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User's Guide to DOE Facilities

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Authorizing Official

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Foreword

The Department of Energy is responsible for the oversight of several major multiprogram and single program research laboratories. These laboratories, while engaged in ongoing research work for the Department, also represent valuable, often unique, resources for university and industrial scientists in many important research fields. It is the policy of the Department to make its laboratories and facilities available to qualified scientists who can make the best use of these capabilities. As part of that effort, this document is intended to serve as an important source of information for those interested in cooperative relationships among the national laboratories, the academic community and private industry.

Alvin W. Trivelpiece

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User's Guide Introduction

The Guide is divided into three parts:

1. Introduction: Answers some basic questions about DOE User Facilities and other user resources such as—

WHO is eligible to use DOE User Facilities ?

WHAT is a DOE User Facility ?

HOW MUCH does it cost ?

WHEN can non-DOE researchers use DOE User Facilities ?

WHO owns patent rights on proprietary research ?

WHERE are DOE User Facilities located ?

2. Detailed Data Sheets

This section comprises the major portion of the Guide. It provides information on each DOE User Facility and other user resources such as location, user contact, description of research, user arrangements, cost, etc.

3. Subject Index—(Alphabetical Listing)

The subject index refers to areas of research and equipment available at DOE User Facilities and other user resources. It cites page numbers in the Guide containing location of the facility, user contact, description of research, user arrangements, cost, etc.

Who is eligible ?

Applications to use DOE User Facilities are accepted from all qualified scientists irrespective of their organizational association. Research that qualifies for consideration must be suitable for the facility, of documented programmatic interest, of high scientific quality and the results must be submitted for publication in the scientific literature. Approval of applications is typically done by a review committee associated with each facility.

The prospective user is required to submit a written research proposal. Proposals are reviewed by an advisory committee made up of user facility staff, representatives from industry and/or academia, and others. Once the proposal is reviewed, recommendations are made to the laboratory director who makes the final decision on proposal acceptance.

What is a user facility ?

Most user facilities were established to ensure widespread participation by the scientific community in a specific area of research. User facilities are of two major types:

1. Designated User Facilities which include any major DOE facility, including associated equipment and instruments, officially designated as either a national research facility or user facility. Characteristics of these facilities are:

- The facilities involve a collection of interrelated equipment and personnel which may have broad use in conducting important scientific and technological research and which do not compete with private capability; and
- Their primary purpose is to serve the research needs of the in-house laboratory scientific staff while encouraging major involvement of industry and universities; and
- The sponsoring agency (DOE) ensures that sufficient time, space and other resources are made available to users without compromising the objectives of either the laboratory or the Department's research programs; and
- The research capabilities of the facility are essentially unique within the U.S. and the facility is of sufficient monetary value and/or sophistication that widespread duplication is unlikely; and
- The facility was constructed by DOE to serve both the outside user community as well as the in-house scientific staff. Many specific requests for unique research facilities are made by outside users and they participate fully in developing proposals to DOE for new facilities.
- Adequate support services are available on-site at the facility to allow an outside researcher to complete all the essential elements of an experiment; and
- A source of Federal funding, independent of the user, is available to provide for routine maintenance and repair.

2. Other User Resources which include major scientific instrumentation, laboratories, or other facilities, whose primary purpose is to serve the needs of the in-house laboratory staff, but which

DOE and laboratory management believe also would be of interest and benefit to DOE supported universities and other qualified users. This equipment is not available in other domestic, private facilities on an independent, convenient and timely basis at a reasonable charge. Designation of such resources as available to outside users is subject to local management decisions concerning scheduling and other applicable restraints.

How much ?

For nonproprietary research at Designated User Facilities or other user resources where the research is related to DOE's mission and the research results are to be published in the scientific literature, there is generally no charge for the use of an instrument or facility. A specific exception to this rule is that fees may be assessed for services beyond the normal, designated use of the facility such as machine shop time, etc. Charges, if any, are determined by the management of each facility on a case-by-case basis.

For proprietary use, users are charged on a full cost-recovery basis.

When can you use ?

DOE User Facilities and other user resources allot time for outside use that will vary from facility to facility. By writing or phoning the contacts listed in the **Guide**, scheduling details can be obtained on a case-by-case basis.

Once a research proposal is approved, joint/user agreements are made which outline operating procedures, time allotted, user fees (if any), collaborative arrangements, and so forth.

Who owns patent rights ?

The use of DOE User Facilities and other user resources for proprietary research is prohibited if a similar, commercial facility is available on an independent, convenient, and timely basis, and at a reasonable charge. If not, proprietary research is permitted.

DOE has recently granted two class waivers governing patent rights issues related to the use of DOE facilities. The first waiver applies to all persons and organizations qualified and selected to conduct research at DOE's "Designated User Facilities" and "Other User Resources" listed in

this guide. The policy permits individuals and organizations performing research in DOE User Facilities or utilizing DOE user resources to keep title to inventions which users make under the user agreement. The Government would receive a comprehensive right of free use, a right to publish the results of the research, and, in the event of deliberate non-use, a right to compel licensing. The second waiver covers privately sponsored research work in DOE facilities which is outside DOE's programmatic mission responsibilities and where the sponsor is providing full cost reimbursement for the work.

The sponsor has the first option to acquire title to inventions made under such agreements, including the inventions made by the operator of the DOE facilities. In addition, the proprietary data of the sponsor involved in the research may be marked and removed from the facility by the sponsor.

As a result of this new patent policy, it is hoped that a greater number of researchers will take part in the research at DOE User Facilities and other user resources thereby enhancing the transfer of technology to the market place. A more detailed explanation of the class waivers may be obtained from DOE Patent Counsel.

Where are they ?

DOE User Facilities and other user resources are located at DOE National Laboratories and other DOE research facilities across the country. A state by state listing is given below.

In addition, contact and coordination for user facilities may also be arranged, at most sites, through the University/DOE Laboratory Cooperative Program. The Lab Coop program provides research appointments for faculty and students at many of the sites listed. See (DOE/ER0043) An Information Guide available from the DOE Technical Information Center, Oak Ridge, Tenn. 37830.

California

Lawrence Berkeley Laboratory
University of California
Berkeley, CA. 94720
Phone: (415) 486-4000

Sandia National Laboratories
P.O. Box 969
Livermore, CA. 94550
(412) 422-7011

Stanford Linear Accelerator Center
Stanford University
P.O. Box 4349
Stanford, CA. 94305
(415) 854-3300

Energy Technology Engineering Center
P.O. Box 1449
Canoga Park, CA. 93104
(213) 700-5326

Geothermal Test Facility
c/o WESTEC Services, Inc.
P.O. Box 791
Holtville, CA. 92250

Colorado

Solar Energy Research Institute
1617 Cole Boulevard
Golden, CO 80401
(303) 231-7115

Grand Junction Facility
Grand Junction Area Office
P.O. Box 2567
Grand Junction, CO. 81502
(303) 242-8621

Idaho

Idaho National Engineering Laboratory
Idaho Falls, Idaho 83401
(208) 526-0111

Illinois

Argonne National Laboratory
9700 South Cass Avenue
Argonne, Illinois 60439
(312) 972-5555

Fermi National Accelerator Laboratory
P.O. Box 500
Batavia, Illinois 60510
(312) 840-3000

Iowa

Ames Laboratory
Iowa State University
Ames, Iowa 50011
(515) 294-2770

Massachusetts

Bates Linear Accelerator Facility
Massachusetts Institute of Technology
P.O. Box 95
Middleton, Massachusetts 01949

Montana

Component Development Integration Facility
P.O. Box 3767
Butte, Montana 59702
(406) 494-7313

New Mexico

Los Alamos National Laboratory
University of California
P.O. Box 1663
Los Alamos, New Mexico 87545
(505) 667-5061

Sandia National Laboratories
Albuquerque, New Mexico 87185
(505) 844-5678

New York

Brookhaven National Laboratory
Upton, Long Island, New York 11973
(516) 282-3000

South Carolina

Savannah River Laboratory
Aiken, South Carolina 29801
(803) 725-2277

Savannah River Ecology Laboratory
Drawer E
Aiken, South Carolina 29801
(803) 725-2472

Tennessee

Oak Ridge National Laboratory
P.O. Box X
Oak Ridge, Tennessee 37830
(615) 576-5454

Washington

Dr. Loren C. Schmid
Pacific Northwest Laboratory
P.O. Box 999
Richland, Washington 99352
(509) 375-2559

Ames Laboratory

The Ames Laboratory is a government owned R & D laboratory operated for DOE by Iowa State University. Located on the Iowa State campus, Ames conducts both basic and applied research in a number of scientific & technological areas including materials sciences, chemical sciences, environmental sciences, engineering sciences, applied mathematics, fossil energy, nuclear physics, high energy physics, non-destructive evaluation and microelectronics.

