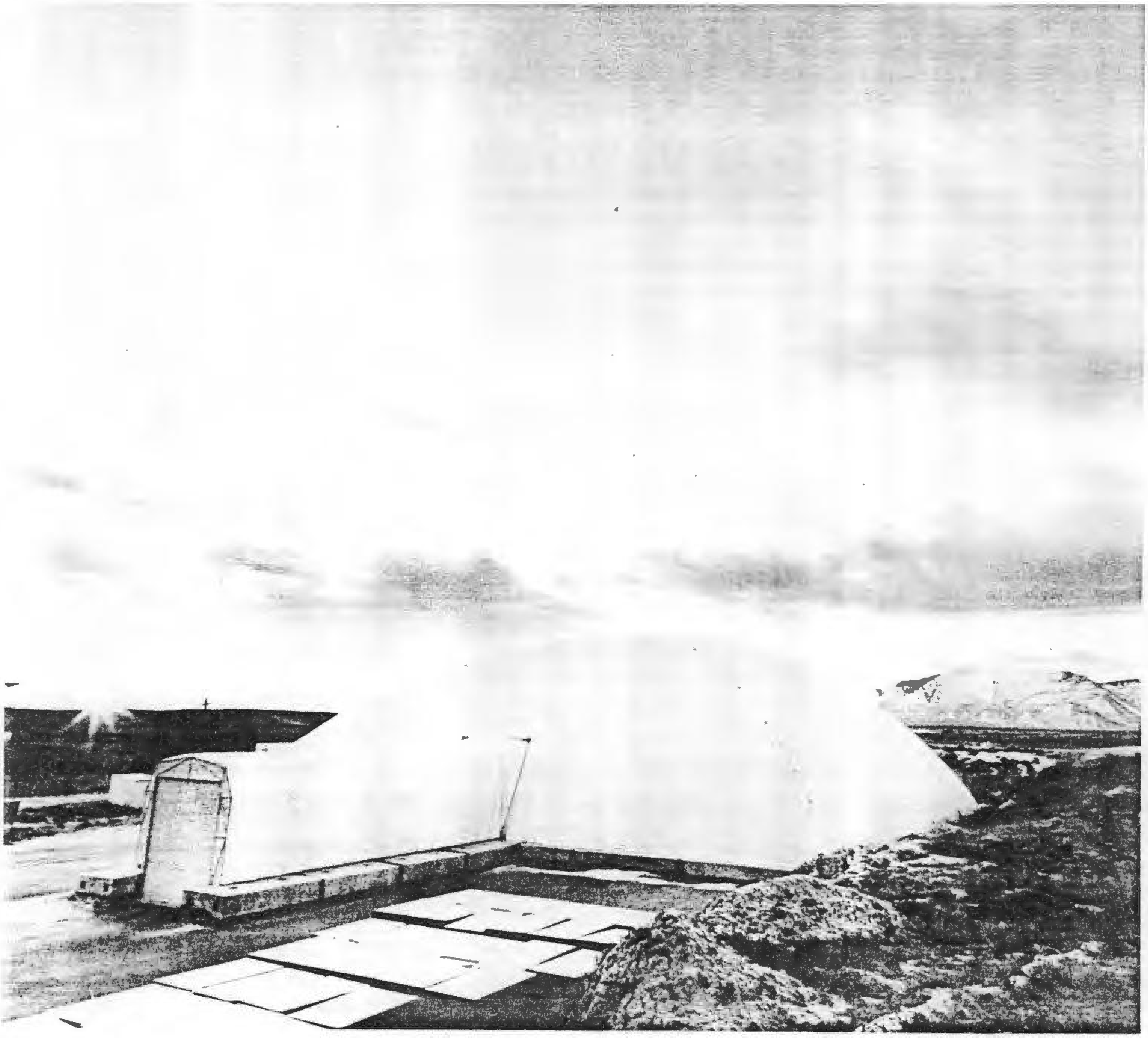
Solid waste, contaminated with long-lived transuranic radioisotopes (principally plutonium-239), primarily consists of broken laboratory glass, duct work, worn-out equipment, coveralls, shoe covers, rags, process sludges, and the like. Since November 1970, transuranic wastes have been stored above ground in the Transuranic Storage Area (TSA), a 56-acre, fenced area inside the RWMC.