Designated User Facilities

Materials Preparation Center

Other User Resources

X-Ray Diffraction Laboratory

Coal Preparation and Characterization Facility

Materials Preparation Center

**Name/Type of
User Facility:**

Materials Preparation Center

Location:

Metals Development Building
Ames Laboratory
Iowa State University
Ames, Iowa 50011

**Brief Narrative
Description:**

Through the Materials Preparation Center (MPC), researchers from other governmental, university and industrial laboratories can gain the benefit of the Ames Laboratory's unique capabilities for the preparation, purification, fabrication, and characterization of metals and the preparation of single crystals of certain materials which are not available from private, commercial suppliers. The major categories of materials with which the MPC is currently involved include: refractory metals, the alkaline earths, rare earth metals and compounds, and certain actinide metals.

In addition to providing materials for specific research projects, the MPC actively and effectively assists in the transfer of the unique technologies which it develops.

User Arrangements:

Specific materials availability and costs cannot be stated in advance; rather, they will be established in light of the actual requirements of potential recipients. For further information regarding these topics and other aspects of the Center, please communicate with the contact person indicated below.

User Contact:

Name: F. A. Schmidt

Title: Director, Materials
Preparation Center and
Program Director for Metallurgy
and Ceramics

Commercial Telephone No.: (515) 294-5236

FTS Telephone No.: 865-5236

X-Ray Diffraction Laboratory

**Name/Type of
User Facility:**

X-Ray Diffraction Laboratory/User Research Instrumentation

Location:

Spedding Hall
Ames Laboratory
Iowa State University
Ames, Iowa 50011

**Brief Narrative
Description:**

An x-ray characterization laboratory including three computer-controlled four-circle single crystal diffractometers, two computer-controlled diffractometers for powder or noncrystalline investigations, an EXAFS spectrometer which is coupled to an Elliott high-intensity rotating anode generator, a microdiffracto-

meter and a variety of film equipment. A VAX 11/780 is also at the same site and used for data processing.

This equipment has been used by numerous groups, both inside and outside of the Ames Laboratory. Recent examples of the latter include (University of Nevada), (South Dakota State University) and (Bowling Green State University).

User Arrangements:

Arrangements are made on an individual basis as warranted. There are no fees charged if the investigation is collaborative in nature; otherwise fees are such as to provide for cost recovery.

User Contact:

Name: R. A. Jacobson

Title: Professor of Chemistry
and Section Chief,
Materials Chemistry Program

Commercial Telephone No.: (515) 294-1144

FTS Telephone No.: 865-1144

Coal Preparation and Characterization Facility

**Name/Type of
User Facility:**

Coal Preparation and Characterization Facility

Location:

Ames Laboratory
Iowa State University
Ames, Iowa 50011

**Brief Narrative
Description:**

The facility consists of continuous process circuits (including comminution, sizing, sample splitting, and float-sink testing, heavy-media vessel and cyclone separation, concentration, hydrocycloning, dewatering, and filtration units), and batch process circuits (including pretreatment, oil agglomeration, froth flotation, chemical desulfurization, dewatering, clarification, and reconstitution by pelletizing, briquetting, and extrusion). Additional equipment is being installed to upgrade the plant and to convert some of the batch processes to continuous process operation. The plant is also available to test and evaluate new equipment and processes. The capacities range from a few hundred pounds up to 20 tons per hour. Extensive analytical support is available using such state-of-the-art instruments as a scanning electron microscope with automated image analyzer, an inductively coupled plasma atomic emission spectroscope, and x-ray diffraction and fluorescence equipment, as well as more conventional instruments and classical techniques. The past and present users of the facility include: the State of Iowa for the Iowa Coal Project; Iowa State University for particulate emission testing; the Iowa State Mining and Mineral Resources Research Institute for the training of scientists and engineers; Pittsburgh and Midway Coal Mining Company for preparation of liquefaction feedstock; Iowa Public Utilities for processing and evaluation of its western coal deposits; Iowa Fuel and Mineral Company, and the Star Coal Company for experimental processing of utility coal; and Mich Coal Company, McConville Coal Company, and Jude Coal Company for coal testing.

User Arrangements:

Arrangements are made on a case by case basis with priority given to DOE contract work. Facilities are available for training personnel and conducting special experiments for fees negotiated in advance which are sufficient to recover costs unless prior collaborative agreements have been made.

User Contact:

Name: Ray W. Fisher

Title: Fossil Energy Program Director

Commercial Telephone No.: (515) 294-3758

FTS Telephone No.: 865-3758

Argonne National Laboratory

Argonne National Laboratory (ANL) is located on a 1700 acre site 28 miles southwest of Chicago, Illinois. Argonne also maintains a second site, (Argonne West) at the Idaho National Engineering Laboratory (INEL) 40 miles west of Idaho Falls, Idaho. ANL is a multiprogram Laboratory that conducts projects in nuclear reactor development (especially the liquid metal breeder reactor), energy and environmental technology, biomedical and environmental research, and basic sciences research. Some of ANL's significant accomplishments are the development of many of the nuclear power reactor types in use today, development and construction of large superconducting magnets, pioneering work in cancer diagnosis and therapy, and development of lithium-metal sulfide batteries for vehicle propulsion and peak-load leveling for utilities. ANL is operated for the Department of Energy by the University of Chicago.

Designated User Facilities

Argonne Tandem/Linac Accelerator Facility
4-MV Dynamitron Facility

Facility for High Resolution Atomic Spectroscopy
Intense Pulsed Neutron Source I (IPNS-I)
Users Support Center
Biological-Materials Growth Facility
High Voltage Electron Microscope Tandem Facility
Janus Biomedical Research Neutron Reactor

Other User Resources

Pulsed Electron Linac
3 MeV Van de Graaff
60-Inch Cyclotron
Solar Collector Test Facility
Salt Gradient Solar Pond
OTEC Heat Exchanger Test Facility
National Battery Test Laboratory
Fossil Energy Users Laboratory

Argonne Tandem/Linac Accelerator Facility

View of the 9-MV tandem with the analyzing magnet of the injection system.

**Name/Type of
User Facility:**

Argonne Tandem/Linac Accelerator Facility

Location:

Argonne National Laboratory
9700 South Cass Avenue
Argonne, Illinois 60439

**Brief Narrative
Description:**

This facility consists of three components, each with its own associated experimental areas. Common to all components is the Model FN Tandem Van De Graaff (9.0 million volt terminal potential), which was installed in 1967 and has the capability of accelerating light and heavy ions. The second component is a prototype heavy ion superconducting linac with 20 million volt equivalent potential drop, which was developed and installed in 1981 after an intensive pioneering effort by the ANL staff. Both the tandem and the linac have experimental areas with scattering chambers and a magnetic spectrometer. The third compo-

ment, which was initiated as an FY 1982 construction project to be completed by 1985, is the ATLAS superconducting linac. It will raise the accelerating power of the tandem-linac system for heavy ions to the equivalent of a 50 million volt (terminal) tandem. Heavy ion beams are used for studies of high-spin states, heavy ion induced resonances, fission and fusion reactions, quasi-elastic and deep inelastic reactions, and mass spectrometry. These studies are occasionally supplemented by measurements with light ion projectiles. A limited program of atomic physics research is starting.

User Arrangements:

The facility is available at no charge for basic research by outside users if the work is judged to be appropriate for the facility. The existing experimental system is aimed primarily at the needs of nuclear physics. User fees for commercial users are determined by the Laboratory. Details concerning application procedures may be obtained by contacting the person listed below.

Although not a requirement, it is probably advisable for outside users to collaborate with an ANL group that keeps abreast of the changing status of the new facility. During the next few years, the present developing accelerator system will evolve into ATLAS, an expanded user-oriented research tool. Up-to-date information about the accelerator and its use is disseminated through a newsletter, available from Margot Smith, phone (312) 972-4020. Fraction of beam time to non-ANL users: 30%

User Contact:

Name: D. G. Kovar

Title: Physics Division

Commercial Phone: (312) 972-4031

FTS Telephone No.: FTS 972-4031

**Name/Type of
User Facility:**

4-MV Dynamitron Facility

Location:

Argonne National Laboratory
9700 South Cass Avenue
Argonne, Illinois 60439

**Brief Narrative
Description:**

A wide variety of experimental systems for ongoing research programs in charged-particle physics occupy most of the beam lines. A 2-ton crane services the target area, and an on-line PDP 11/45 computer with a variety of hardware and software is available. Some of the principal parameters are:

Beams	atomic or molecular ions of many species
Ion energies (present)	300keV—4.5MeV
Beam energy spread	< 1keV
Ion currents (steady)	a few nA to tens of μ A (higher for light ions)

If beam is pulsed:
Pulse width variable from nanosecond to
 millisecond range

Duty cycle ~1% to ~25%

Height of beam lines 65 in.

In one of the experiments performed at the Dynamitron, energetic molecular ions are "Coulomb exploded" by impact on thin solid targets such as carbon. Studies like these are aimed at understanding the forces acting on charged particles penetrating matter as well as the structure of the incident molecules.

User Arrangements:

User time is available within the limits imposed by an intensive ANL research program. Details regarding scheduling, time allocation, process, etc., can be obtained from Dr. Elwyn at the number given below.

User Contact:

Name: Dr. A. J. Elwyn
Title: Physics Division
Commercial Telephone No.: (312) 972-4044
FTS Telephone No.: 972-4044

**Name/Type of
User Facility:**

Facility for High-Resolution Atomic Spectroscopy

Location:

Argonne National Laboratory
9700 South Cass Avenue
Argonne, Illinois 60439

**Brief Narrative
Description:**

The three principal instruments are: (a) a high-intensity source of tunable, coherent vacuum-ultraviolet radiation, having a resolving power of several million; (b) a five-meter vacuum spectrograph, capable of resolving powers of about one million, equipped with electronic detection and (c) a 30' Paschen-Runge spectrograph with resolving powers of up to 600,000. Typical experiments are (a) for the coherent vuv source: resolution of finer detail in absorption or fluorescence spectroscopy, lifetimes of excited states, Resonance Ionization Spectroscopy and selective molecular fragmentation; (b) and (c) for dispersive spectroscopy: diamagnetic spectroscopy of atomic Rydberg states and survey spectroscopy for laser-based experiments.

User Arrangements:

Details regarding scheduling, time allocation, process, etc., can be obtained from Dr. Crosswhite at the number given below. Cooperative research is encouraged.

User Contact:

Name: Dr. H. M. Crosswhite
Title: Chemistry Division
Commercial Telephone No.: (312) 972-3637
FTS Telephone No.: FTS 972-3637

Intense Pulsed Neutron Source I (IPNS-I)

**Name/Type of
User Facility:**

Intense Pulsed Neutron Source I (IPNS-I)

Location:

Argonne National Laboratory
9700 South Cass Avenue
Argonne, Illinois 60439

**Brief Narrative
Description:**

IPNS-I is a national user facility dedicated to basic research on condensed matter in the areas of neutron scattering and radiation effects. Neutron scattering is used to study the static and dynamic structures of crystals, glasses, and liquids; voids and defects in solids; structural transformations associated with magnetic, crystallographic, and electronic phase changes; spin waves and magnetic structures in solids; and structural arrangements in surface-absorbed films, in polymers, and in biological materials. Radiation-effects studies include fast-neutron damage production and annealing at low (4°K) and high temperatures, mechanical properties, microstructural changes, defects in semiconductors, and radiation effects in fusion-magnet materials.

IPNS-I began operation in 1981 and has seven neutron-scattering instruments and capabilities for studying radiation effects from 4° to 800°K.

User Arrangements:

A program Committee headed by Dr. J. M. Rowe of the National Bureau of Standards reviews experiments proposed for IPNS-I and selects those having the greatest scientific merit. Information about procedures for submitting proposals for experiments will be sent on request.

User Contact:

Name: B. S. Brown

Title: Intense Pulsed Neutron Project

Commercial Phone: (312) 972-4999

FTS: 972-4999

**Name/Type of
User Facility:**

Users Support Center

Location:

Argonne National Laboratory
9700 South Cass Avenue
Argonne, Illinois 60439

**Brief Narrative
Description:**

The Center serves research groups in high-energy physics and nuclear fusion by making available the unique facilities and many fields of expertise developed at Argonne. These include:

- Plastics Shop with facilities for bonding, shaping, and molding.
- Detector fabrication facility for large-area wire spark chamber and foils.
- Engineering for high current, fast-rise-time power supplies and magnet.
- Magnet test facility. A number of unique power supplies and cooling-water facilities are available.

- A motor-generator-flywheel set and 12-phase controlled rectifiers can provide 125 MW of power ranging from 12.5 kA, 10 kV to 100 kA, 1.25 kV in four steps. The system has a stored energy of 460 MJ.
- A 50-kA, 5-V power supply and a 13 kA, 560 V dc power supply.
- Computer control engineering, ranging from the control of rapid cycling synchrotrons to computer-based magnet field mapping systems, various state-of-the-art computer/operator interfaces, and array-processor signal analysis.
- Superconducting magnet design, design and operation of cryogenic equipment, field and force calculations, and consultation on superconducting magnets. Facilities include dc magnets providing fields to 8T with bores of 25 cm; helium liquefiers of 50 liter/hour with storage facilities of 10,000 liquid liters; research dewars to 120 in. length and up to 30 in. diameter; instrumentation for low-temperature thermometry and material-property measurements; coil-winding facilities for large and small solenoids and for large and small saddle coils.
- Pulsed superconducting cable test facility for cables in the form of double pancake coils. They can be tested in the background field of $B=6T$, $dB/dt \leq 10 T/s$ and $I \leq 50 kA$ for the studies of stabilities, mechanical properties, and ac losses of the cable.

User Arrangements:

Initial discussions with Center personnel will be paid for by the Center, but the costs of any detailed engineering, shop work, and materials will be borne by the User. However, it is possible that part of the expenses for some projects can be covered by other sources.

User Contact:

Name: W. F. Praeg

Title: Electromagnetic Technology

Commercial Phone: (312) 972-6543

FTS: 972-6543

Biological-Materials Growth Facility

**Name/Type of
User Facility:**

Biological-Materials Growth Facility

Location:

Argonne National Laboratory
9700 South Cass Avenue
Argonne, Illinois 60439

**Brief Narrative
Description:**

This is a facility in which plant micro-organisms produce deuterated and other isotopically labeled compounds for use in magnetic-resonance, infra-red, and Raman spectroscopy and in neutron-scattering analysis. Use of the facility is restricted to the production of materials not available commercially. Fully deuterated green and blue-green algae, photosynthetic bacteria, and *Halobacterium halobium* are cultured on a multi-liter scale. Organisms substituted with ^{13}O and ^{15}N are cultured on a more modest scale.

User Arrangements:

This a funded-operation facility. Users must supply their own stable isotopes, as well as housing funds.

User Contact:

Name: H. L. Crespi
Title: Chemistry Division
Commercial Phone: (312) 972-3686
FTS: 972-3686

**Name/Type of
User Facility:**

High Voltage Electron Microscope—Tandem Facility (HVEM)

Location:

Argonne National Laboratory
9700 South Cass Avenue
Argonne, Illinois 60439

**Brief Narrative
Description:**

This facility for materials research provides unique combinations of the techniques of advanced high-voltage electron microscopy, ion implantation, ion bombardment, and ion-beam analysis. The ion-beam interface permits direct microscopic observation of the effects of electron and ion bombardment on materials. The unique capabilities of this facility are being applied to a number of studies such as: radiation-induced segregation in steels; dislocation structures in silicon semiconductors; in situ radiation-induced phase changes, surface sputtering, ion implantation, deformation behavior of alloys, kinetics and morphology of oxidation, and basic studies of defects in solids.

User Arrangements:

A steering committee of ANL, university and industrial representatives evaluates research proposals and allots user time; non-ANL use is approximately 50%.

User Contact:

Name: A. J. Taylor
Title: Materials Science and Technology Division
Commercial Telephone No.: (312) 972-5005
FTS Telephone No.: FTS 972-5005

**Name/Type of
User Facility:**

JANUS Neutron Reactor

Location:

Argonne National Laboratory
9700 South Cass Avenue
Argonne, Illinois 60439

**Brief Narrative
Description**

The JANUS Reactor facility is a light water moderated ^{235}U nuclear reactor developed specifically for the delivery of fission-spectrum neutrons under highly controlled and calibrated conditions for radiobiological research. Typical applications include: basic radiobiological research exposing mammalian or bacterial cell cultures and small tissue specimens over a wide range of doses or dose rates; acute and low level radiation toxicology studies using large numbers of small rodents; and applied radiation dosimetry research and dosimeter calibrations.

The 200-kw nuclear reactor produces thermal neutrons which interact with a ^{235}U converter plate which in turn produces fission neutrons whose intensity may be varied by adjustments of reactor power. The system operates in a stable manner between 20 watts and 200 kilowatts to provide at least 10^4 range of dose rates.

The reactor is typically utilized during single-shift operation. Exposure time of 2 minutes to 7 hours can be routinely handled. The Exposure Room can be entered 2 minutes after the completion of an exposure, while the reactor remains at operating power.

User Arrangements:

Interested users should contact Dr. T. E. Fritz to discuss scheduling and possible collaborative research.

User Contact:

Name: Dr. Thomas E. Fritz

Title: Division of Biological
and Medical Research

Commercial Phone: (312) 972-7428

FTS: 972-7428

Pulsed Electron Linac

Pulsed Electron Linac used for experiments in radiation chemistry.

**Name/Type of
User Facility**

Pulsed Electron Linac

Location:

Argonne National Laboratory
9700 South Cass Avenue
Argonne, Illinois 60439

**Brief Narrative
Description:**

The Pulsed Electron Linac is a pulsed L-band linear accelerator with a no-load energy of 22 MeV. It is used in the Chemistry Division's Radiation Chemistry Program and in the Physics Division's Photo-neutron Program (high-resolution neutron spectra near threshold). A beam transport/analyzing system is available. As a result of a new development in the injector, the charge of the picosecond pulse has been dramatically increased (from 8 to 30 nC).

User Arrangements:

Details regarding scheduling, time allocation, process, etc., can be obtained from Dr. Aron at the number given below.