Plans are to retrieve TSA waste stored above ground and transfer it to the Waste Isolation Pilot Plant (WIPP) in New Mexico, beginning about 1989.

Transuranic wastes received at the INEL are currently packaged in fiberglass-reinforced, polyester-coated boxes, metal boxes or in polyethylene liners inside 55-gallon steel drums.

Within the TSA, the waste containers are stacked on an above-grade asphalt storage pad, sloped from one end to the other for drainage. The containers are stacked in cells separated by earth walls and then covered with plywood, tough nylon-reinforced polyvinyl, and 2 to 3 feet of soil.

Air support building at RWMC.



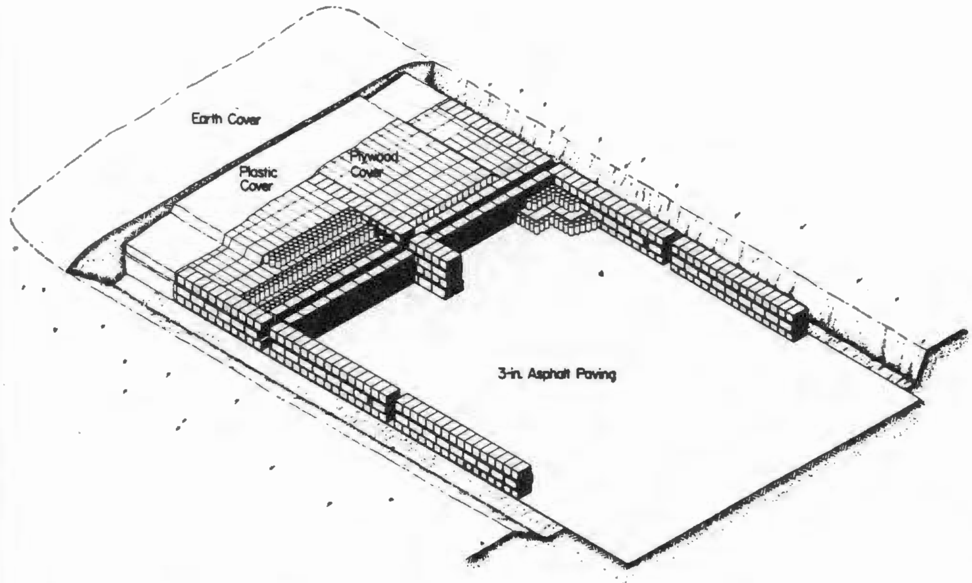


Diagram of stored transuranic contaminated waste on storage pads.

From 1954 through 1970, transuranic-contaminated wastes were buried in large pits and trenches at the RWMC and covered with 2 or more feet of soil. A research and development program was started in 1974 to determine the feasibility of safely retrieving the most recently buried wastes, gain experience in handling and repackaging it, and develop techniques and costs for full-scale retrieval.

A second retrieval program in 1975 investigated problems associated with retrieving transuranic waste buried at the RWMC before 1964. Investigation was aimed primarily at developing methods, equipment, and techniques to retrieve wastes and assess hazards or risks that may be associated with retrieval.

TRU waste covered by air support building while stacking barrels.

Subsurface Disposal Area

The Subsurface Disposal Area is an 88-acre, fenced portion of the RWMC. Various waste materials contaminated with nontransuranic radioisotopes are boxed or wrapped placed in pits and trenches in the SDA and buried directly in the soil.

Of the wastes buried at SDA in recent years, no more than 7 percent have decay half-lives of as long as 30 years, and in most years those wastes comprised less than 1 percent of the total. A few percent of the other radioactive materials in the SDA have decay half-lives of 5.3 years. But the remainder (over 90 percent) have half-lives measured in days. (Half-life is the time during which half a material's radioactivity decays away. After ten half-lives, a radioactive material essentially decays entirely.)

During nuclear operations, some nonradioactive metals (reactor core structural materials and the like) become activated, or radioactive. When these activated metals are no longer usable, they are buried directly in the soil at the RWMC. Greater than 80 percent of the radionuclides in such wastes have decay half-lives less than one year and are immobile because radioactivity is contained in the metals, especially stainless steel.

New Waste Processes

Three new facilities to aid future waste operations are being developed at the INEL. The facilities include: a Solid Waste Examination Pilot Plant (SWEPP), a Processing Experimental Pilot Plant (PREPP), and a Waste Experimental Reduction Facility (WERF).

Alternative Energy Development

Industrial Energy Conservation

DOE's Idaho Operations Office provides procurement services, contract administration, and program management, in addition to technical assessments and specific research and development, for a wide variety of high technology, high risk industrial conservation programs. These programs include:

- Waste heat recovery
- Combustion efficiency
- Industrial heat pump technology
- Automated process control systems
- Advanced separation processes
- Waste tire utilization
- Advanced metals reduction/production technology
- Energy integrated farms.

Estimates show widespread adoption of successful research and development could conserve over three quadrillion Btu or over $12 billion annually.

Small Hydropower Program

The DOE's National Small Hydropower Program offered partial funding for 20 hydro projects demonstrating cost effectiveness. A number of projects are still in their respective construction and licensing phases and should be complete in 1985. Monitoring and evaluation work is continuing and technology transfer reports are providing "lessons learned" to commercial developers. The Small Hydropower Program is also working in cooperation with the Electric Power Research Institute on engineering development projects studying either new hydro technologies or new applications of existing ones.

Geothermal Research

The DOE Idaho Operations Office plans, implements, and manages geothermal energy programs in three major areas: hydrothermal injection, conversion, and exploration technologies.

The Hydrothermal Injection Program is studying single-well test techniques to plan commercial reservoir development in fractured rock systems. Conversion Technology investigates more efficient methods to use moderate-temperature resources. Advanced geochemistry, geophysics, and geology techniques are being developed through the Exploration Technology Program area to assist in locating and using geothermal resources.

Hydropower in Idaho Falls.

Common Site Services

Central Facilities Area

In addition to direct support furnished by DOE, utilities and many other common services for the entire Site are centered in the CFA, operated for the Idaho Operations Office by EG&G Idaho.

In addition, a fleet of more than 120 large passenger buses is operated by EG&G Idaho, Inc. to transport INEL operating personnel between their homes in surrounding communities and their work areas at the Site. The trips range from approximately 20 to 75 miles one way.

CFA technician.

Health and Safety Requirements

DOE-ID is responsible for protecting property, environment, and the health and safety of people on or near the INEL. Elaborate safeguards are constantly in effect to minimize any possible hazard from Site activities.

Health and safety interests encompass all phases of occupational safety. The program includes developing and enforcing traffic and industrial safety policies and administering an environmental monitoring program to determine various radionuclides' effects on plant and animal life. Chemical and radiochemical analyses are provided for any potential health hazard materials and a comprehensive program for effluent, whole body, and personnel monitoring.

Nuclear safety overview activities, provided by DOE-ID, ensure the many INEL nuclear reactors operate with the highest degree of safety.

ID also administers a comprehensive occupational health program, and is responsible for safe radioactive material management. An audit and review of all facilities' design, construction, and operation ensures contractor programs comply with DOE codes and standards and adequate provisions for safe operation are included and maintained.