User Contact: Name: Dr. Jack Aron
Title: Chemistry Division
Commercial Phone: (312) 972-4895
FTS: 972-4895

Name/Type of User Facility: **3-MeV Van de Graaff**

Location: Argonne National Laboratory
9700 South Cass Avenue
Argonne, Illinois 60439

Brief Narrative Description: The 3-MeV Van de Graaff has an energy range 0.3—3.0 MeV. It is used in studies of magnetic effects in reactions of radicals generated by pulse radiolysis and in ultra-fast EPR spectroscopy to study short-lived radical species and the products of those transient intermediates examined by NMR spectroscopy. A multi-port beam-transport system is available. This accelerator is operated in either a DC or a pulsed mode.

User Arrangements: Details regarding scheduling, time allocation, process, etc., can be obtained from Dr. Aron at the number given below.

User Contact: Name: Dr. Jack Aron
Title: Chemistry Division
Commercial Phone: (312) 972-4895
FTS: 972-4895

Name/Type of User Facility: **60-in. Cyclotron**

Location: Argonne National Laboratory
9700 South Cass Avenue
Argonne, Illinois 60439

Brief Narrative Description: The 60-in. Cyclotron is a fixed-frequency machine capable of producing beams up to 100 μ A or more of

protons	up to 10.6 MeV	helium-3	up to 33.9 MeV
deuterons	up to 21.1 MeV	helium-4	up to 42.8 MeV

Neutron fluxes exceeding 10^{11} cm⁻²s⁻¹ (median energy 8 MeV) can also be produced. This cyclotron is especially suitable for isotope production (primarily for nuclear-medicine and waste-management studies) and radiation-damage studies.

User Arrangements: Details regarding scheduling, time allocation, process, etc., can be obtained from Dr. Aron at the number given below.

User Contact: Name: Dr. Jack Aron
Title: Chemistry Division

Commercial Phone: (312) 972-4895

FTS: 972-4895

Name/Type of User Facility: **Solar Collector Test Facility**

Location: Argonne National Laboratory
9700 South Cass Avenue
Argonne, Illinois 60439

Brief Narrative Description: The Solar Collector Test Facility at ANL is a fully instrumented collector test facility that can test collectors at temperatures from ambient to 450°F. The facility has complete data acquisition equipment and solar insolation measurement equipment.

User Arrangements: Details regarding scheduling, time allocation, process, etc. can be obtained from Dr. Schertz at the number given below.

User Contact: Name: Dr. W. W. Schertz
Title: Solar Program

Commercial Phone: (312) 972-6230

FTS: 972-6230

Name/Type of User Facility: **Salt Gradient Solar Pond**

Location: Argonne National Laboratory
9700 South Cass Avenue
Argonne, Illinois 60439

Brief Narrative Description: The ANL Research Salt Gradient Solar Pond is a 1,000m², 4m deep salt gradient solar pond which has obtained operating temperatures of 170°F (70°C). Facilities include the capability of establishing arbitrary salinity gradients, measuring ground heat loss, and making measurements of temperatures, salinity and radiation flux at any depth and location in the pond.

User Arrangements: Details regarding scheduling, time allocation, process, etc., can be obtained from Dr. Schertz at the number given below.

User Contact: Name: Dr. W. W. Schertz
Title: Solar Program
Commercial Phone: (312) 972-6230
FTS: 972-6230

Heat Exchanger Test Facility

Overview Heat Exchanger Test Facility

**Name/Type of
User Facility:**

Heat Exchanger Test Facility

Location:

Argonne National Laboratory
9700 South Cass Avenue
Argonne, Illinois 60439

**Brief Narrative
Description:**

This is a highly instrumented facility originally designed for testing heat exchangers for the Ocean Thermal Energy Conversion program. The facility has separate loops for warm water, cold water, and a working fluid. Nominal heat duty is 3.2 million Btu/hr (approximately 1 MW thermal) with a range of 1 to 5 million Btu/hr. Nominal flow in both water loops is 3200 gpm with a range of 1000 to 5000 gpm. Nominal water temperatures of 40°F and 80°F for cold-water and warm-water loops respectively. This facility was designed for ammonia as the working fluid but has also been used with Freon 22. Design pressure for working-fluid system is 215 psig. Has completely automated data acquisition system which samples all instruments several times a minute, keeps running averages, and periodically prints out average data values and calculations based thereon. Quartz crystal sensors are used for critical temperature and pressure readings. The facility is backed up by a team of specialists who can prepare test plans, conduct the tests, analyze the data, and publish the results.

User Arrangements:

Interested users should contact Dr. Anthony Thomas to discuss scheduling.

User Contact:

Name: Dr. Anthony Thomas

Title: OTEC Program

Commercial Phone: (312) 972-8071

FTS: 972-8071

**Name/Type of
User Facility:**

National Battery Test Laboratory (NBTL)

Location:

Argonne National Laboratory
9700 South Cass Avenue
Argonne, Illinois 60439

**Brief Narrative
Description:**

The NBTL is a national, central facility for testing, evaluating, and performing special studies on new and improved (or existing) batteries. Operational since 1978, the laboratory is fully automatic, operating unattended around the clock. It has space for the simultaneous and independent testing of about 50 batteries under various environmental and test conditions over a wide range of voltage and currents. Batteries can be performance characterized under constant current, constant power and variable power conditions. Power profiles can be programmed to simulate electric vehicle, utility load leveling, solar and wind, and other dynamic or static loads. Designated test stations are equipped with unique instrumentation and controls to perform special charge studies to optimize battery performance. Special discharge studies are also conducted to evaluate battery behavior under pulsed conditions that synthesize solid-state switching controllers that are often used in battery applications.

Test voltages, currents, and temperatures are controlled and data recorded and analyzed by computers. Tabular and graphic displays of data are instantly and conveniently available to give the performance history of a battery.

The availability of prompt post-test analysis of batteries removed from testing offers an insight into battery component failure or degradation mechanisms related to the test program. Fundamental chemical and physical analytical techniques are aided by an array of modern instruments such as SEM, X-ray diffraction, and laser interferometry. Battery off-gas measurement and analysis in real-time is also available.

All tests and studies performed in the NBTL are normally conducted by ANL staff.

Interested parties should contact Dr. N. P. Yao.

Contact:

Name: Dr. N. P. Yao

Title: Electrochemical Technology

Commercial Phone: (312) 972-4507

FTS: 972-4507

The high bay area of the National Battery Test Laboratory showing batteries undergoing tests under the exhaust hoods.

**Name/Type of
Facility:**

Fossil Energy Users Laboratory (FEUL)

Location:

Argonne National Laboratory
9700 South Cass Avenue
Argonne, Illinois 60439

**Brief Narrative
Description:**

FEUL can accommodate a wide range of experiments related to coal and oil combustion, and to fossil-fired boiler systems. The facility has two test legs; one having a combustor capable of burning liquid fuels, including liquid-solid slurry fuels, and the other a two-stage cyclone coal combustor. Each test leg has the necessary fuel-feed, support, and control systems. They share a combustion air preheater, effluent cleaning equipment, cooling systems and data acquisition system. The nominal thermal power is 2 Mw and hot gas flow rate is 1 kg/s.

Experiments are made by installing instrumented test sections downstream of the combustor. A variety of interchangeable test sections that simulate various steam plant components are available. Typically, tests are made to determine combustor performance, heat transfer, fouling, and entrained particulate characteristics.

User Arrangements:

Interested users should contact Dr. Terry R. Johnson.

User Contact:

Name: Dr. Terry R. Johnson

Title: Chemical Technology Division

Commercial Phone: (312) 972-5964

FTS: 972-5964

Bates Linear Accelerator Facility

The Bates 400 million electron volts electron linear accelerator (LINAC) was completed in 1972 at a location near the Cambridge campus of the Massachusetts Institute of Technology. The accelerator provides a high-intensity beam of electrons spread over a very narrow band of energy that makes possible very accurate measurement of the fine structure of the atom's nucleus. The facility is used in high energy and nuclear physics research.

Designated User Facility

Entire Facility

**Name/Type of
User Facility:**

William H. Bates Linear Accelerator Facility

Location:

Massachusetts Institute of Technology
P.O. Box 95
Middleton, MA 01949

**Brief Narrative
Description:**

This facility offers a vigorous experimental program in medium energy nuclear physics using the 400 million electron volt accelerator. This program emphasizes experimental investigations of: the electromagnetic properties of nuclei, the mechanisms by which mesons interact with nuclei, properties of nuclei which can be learned from meson and lepton probes, and the fundamental weak and strong interactions.

User Arrangements:

Outside users are required to submit a proposal to Bates. The proposal is then reviewed by the Program Advisory Committee which makes recommendations to the Director. Selected proposals are then sent to the Scheduling Committee which allots the number of hours for accelerator use. There are no user fees.

User Contact:

Name: Dr. W. Wade Sapp

Title: Bates LINAC Users Group, Inc. Director

Commercial Telephone No. (617) 245-6600

Brookhaven National Laboratory

Brookhaven National Laboratory (BNL) occupies a 5,625 acre tract of land near the geographic center of Long Island about 60 miles east of New York City. The research program explores the fundamental constituents of matter, their properties, and their interactions; studies of physical, chemical and biological effects of radiation and of chemical substances involved in the production and use of energy; uses a variety of special facilities and scientific devices in advancing knowledge in the basic energy sciences; and conducts research and development to solve problems of national interest in energy systems. BNL is operated by Associated Universities, Inc. for the U.S. Department of Energy.