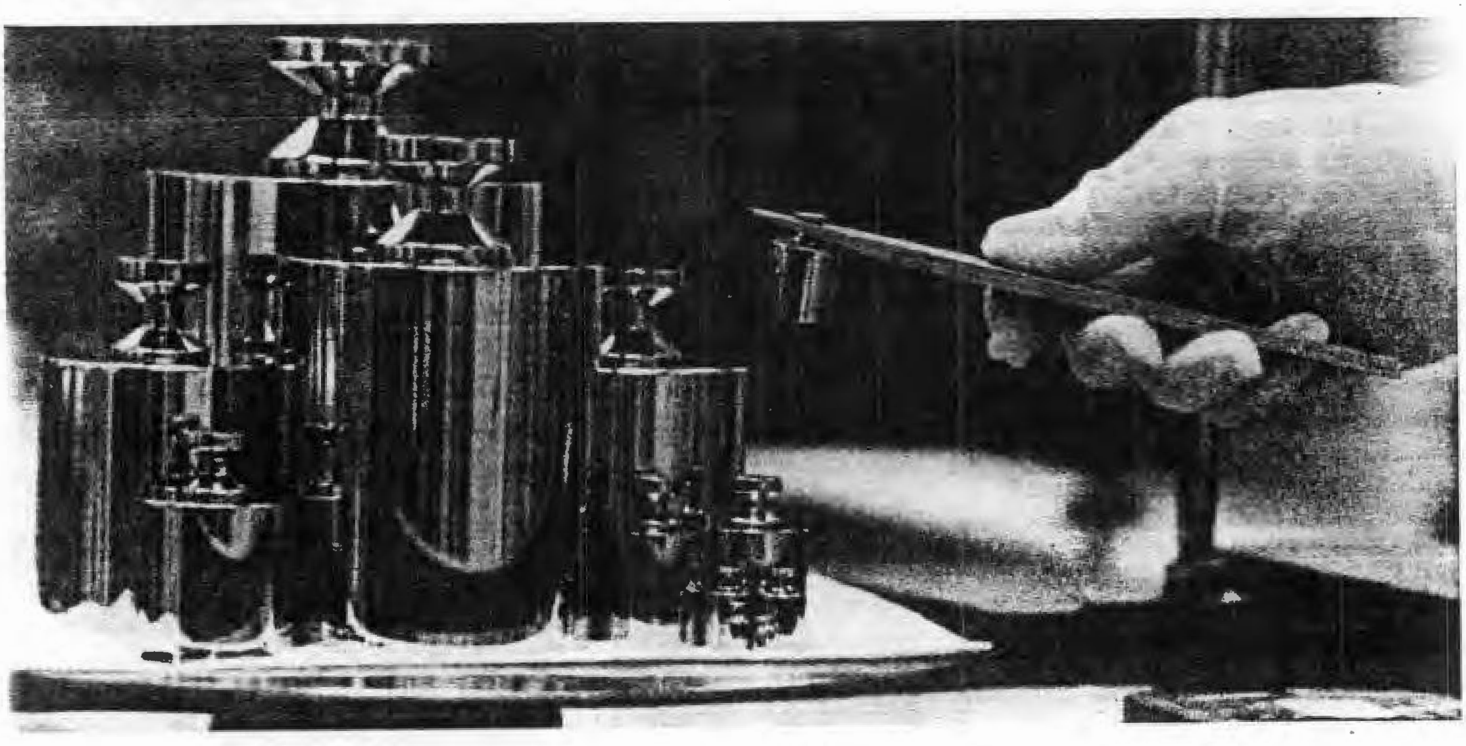
The Idaho Operations Office also coordinates cooperative operations and research programs with other government agencies. These agencies include the National Oceanic and Atmospheric Administration for atmospheric diffusion and climatological research, and the U.S. Geologic Survey for hydrological studies.

Engineering and Construction

Since 1949, DOE-ID has directed a building program providing experimental and production facilities with a replacement value of $2.4 billion. These projects include nuclear reactors, radioactive and contaminated waste storage and treatment facilities, and general support projects, such as offices, craft shops, electrical improvements, and roads.

INEL engineering and construction programs averaged $12 million annually for the period from 1950 through 1976. Construction program costs were $30 million in 1977 and have increased steadily to a high of $93.7 million in 1982.

Standards calibration services.



Radiological Assistance Program

The INEL Radiological Assistance Program provides assistance in the form of specially selected teams. The teams can be dispatched to points in Colorado, Idaho, Montana, Utah, and Wyoming if incidents involving radioactive materials occur. Teams, under the direction of the Idaho Operations Office, consist of trained medical and monitoring personnel prepared to act in response to radiation accident calls.