Designated User Facilities

National Synchrotron Light Source
Alternating Gradient Synchrotron

Scanning Transmission Electron Microscopy Facility
PETT VI Positron Emission Transaxial Tomograph
JSW168 Small Cyclotron
60-Inch Cyclotron
Double MP Tandem Accelerator Facility

Other User Resources

High Flux Beam Reactor
Medical Research Reactor
Whole-Body Gamma Spectrometer Facility
Dynamitron Electron Accelerator

National Synchrotron Light Source

Aerial View of the National Synchrotron Light Source

**Name/Type of
User Facility:**

National Synchrotron Light Source

Location:

Brookhaven National Laboratory
Upton, New York 11973

**Brief Narrative
Description:**

The National Synchrotron Light Source (NSLS) is designed to provide the world's brightest continuous sources of X-ray and UV radiation. It is also the first X-ray facility in the United States dedicated for use as a synchrotron light source. Currently, the VUV storage ring is operational and research is expected to begin soon on the X-ray ring before the end of 1982.

There is a 700 MeV, one Ampere storage ring with 16 ports for VUV and IR research. It incorporates a unique Free Electron Laser designed to be a narrow-band continuously tunable UV source of average power in the one to several watt range. The 2.5 GeV, 0.5 Ampere X-ray storage ring has 28 ports. Each of the 16 VUV and 28 X-ray ports are divisible into two or three individual beam lines.

Presently under construction are several wiggler and undulator magnets which will significantly increase the photon energy and brightness.

User Arrangements:

The facility currently has a wide range of research equipment for basic and applied studies in condensed matter, surface science, photochemistry and photophysics, lithography, crystallography, small-angle scattering, metallurgy, x-ray microscopy, etc.

The NSLS is a national user facility available without charge to university, industrial, national laboratory and government users. In addition, proprietary work can be done on a full cost recovery basis, with the option to retain title to inventions resulting from research at the NSLS.

There are several modes of use of experimental facilities. A large number of beam lines have been designed and constructed by the 32 Participating Research Team (PRTs). PRTs are, for the most part, user groups from outside BNL with large, long-range programs which have been approved by the NSLS Program Advisory Committee. The PRTs are given priority for up to 75% of their beam life's operational time. General Users, who may have a less substantial need for the use of the facility, will be scheduled on both PRT beam lines and on lines built by the NSLS for the general community.

Information about submitting proposals may be obtained from the User Liaison Office.

User Contacts:

Name: Dr. John P. McTague

Title: Chairman National Synchrotron Light Source Department

Commercial Telephone No.: (516) 282-4966

FTS Telephone No.: 666-4966

Name: Dr. Roger W. Klaffky

Title: Staff Scientist/User Liaison

Commercial Telephone No.: (516) 282-4974

FTS Telephone No.: 666-4974

**Name/Type of
User Facility:**

Alternating Gradient Synchrotron

Location:

Brookhaven National Laboratory
Accelerator Department
Upton, NY 11973

**Brief Narrative
Description:**

The AGS is a national user facility dedicated to basic research in elementary particle physics. It is a proton synchrotron of the alternating gradient type with a maximum energy of 30 GeV. The AGS experimental area consists of 15 secondary beams ranging from 400 MeV/c antiprotons and kaons to 30 GeV/c protons and is operated in either the slow extracted beam made of 10^{13} protons extracted for 1.0 second every 2.5 seconds or the fast extracted beam where 10^{13} protons are extracted over 2.3 sec every 1.3 seconds. The AGS physics program is centered around studies into the fundamental nature of the strong, electromagnetic and weak interactions. This program has done some of the most significant work in experimental particle physics culminating in two Nobel Prizes in physics, CP violations (Cronin/Fitch - 1980) and J/ψ discovery (Richter/Ting - 1976). In addition, the discovery of two types of neutrinos, the discovery of the Ω^- and the discovery of the first charmed baryon Λ_c are major accomplishments of the research program. The AGS also provides two internal facilities, the Multiparticle Spectrometer Facility (MPS) and the On-Line Data Facility (OLDF). The MPS is the Laboratory's major electronic particle detector facility which consists of a large aperture 700 ton C-magnet with a large assortment of drift chambers, proportional wire chambers, Cerenkov and scintillation counters, etc. The OLDF provides AGS users with on-line computational support in the form of two PDP-10 computers.

User Arrangements:

The High Energy Advisory Committee (HEAC), advises the Director on the scientific merit of experimental proposals. The HEAC is composed of eleven members who serve for three years. Nine of the members attend the meetings to provide general information or advice on resources. DOE and/or NSF representatives often attend as observers. Information about submitting proposals is available in the High Energy Physics Users Handbook, which will be sent upon request.

User Contact:

Name: Dr. D. I. Lowenstein

Title: Deputy Chairman
Accelerator Department

Commercial Telephone Number: (516) 282-4611

FTS Telephone Number: 666-4611

**Name/Type of
User Facility:**

Scanning Transmission Electron Microscopy Facility (STEM)

Location:

Biology Department
Brookhaven National Laboratory
Upton, New York

**Brief Narrative
Description:**

In 1982 there were about 25 active projects in collaboration with outside scientists, 3 in industrial labs and the remainder in universities. Studies include labeling of biological molecules with heavy atom cluster compounds and determination of molecular weight and mass distribution within single macromolecules and complexes. The BNL STEM provides 2.5 Å resolution on specimens held at -160°C. STEM control and image recording are via on-line computer and a separate interactive computer is available for image analysis.

User Arrangements:

Time allocated in blocks of 1 week by the STEM Advisory Committee. Use is restricted to biological studies. No fees are charged at present.

User Contact:

Name: Dr. J. Wall

Title: Biophysicist

Commercial Telephone No.: (516) 282-2912/3372

FTS Telephone No.: 8-666-2912/3372

**Name/Type of
User Facility:**

PETT VI Positron Emission Transaxial Tomograph

Location:

Chemistry Department
Brookhaven National Laboratory
Upton, New York

**Brief Narrative
Description:**

The Positron Emission Transaxial Tomograph VI (PETT VI) measures regional positron emitting isotope activity in the brains of human and animal subjects. The PETT VI system acquires measurements from seven transaxial slices of the brain simultaneously and subsequently reconstructs these measurements into seven activity maps using a computer technique similar to that of the more familiar CAT scanner.

The PETT VI has a resolution of 1.0 cm Full-Width Half-Maximum (FWHM) in the planar slices and 1.4 cm FWHM in the axial direction. Using CsF coincidence detectors, PETT VI can accurately quantitate the spatial distribution of high count-rate activity.

The PETT VI building is immediately adjacent to the 60-inch Isochronous Cyclotron, the JSW168 Cyclotron and the laboratories where the positron-emitting isotopes are incorporated into materials suitable for administration to the subjects.

In addition to the PETT VI Scanner, the Facility includes a Perkin-Elmer 3220 Digital Computer, a small blood analysis laboratory and a staff of technicians, computer programmers and clinical support personnel.

User Arrangements:

Research at this facility must generally be collaborative between the BNL staff and the outside users. Several such behavioral, physiological investigations are in progress with New York University, University of Pennsylvania and SUNY at Stony Brook. Research proposals from responsible individuals and organizations are welcome. However, the resources of the Facility are finite and mostly committed, and the proposals should include a description of the support with which the candidate-investigator expects to augment the existing resources.

The Laboratory Management and the PETT Principal Investigator establish any charges for using this facility.

User Contacts:

Name: Dr. Alfred P. Wolf

Title: Chairman
Department of Chemistry

Commercial Telephone No.: (516) 282-4301, 4397

FTS Telephone No.: 666-4301, 4397

Name: Ms. Carol Redvanly

Title: Chemist/Admin.

Commercial Telephone No.: (516) 282-4398, 4397

FTS Telephone No.: 666-4398, 4397

**Name/Type of
User Facility:****JSW 168 Small Cyclotron****Location:**

Chemistry Department
Brookhaven National Laboratory
Upton, New York

**Brief Narrative
Description:**

The JSW168 Small Cyclotron is a fixed energy, two particle machine. The characteristics of the machine are:

Protons: 16 MeV > 50 μ A (external)

Deuterons: 10 MeV, >50 μ A

The machine is a prototype cyclotron for the production of positron-emitting radionuclides for biological, physiological and medical applications. The smallness of the machine lends itself for installation in the medical school and "major metropolitan hospital environments". The cyclotron has the capability of providing large quantities of ^{11}C , ^{18}F , ^{13}N and ^{15}O for use in clinical research and in "routine" clinical procedures.

The special targetry, automated systems for production and delivery of isotopes to the chemistry laboratory and PETT VI Facility are in process. The cyclotron is an integrated component of the BNL Cyclotron — PETT Facility. No interruption in providing the positron emitters is anticipated as the BNL 60-inch Cyclotron will serve as a back up during such periods.

User Arrangements:

In the near term, time allocation to users, process for applications, restrictions, charges and special provisions will be determined.

It is anticipated that the small cyclotron, and its products will be available for a larger segment of time and for a large number of programs than the 60-inch cyclotron has been in the past. This is owing to its modern design, specification of design and efficiency.

User Contacts:

Name: Dr. Alfred P. Wolf

Title: Chairman
Department of Chemistry

Commercial Telephone No.: (516) 282-4301, 4397

FTS Telephone No.: 666-4301, 4397

Name: Ms. Carol Redvanly

Title: Chemist/Admin.

Commercial Telephone No.: (516) 282-4398, 4397

FTS Telephone No.: 666-4398, 4397

**Name/Type of
User Facility:****BNL 60-Inch Cyclotron****Location:**

Chemistry Department
Brookhaven National Laboratory
Upton, New York

**Brief Narrative
Description:**

The four particle, isochronous, variable energy 60-inch cyclotron operates currently on a 40 hour week for basic research in cyclotron produced excited species and design, development and production of positron emitters and other radionuclides of interest in biological and physiological sciences.

The machine is capable of accelerating four particles. The characteristic beams are as follows.

Protons: 10-36 MeV, 1 kw (external)
Deuterons: 17-23 MeV, 1 kw
Alphas: 34-46 MeV, 15 μ A
³He: 30-64 MeV, 10 μ A

A partial listing of users in the past and at present for collaborative research include: Harvard University, University of California, San Diego and Los Angeles, University of Pennsylvania, Yale University, SUNY at Stony Brook, University of Illinois, NIH, Columbia University and the Exxon Corporation.

User Arrangements:

Allocation of time (to outside users) is scheduled on the basis "as available". User requests should be made in writing.

Fees for facility use are established by the laboratory management and vary depending upon the nature of the research, partial—total collaborative projects to strictly service procedures.

The 60-inch Cyclotron is a component of the BNL integrated Cyclotron—PETT Facility. In the near term this cyclotron will be devoted primarily to basic research as the new small cyclotron, JSW168, will be used primarily in its production mode for large quantities of short-lived positron emitters, i.e. ^{11}C , ^{18}F , ^{15}O and ^{13}N . The capabilities of the 60-inch cyclotron will be developed for which it is best suited; i.e. the delivery of high energy beams and variable energy control for all four particles. The 60-inch cyclotron will be scheduled as a back-up for the small cyclotron should difficulties arise, but remaining time may be allocated to outside users. The configuration of the shielding walls and layout of the two machines is such that both machines can be operated simultaneously or either machine and associated target systems can be worked on while the other machine is in operation.

User Contacts:

Name: Dr. Alfred P. Wolf

Title: Chairman Department of Chemistry

Commercial Telephone No.: (516) 282-4301, 4397

FTS Telephone No.: 666-4301, 4397

Name: Ms. Carol Redvanly

Title: Chemist/Admin.

Commercial Telephone No.: (516) 282-4398, 4397

FTS Telephone No.: 666-4398, 4397

Double MP Tandem Accelerator Facility

**Name/Type of
User Facility:**

Double MP Tandem Accelerator Facility

Location:

Brookhaven National Laboratory
Upton, New York 11973

**Brief Narrative
Description:**

This facility consists of two upgraded model MP Tandem Van de Graaff accelerators, four target rooms, a large variety of experimental equipment, and a time sharing computer system for data collection and analysis. The accelerators can be used individually or in two different coupled modes. A wide selection is available of light and heavy ion DC and pulsed beams. Up to now, 55 isotopes of over 40 different elements have been accelerated, ranging from protons to uranium. The beam quality is excellent with beam spot areas typically smaller than 1 mm². The energies are continuously variable and precisely known (to one part in 10⁴). The maximum energies are obtained in one of the coupled modes. The combination of these two accelerators provides beams roughly equivalent to the beams that could be obtained from a single 19 or 20 MV tandem accelerator.

The largest fraction of the beam time is used for nuclear physics research, but there are also important programs in atomic and molecular physics. Applications of interest for solid state physics, plasma physics and biology are also possible. Recently, a new and unique "accel-decel" capability has been developed to generate highly stripped heavy ions at very low energies such as fully stripped sulphur at 5 MeV. The availability of these unusual beams has given rise to a new atomic physics research program of great interest.

User Arrangements:

Over half of the available beam time is used by scientists from institutions other than BNL. They come from many different U.S. and foreign universities and laboratories. Over the last three years over 45 institutions were represented by about 150 visiting scientists and students.

Constant efforts are made to facilitate the visitors' work by providing around-the-clock accelerator operation, by developing easy to use experimental equipment and computer programs, and by giving technical assistance for setting up experiments. Groups without BNL collaborators often arrive the day before the experiment starts without having to bring equipment. They only supply expensive expendable materials such as separated isotopes, detectors, if they will be damaged during the experiment, etc.

Time is allocated by a Program Advisory Committee which meets two or three times a year. Usually there are so many requests that one-third to one-half of them cannot be accommodated. There is no charge for non-profit use. The fraction of beam time for outside users is 50%.

User Contact:

Name: O. C. Kistner

Title: Sr. Physicist

Commercial Telephone No.: (516) 282-3991
282-4581

FTS Telephone No.: 666-3991
666-4581

High Flux Beam Reactor

An experimental station at the High Flux Beam Reactor

**Name/Type of
User Facility:**

High Flux Beam Reactor

Location:

Brookhaven National Laboratory
Upton, New York 11973

**Brief Narrative
Description:**

The Brookhaven High Flux Beam Reactor (HFBR) operates at a power of 60 megawatts and provides an intense source of thermal neutrons. The HFBR was designed to provide particularly pure beams of thermal neutrons uncontaminated by fast neutrons and by gamma rays. A cold source (liquid hydrogen moderator) provides enhanced flux at long wavelengths. A polarized beam spectrometer, triple-axis spectrometers and small-angle scattering facilities are among the available instruments. Special equipment for experiments at high and low temperatures, high magnetic fields, and high pressure are also available. The emphasis of the research efforts at the HFBR has been on the study of fundamental problems in the fields of solid state and nuclear physics and in structural chemistry and biology.

User Arrangements:

The HFBR serves the U.S. scientific community and there exists a strong collaboration between the Brookhaven staff and users from universities, industry, and other national laboratories. In 1981 more than 150 persons visited Brookhaven to participate in experiments and more than 50 others collaborated from their home institutes. Experiments are scheduled at the HFBR following review of research proposals. The beam facilities are available at no cost to outside users. A copy of an HFBR Handbook containing considerable detail on the experimental equipment and operating procedures is available upon request.

User Contacts:

Name: Dr. Roger Klaffky

Title: Coordinator
National Synchrotron Light Source—Building 725B
Brookhaven National Laboratory
Upton, New York 11973

Commercial Telephone No.: (516) 282-4974

FTS Telephone No.: 666-4974

**Name/Type of
User Facility:****Brookhaven Medical Research Reactor (BMRR)****Location:**

Brookhaven National Laboratory
Upton, New York

**Brief Narrative
Description:**

The Brookhaven Medical Research Reactor is a tank type, heterogeneous, light water moderated and cooled, graphite reflected, 3 MW reactor used to provide beams of thermal neutrons with low contamination from fast neutrons and gamma rays. In addition, several irradiation thimbles are available for irradiation of small samples in fluxes up to 4.5×10^{13} neutrons/cm²-sec. The reactor has been used for activation analysis, X-ray radiography, neutron radiography, non-destructive materials testing, material defect analysis and radiation damage studies.

User Arrangements:

The reactor is run on demand, and may be scheduled for use with several days advance notice. Charges are made based on each hour of running time.

User Contact:

Name: Dr. D. C. Rorer

Commercial Telephone No.: (516) 282-4056

FTS Telephone No.: 666-4056

**Name/Type of
User Facility:**

Whole-Body Gamma Spectrometer Facility

Location:

Brookhaven National Laboratory
Medical Research Center
Upton, New York

**Brief Narrative
Description:**

This facility is used to measure the total body content of gamma ray emitting nuclides and the induced radioactivity produced by an *in vivo* neutron activation technique. The system includes 54 NaI (Tl) detection and is computer controlled. Total body data for potassium, calcium, sodium, chlorine and phosphorous are obtained.

User Arrangements:

Inquiries regarding the use of this facility should be made to the contact listed below.

User Contact:

Name: Dr. S. H. Cohn

Commercial Telephone No.: (516) 282-3591

FTS Telephone No.: 666-3591

**Name/Type of
Facility:**

Dynamitron Electron Accelerator

Location:

Brookhaven National Laboratory
Upton, New York

**Brief Narrative
Description:**

The electron beam can be routed to any of four target rooms for radiation damage or other materials science or chemistry experiments. Experimental apparatus for collaborative research includes cryostats, resistivity, internal-friction, and positron-annihilation apparatus. The facility specifications are:

Electron energy 0.4-2.5 Mev

Electron beam current 0.1 μ A-5mA
(well regulated)

Target Areas 4

User Arrangements:

User time is available within the limits of the in-house programs.