Support to Nuclear Regulatory Commission

The Idaho Operations Office's Radiological and Environmental Sciences Laboratory serves as a reference laboratory, providing services to the Nuclear Regulatory Commission's programs. These include surveillance of licensed facilities including nuclear power stations, fuel fabrication, and fuel processing plants and involve chemical analyses, environmental dosimetry, and data analyses. Also RESL provides equipment, supplies, personnel training, and various radiochemical standards to the commission's regional offices.

Safeguards and Security

Overall INEL security is the responsibility of the Idaho Operations Office's Safeguards and Security Division. This division provides physical protection (including guards, through an ID contractor, and compliance surveys) for classified matter, unclassified nuclear material, and other government property for the general INEL and for DOE-Idaho contractor facilities. The division processes and grants clearances and access authorizations necessary for INEL operations and provides necessary visitor controls. It operates an around-the-clock Warning Communications Center which includes a system of elaborate radio networks and alarm central station controls. The division administers the INEL Operational Security program and the accountability, control, and management of nuclear materials involved in the Idaho Operations Office contractor operations.

Computer Science Center

EG&G Idaho, Inc., provides a full spectrum of computer services through the INEL Computer Science Center (CSC) in Idaho Falls. The equipment operated at the CSC includes two CYBER 170 Model-76s 1, an IBM Model 4341, and various minicomputers. The three large digital computer systems are accessible by 18 remote input/output terminals and over 220 time-sharing terminals. CSC supports all INEL contractors as well as other DOE sites and federal agencies throughout the country on an as-required basis. The CSC is supported by more than 300 personnel.

Idaho Laboratory Facility

A wide range of experimental research and development work is conducted at the INEL's Idaho Laboratory Facility in Idaho Falls. The complex consists of a laboratory and an administrative section. There are six major areas of work conducted at the ILF: materials, physics, earth and life sciences, chemical engineering, and chemistry.

INEL bus fleet.

History of the INEL Site Area

The Snake River Plain is classified in the Pleistocene epoch, which began one million years ago and is one of the most recent geologic time categories. Fossils of prehistoric mammals have been found in excavations at the INEL Site. It is postulated that they are from camels and mastodons that inhabited the region during the latter part of the Pleistocene epoch, about 35,000 years ago. A fossil taken from carboniferous strata, encountered during well drilling at approximately 100 feet below land surface, has been determined to be over 40,000 years old.

Recent archeological investigations disclosed evidence that man has been in the eastern Idaho region for perhaps 10,000 to 12,000 years. Fur trappers were the first white men to enter the area now occupied by the Site. Thyery Godin, a French-Canadian trapper representing the English Northwest Company, discovered what was then known as the Godin River in 1820. Later, it became known as the Big Lost River because of the phenomenon of the river's "disappearance" in the area now circumscribed by the Site boundaries. Alexander Ross, representing the Hudson Bay Company, visited the Godin River in 1824 and mentioned the "Three Pilot Knobs," which could have been the Three Buttes on the INEL Site or the Teton Mountains, which were also referred to by this name. The Lost River Sinks and the Three Buttes were shown on map sketches made by Captain Bonneville, U.S. Army, in 1832-33-34. In the winter of 1832-33, he referred to the Snake River Plain as the great plain of the Three Buttes.

In the late 1870s, the INEL Site area was crossed by a trail used for large cattle herds, which were moved eastward from Oregon to eastern markets and ranges made available in Wyoming by treaties with the Indians. Two stagecoach lines also crossed the plain near the Twin Buttes, which long served as a landmark for early gold seekers. A branch of the Oregon Short Line Railroad Company was constructed in 1910. Cerro Grande, now only a location name at the southern boundary of the Site, was the terminus until the rails were extended to Arco and the mining town of Mackay.

An area within the INEL Site boundary was once a part of the Big Lost River Irrigation Project, one of the historically colorful reclamation projects in the West. It was authorized under the Carey Act of 1894, which provided that each state could be given land suitable for irrigation if the states did the reclaiming. Idaho accepted the application on the basis that private capital could be induced to construct the works and that the state would provide supervision.