User Contact:

Name: C. L. Snead, Jr.

Title: Physicist

Commercial Telephone No.: (516) 282-3502

FTS Telephone No.: 666-3502

Component Development and Integration Facility

The Component Development and Integration Facility (CDIF) is an engineering scale, development test facility for MHD topping cycle components operated for the Department of Energy by Mountain States Energy, Inc. The facility is located in Butte, Montana and designed for nominal thermal input of 50 MW_t to the experimental components with expansion capability to 100 MW_t . The CDIF has the capability for: oil-fired, ash-injected, test simulating coal operations and coal fired tests. The CDIF provides two test bays for testing; one bay contains a 3 Tesla conventional iron-core

magnet, the other test bay will contain a 6 Tesla superconducting magnet system for future testing. Results obtained from the CDIF will provide part of the design basis for larger scale integrated plants.

Other User Resources

Analytical Chemistry and Materials Laboratory
Combustion and High Temperature Test Facility
Coal Handling Storage Processing and Delivery Facility
DC-AC Inverter Facility

**Name/Type of
User Facility**

Analytical Chemistry and Materials Laboratory

Location:

Component Development and Integration Facility
Butte, Montana (A Facility of the Idaho National Engineering Laboratory)

**Brief Narrative
Description:**

Materials laboratory capabilities encompass the ability for complete metallographic studies that include sample cutting, mounting, polishing, and examination by a light microscope equipped with various light microscope equipped with various light sources and filters. Metallic and non-metallic materials can also be examined with a Scanning Electron Microscope that is equipped with an Energy Dispersive X-ray Analysis System. Miscellaneous laboratory equipment includes stereomicroscopes equipped with photographic capabilities and ultrasonic testing equipment that is capable of detecting defects in weldments. An analytical chemistry laboratory is also available for elemental, organic, and water analyses.

User Arrangements:

No standing arrangements. Use would require negotiation and approval on a case-by-case basis.

**User Facility
Contact:**

Name: V. J. DeJong

Title: Facility Division Manager

Commercial Telephone No.: (406) 494-7313

FTS Telephone No.: 587-7313

**Name/Type of
User Facility:**

Combustion and High Temperature Test Facility

Location:

Component Development and Integration Facility
Butte, Montana (A Facility of the Idaho National
Engineering Laboratory)

**Brief Narrative
Description:**

The Combustion and High Temperature Test Facility is an engineering test facility designed for a nominal thermal input of 50 MW_t to support the testing of Magnetohydrodynamics (MHD) topping cycle components. The facility is also capable of supporting high temperature research and development, particularly in the areas of high temperature materials and combustion processes.

Combustion/High Temperature Support Systems

• TEST SPACE

Two enclosed test bays which comprise a total area 90 ft. x 100 ft. with a vertical clearance of 35 ft. including a pit area 25 ft. deep x 90 ft. long x 25 ft. wide at the south end of the test bays.

• PROCESS AIR SUPPLY

4-Stage (3 intercooled) Centrifugal Compressor:

Maximum Flow..... 75,000 lb/hr

Maximum Pressure..... 210 psia

- **OXYGEN SUPPLY**

200,000 lb. of LOX net capacity. Vaporizer capable of delivering up to 30,000 lb/hr of gaseous oxygen at a minimum of 70°F and 250 psia.

- **AIR PREHEAT**

Indirect Fired Air Heater:

Maximum Flow	75,000 lb/hr
Temperature	250-1200°F

Vitiated Air Heater:

Maximum Air Flow	55,000 lb/hr
Maximum Oxygen Flow	9,000 lb/hr
Temperature	250-1200°F

- **FUEL OIL**

Fuel Oil Storage	25,000 gal.
Delivery Rate	2,340 gph

- **NITROGEN SUPPLY**

160,000 lb. of liquid nitrogen net capacity. Vaporizer capable of delivering up to 22,000 lb/hr of gaseous nitrogen at 70°F and up to 500 psia.

- **EXIT GAS AND PARTICULATE REMOVAL SYSTEM**

Quench (Direct Water Contact):

Temperature Drop	4600°F to 200°F
Gas Flow up to	32 lb/sec
Quench Water Flow	1300 gpm
Scrubber Water Flow	1700 gpm
Stack	9 ft. 9 in. deep x 86 ft. high
Thickener Tank	530,000 gal.
Evaporation Ponds (2)	1,000,000 gal. each

- **DEIONIZED COOLING WATER**

Closed loop circulating system using deionized water. Designed to a maximum heat removal capacity of 35.8 MW_t. Consists of the following main components:

Deionizer	150 gpm
Storage tank	5,000 gal.
Circulating Pumps (3)	1,900 gpm each
Heat Exchanger	35.8 MW _t
Water Conductivity	1 Megohm per cm

- **PLANT COOLING WATER SYSTEM**

Two cell cooling towers capable of cooling 7300 gpm of water from 100°F to 80°F. Circulating water pumps, chemical injection pumps, tanks, piping, valves, controls.

- **FLY ASH/ANHYDROUS K_2CO_3 (DRY POWDER FEED SYSTEM)**

Ash Storage	20,000 lb/hr
Maximum Ash Injection Rate	2,000 lb/hr
Maximum K_2CO_3 Injection Rate	4,700 lb/hr

- **MAGNET**

3 tesla (30,000 gauss) conventional iron-core magnet,
8500 amps, 700 volts DC.

- **DATA ACQUISITION**

Complete computerized system. 1 Host and 4 Satellites. 2241 Channels (sampled once per second or 160 channels sampled 100 times per second), full range of peripherals includes disks, tapes, CRTs, printers, card readers, etc.

Academic Users:

Mississippi State University and Stanford Research Institute.

User Facility Arrangements:

No standing arrangements. Use would require negotiation and approval on a case-by-case basis.

User Facility Contact:

Name: V.J. DeJong

Title: Facility Division Manager

Commercial Telephone No.: (406) 494-7313

FTS Telephone No.: 587-7313

Name/Type of User Facility:

Coal Handling, Storage, Processing and Delivery Facility

Location:

Component Development and Integration Facility
Butte, Montana (A Facility of the Idaho National Engineering Laboratory)

Brief Narrative Description:

The Coal system consists of Coal Unloading, Reclaiming, and Storage; Coal Predrying; Coal Pulverizing and Drying; and Coal Injection Subsystems.

The coal unloading, reclaiming, and storage subsystem consists of a coal railroad car unloading hopper, unloading conveyor belt, radial stacker belt, magnet separator, coal crusher, bucket elevator, and storage bin. This subsystem can prepare 35 tph of $\frac{1}{2}$ " $\times$ 0 coal and store the product in an 80-ton storage bin inerted with nitrogen gas.

The coal predrying subsystem is capable of drying and handling 28,200 lb/hr of $\frac{1}{2}$ " $\times$ 0 coal from an initial 35% moisture content to 15%.

The coal pulverizing and drying subsystem dries 15% moisture coal and is capable of delivering 20,700 lb/hr of 2% moisture coal ground to a nominal but variable distribution of 70% through 200 mesh. Pulverized coal is pneumatically transferred to a cyclone separator where the coal is separated from the

transport gas. The coal is then screened and stored in a 53-ton storage bin, where it is inerted with nitrogen gas.

The coal injection subsystem is capable of delivering up to 13,800 lb/hr of dried (2%) pulverized coal to an MHD or other coal-fired combustor. Coal is transported by compressed air. The coal injection subsystem utilizes a system consisting of a variety of pressure and transport vessels designed so that flow to the combustor is uninterrupted.

Industrial Users:

- Dried/pulverized coal supplied to TRW and AVCO
Everett Research Laboratory.

**User Facility
Arrangements:**

No standing arrangements. Use would require negotiation and approval on a case-by-case basis.

**User Facility
Contact:**

Name: V. J. DeJong

Title: Facility Division Manager

Commercial Telephone No.: (406) 494-7313

FTS Telephone No.: 587-7313

DC-AC Inverter Facility

**Name/Type of
User Facility:**

DC-AC Inverter Facility

Location:

Component Development and Integration Facility
Butte, Montana (A Facility of the Idaho National Engineering Laboratory)

**Brief Narrative
Description:**

The 3 megawatt dc to ac power conversion system is a current-sourced, line commutated inverter. The converter (inverter) is a simple six-pulse (Graetz) bridge using thyristors in series for its "valves" to perform the desired switching functions. The ac interface to Montana Power Company is accomplished with the use of static VAR generators. Back-up fusing and a shorting dc fault switch are provided against the contingencies of converter valve or interrupter failure.

Academic Users:

- Montana State University—Small scale inverter testing (planned).
- EPRI/Stanford University—Transient electrical data.

**User Facility
Arrangements:**

No standing arrangements. Use would require negotiation and approval on a case-by-case basis.