A dam on the Lost River was started in 1909 to provide storage to irrigate some 100,000 acres, 30,000 of which were known as the Powell Tract lying within what is now the boundaries of the Site. During 1910, canals, ditches, and channel structures were constructed. The project was plagued with grave errors of engineering, financial difficulties, and legal and political controversies. Construction of the Powell Tract was discontinued in the spring of 1911. The old canals and structures are still prominent landmarks.

A similar project on the Little Lost River involved a small tract of land on the northwest side of the Site. The Mud Lake Project in the northeast also included land within the Site boundary. Both projects were the result of overly optimistic estimates. The dry canal systems are all that remain.

During World War II, the U.S. Navy utilized about 270 square miles of the plain of a gunnery range. An area southwest of the naval area was once used by the U.S. Army Air Corps as an aerial gunnery range. The present Site included all of the former military area and a large adjacent area withdrawn from the public domain for use by DOE. The former navy administration shop, warehouse, and housing area is today the Central Facilities Area of the INEL Site.

APPENDIX

Tabulation of Facilities at the Idaho National Engineering Laboratory

Reactors Operating or Operable
(As of 1983)

	Name	Page	Abbreviation	Operating Contractor
1.	Advanced Reactivity Measurement Facility No. 1	11	ARMF-1	EG&G
2.	Advanced Test Reactor	10	ATR	EG&G
3.	Advanced Test Reactor Critical	10	ATRC	EG&G
4.	Argonne Fast Source Reactor	7	AFSR	ANL
5.	Coupled Fast Reactivity Measurement Facility	11	CFRMF	EG&G
6.	Experimental Breeder Reactor-II	7	EBR-II	ANL
7.	Large Ship Reactor "A"	9	A1W-(A)	WEC
8.	Large Ship Reactor "B"	9	A1W-(B)	WEC
9.	Loss-of-Fluid Test Facility	5	LOFT	EG&G
10.	Natural Circulation Reactor	9	S5G	WEC
11.	Neutron Radiography Facility	8	NRAD	ANL
12.	Power Burst Facility	4	PBF	EG&G
13.	Submarine Thermal Reactor	9	S1W(STR)	WEC
14.	Transient Reactor Test Facility	8	TREAT	ANL
15.	Zero Power Plutonium Reactor	8	ZPPR	ANL

Reactors Dismantled, Transferred, or in Standby Status

	Name	Abbreviation	Operating Contractor
1.	Advanced Reactivity Measurement Facility No. 2	ARMF-II	PPCo.,INC
2.	Boiling Water Reactor Experiment No. 1	BORAX-I	ANL
3.	Boiling Water Reactor Experiment No. 2	BORAX-II	ANL
4.	Boiling Water Reactor Experiment No. 3	BORAX-III	ANL
5.	Boiling Water Reactor Experiment No. 4	BORAX-IV	ANL
6.	Boiling Water Reactor Experiment No. 5	BORAX-V	ANL
7.	Cavity Reactor Critical Experiment	CRCE	GE,INC
8.	Critical Experiment Tank	CET	GE
9.	Engineering Test Reactor	ETR	INC,ANC, EG&G
10.	Engineering Test Reactor Critical	ETRC	INC,ANC, EG&G
11.	Experimental Beryllium Oxide Reactor	EBOR	GA
12.	Experimental Breeder Reactor-I	EBR-I	ANL
13.	Experimental Organic Cooled Reactor (mothballed before startup)	EOCR	PPCo.
14.	Fast Spectrum Refractory Metals Reactor	710	GE
15.	Gas Cooled Reactor Experiment	GCRE	AGC
16.	Heat Transfer Reactor Experiment No. 1	HTRE-I	GE
17.	Heat Transfer Reactor Experiment No. 2	HTRE-II	GE
18.	Heat Transfer Reactor Experiment No. 3	HTRE-III	GE
19.	High Temperature Marine Propulsion Reactor	630-A	GE
20.	Hot Critical Experiment	HOTCE	GE
21.	Materials Testing Reactor	MTR	PPCo.,INC
22.	Mobile Low Power Reactor No. 1 (Army)	ML-1	AGC
23.	Nuclear Effects Reactor	FRAN	INC
24.	Organic Moderated Reactor Experiment	OMRE	AI
25.	Reactivity Measurement Facility	RMF	PPCo.
26.	Shield Test Pool Facility Reactor	SUSIE	GE
27.	SNAP 10A Transient No. 1	SNAPTRAN-1	AI/PPCo.
28.	SNAP 10A Transient No. 2	SNAPTRAN-2	AI/PPCo.
29.	SNAP 10A Transient No. 3	SNAPTRAN-3	AI/PPCo.
30.	Special Power Excursion Reactor Test No. 1	SPERT-I	PPCo.
31.	Special Power Excursion Reactor Test No. 2	SPERT-II	PPCo.
32.	Special Power Excursion Reactor Test No. 3	SPERT-III	PPCo.
33.	Special Power Excursion Reactor Test No. 4	SPERT-IV	PPCo.
34.	Spherical Cavity Reactor Critical Experiment	SCRCE	ANC
35.	Split Table Reactor	STR	GE, INC, ANC
36.	Stationary Low Power Reactor No. 1*	SL-1	CE
37.	Waste Calcining Facility	WCF	PPCo.,AL,ENICO
38.	Zero Power Reactor No. 3	ZPR-III	ANL

**Accidentally destroyed during shutdown, January 3, 1961, following 931.5 megawatt days of operation.*

Other Facilities In Use

	Name	Page	Abbreviation	Operating Contractor
1.	Argonne National Laboratory—West Area	7	ANL-W	ANL
2.	Auxiliary Reactor Area	12	ARA	EG&G
3.	Central Facilities Area	18	CFA	EG&G
4.	Chemical Engineering Laboratory	—	CEL	ENICO
5.	Computer Science Center (in Idaho Falls)	19	CSC	EG&G
6.	Expended Core Facility	9	ECF	WEC
7.	Experimental Field Station	—	EFS	DOE-ID
8.	Field Engineering Test Facility (formerly Flight Engine Test Facility)	—	FET	EG&G
9.	Fuel Element Storage Facility	—	FESF	ENICO
10.	Fuel Receiving and Storage Building	13	—	ENICO
11.	Hot Fuel Examination Facilities	8	HFEF	ANL
12.	Hot Pilot Plant	—	HPP	ENICO
13.	Idaho Chemical Processing Plant	12	ICPP	ENICO
14.	Idaho Laboratory Facility (in Idaho Falls)	19	ILF	EG&G/ENICO
15.	Irradiated Fuel Storage Facility	—	IFSF	ENICO
16.	LOFT Test Support Facility	—	LTSF	EG&G
17.	Naval Reactors Facility	9	NRF	WEC
18.	New Waste Calcining Facility	14	NWCF	ENICO
19.	Radioactive Waste Management Complex	15	RWMC	EG&G
20.	Radiological and Environmental Sciences Laboratory	3	RESL	DOE-ID
21.	Reactor Training Facility	—	RTF	EG&G
22.	Semiscale Test Facility	5	STF	EG&G
23.	Small Hydroelectric Power Program	17	—	DOE-ID
24.	Standards Calibration Laboratory (CF-698)	—	SCL	EG&G
25.	Technical Services Center (CF-688; 689)	—	TSC	EG&G
26.	Technical Services Facility	6	TSF	EG&G
27.	Test Area North	6	TAN	EG&G
28.	Test Reactor Area	10	TRA	EG&G
29.	Waste Experimental Reduction Facility	16	WERF	EG&G
30.	Willow Creek Building (in Idaho Falls)	—	WCB	EG&G/ENICO

Facilities Under Construction

	Name	Abbreviation	Operating Contractor
1.	Coal Fired Steam Generating Facility	—	ENICO
2.	Fuel Processing Restoration Project	—	ENICO
3.	Fluorinel and Fuel Storage Facility	FAST	ENICO

Facilities Dismantled Transferred or in Standby Status

	Name	Abbreviation	Operating Contractor
1.	Alcohol Fuels Plant	—	EG&G
2.	Raft River Geothermal Project	—	EG&G

Idaho National Engineering Laboratory Vicinity Map