**User Facility
Contact:**

Name: V. J. DeJong

Title: Facility Division Manager

Commercial Telephone No.: (406) 494-7313

FTS Telephone No.: 587-7313

Energy Technology Engineering Center

The Energy Technology Engineering Center (ETEC) is located in the Santa Susana Mountains, 40 miles northwest of Los Angeles, California. ETEC is a government-owned, contractor-operated (GOCO) laboratory, operated for DOE by the Energy Systems Group of Rockwell International. ETEC is primarily an engineering organization—not a research or commercial products group—specializing in managing the design and construction of test facilities, and in managing and conducting test programs.

ETEC was originally established to support the Liquid Metal Fast Breeder Reactor (LMFBR) program by providing facilities for development of liquid sodium components and instrumentation. ETEC heat transfer engineering activities have been expanded to include many other energy program areas including solar, fossil, geothermal, conservation, light-water fission and fusion power development. Off-site management and monitoring of non-LMFBR energy system design, construction and testing is an ETEC specialty. In addition to its Southern California base of operations, ETEC maintains site offices in San Francisco, Denver, Laramie, Huntsville and Washington, D.C.

ETEC provides technical support to the Nuclear Regulatory Commission, the Electric Power Research Institute, and to other Federal laboratories. Subject to DOE approval, ETEC resources and capabilities are made available to State and local governments, universities and other non-profit institutions, as well as commercial industries and the private sector.

Designated User Facilities

Sodium Pump Test Facility
Sodium Components Test Installation

Other User Resources

Thermal Transient Facility
Small Components Test Loop
Large Leak Test Rig
Hydraulic Test Facility
Static Sodium Test Rig
Chemistry & Metallography Lab
Instrumentation & Standards Lab

ETEC Sodium Pump Test Facility (SPTF)

**Name/Type of
User Facility:**

Sodium Pump Test Facility (SPTF)

Location:

Energy Technology Engineering Center
P.O. Box 1449
Canoga Park, CA 91304

**Brief Narrative
Description:**

Pumps and other large sodium components such as flowmeters, valves, coolers, cold traps and piping are tested in this facility which is the largest of its type in the world. Thermal transients are performed by a feed-and-bleed technique of injecting sodium at a programmed rate.

Pumps tested include DOE's FFTF pump and an inducer pump at 14,500 gpm. Testing of a CRBR prototype pump at 35,000 gpm is in progress. Planned facility modifications will increase SPTF flow test capability to 110,000 gpm for testing larger prototypes.

All ETEC test facilities are designed to be easily adapted to a wide range of test parameters. Facility modifications to meet user needs at minimal cost are a prime feature of ETEC's can-do engineering posture.

User Arrangements:

DOE San Francisco Operations Office

**User Contact
at ETEC:**

K. T. Stafford (213) 700-5326

ETEC Sodium Components Test Installation (SCTI)

**Name/Type of
User Facility:**

Sodium Components Test Installation (SCTI)

Location:

Energy Technology Engineering Center
P.O. Box 1449
Canoga Park, CA 91304

**Brief Narrative
Description:**

SCTI is the world's largest test facility for evaluating thermal and hydraulic characteristics of sodium steam generators and heat exchangers under both steady-state and upset conditions. The facility has 70 MWt of fossil-fired sodium heaters and complete steam and feedwater system with precise water purity controls. In-line components such as valves, expansion joints, and pressure, level, flow and leak detection instrumentation can also be tested in either the sodium or steam and feedwater system.

A full-size CRBR prototype steam generator is currently being tested and other large plant prototypes are scheduled. Installation of a turbine-generator set is planned to produce electric power which will offset facility operating costs.

User Arrangements:

DOE San Francisco Operations Office

**User Contact
at ETEC:**

K. T. Stafford (213) 700-5326

**Name/Type of
User Facility:**

ETEC Thermal Transient Facility (TTF)

Location:

Energy Technology Engineering Center
P.O. Box 1449
Canoga Park, CA 91304

**Brief Narrative
Description:**

TTF is used to simulate the effect of process fluid transient temperatures on plant components. Simulations for hot water, sodium, slurries, and molten salts can be achieved by directing high-velocity inert gas through thermally pre-conditioned test articles. Component temperatures are computer-controlled to match predicted values, and data acquisition and parametric controls are programmed to allow continuous thermal cycling and recording of temperature, pressure, flow and strain gage measurements. Twin test bays permit test setup activities on one side while testing on the other. TTF also contains a large hydraulic loading structure mounted on a massive steel-reinforced concrete base, which permits simultaneous mechanical and thermal stress testing of components up to 32 by 40 by 15 feet. TTF could be modified for seismic testing.

Plans are to use TTF's 500,000-lb seismic mass, which is set in bedrock, as a base for high-level seismic failure testing of piping systems and components. Failure frequencies of 3 to 5 Hz (30 to 50 times SSE) will be used, making TTF's seismic test capability an order of magnitude greater than any existing large component test facility.

User Arrangements:

DOE San Francisco Operations Office

**User Contact
at ETEC:**

K. T. Stafford (213) 700-5326

Thermal Transient Facility (TTF)

**Name/Type of
User Facility:**

Small Components Test Loop (SCTL)

Location:

Energy Technology Engineering Center
P.O. Box 1449
Canoga Park, CA 91304

**Brief Narrative
Description:**

SCTL component testing capabilities include thermal transients, isothermal flow, and immersion testing. Severe transients are absorbed by a large thermal capacitor, which protects the balance of the sodium loop from excessive shock. SCTL has a 10-inch pipe diameter loop for pump and valve testing, and separate 4 and 80 inch loops for transient tests. SCTL can also test cold traps, in-vessel reactor mechanisms, and a variety of sodium instrumentation.

Typical features of a sodium valve test include throttling characteristics, computer-controlled mechanical cycling, seat load measurements, static leakage in both flow directions, and thermal transients.

User Arrangements:

DOE San Francisco Operations Office

**User Contact
at ETEC:**

K. T. Stafford (213) 700-5326

**Name/Type of
User Facility:**

Large Leak Test Rig (LLTR)

Location:

Energy Technology Engineering Center
P.O. Box 1449
Canoga Park, CA 91304

**Brief Narrative
Description:**

LLTR is a sodium-water reaction test facility, containing a modified steam generator and reaction product vent relief system. Water-steam can be injected into the sodium side of the steam generator from an intentionally-faulted tube. Pressurized water-steam is provided to the remaining steam generator tubes to evaluate consequential secondary failures and the effects of multiple tube failures. High-speed recording equipment monitors all parameters during testing.

LLTR has been used for sodium-water reaction tests on a modular steam generator, and for a variety of large and small leak tests on a simulated full-scale CRBR steam generator. LLTR can also be used to investigate tube leakage failure phenomena in light-water-reactor steam generator tubes.

User Arrangements:

DOE San Francisco Operations Office

**User Contact
at ETEC:**

K. T. Stafford (213) 700-5326

ETEC Hydraulic Test Facility (HTF)

**Name/Type of
User Facility:**

Hydraulic Test Facility (HTF)

Location:

Energy Technology Engineering Center
P.O. Box 1449
Canoga Park, CA 91304

**Brief Narrative
Description:**

The HTF circulates demineralized water for hydraulic testing of flow components ranging from 0 to 4500 gpm. The water can be heated and regulated to permit thermal transient testing. The facility is equipped with a digital data acquisition system for generating on and off-line processing, real-time CRT displays and recall plotting. FM-analog data acquisition is also available at HTF and most other ETEC facilities.

User Arrangements:

DOE San Francisco Operations Office

**User Contact
at ETEC:**

K. T. Stafford (213) 700-5326

ETEC Static Sodium Test Rigs

**Name/Type of
User Facility:**

Static Sodium Test Rigs

Location:

Energy Technology Engineering Center
P.O. Box 1449
Canoga Park, CA 91304

**Brief Narrative
Description:**

Two ETEC facilities contain multiple test rigs for evaluating various types of instrumentation in a static sodium environment. Instruments for measuring temperature, pressure, level, and mechanical strain are tested and calibrated in sodium up to 1200°F and 300 psig.

User Arrangements:

DOE San Francisco Operations Office

**User Contact
at ETEC:**

K. T. Stafford (213) 700-5326

**Name/Type of
User Facility:**

**Chemistry & Metallography Lab and
Instrumentation & Standards Lab**

Location:

Energy Technology Engineering Center
P.O. Box 1449
Canoga Park, CA 91304

**Brief Narrative
Description:**

The Chemical and Metallurgical laboratories at ETEC provide analytical services and specialized technical consultation for all on-site test facilities and off-site engineering test programs. The Chemistry Laboratory is fully equipped to identify and characterize unknown materials, and to provide routine impurity analyses of test facility cover gas, sodium, and boiler feedwater. Gas chromatography, spectroscopy, and X-ray diffraction and fluorescence are some of the analytical methods employed. The Metallurgical Laboratory has a full complement of precision optical instruments for microstructure characterization including a computer-aided scanning electron microscope.

The Instrumentation and Standards Laboratory maintains over 7000 instruments using on-site service, calibration, and repair capabilities. Working and transfer standards permit traceability of instrumented test data to the National Bureau of Standards. Typical standards maintained include electrical, volumetric, pressure and flow, linear, time and temperature. A computerized system provides inventory control, calibration recall interval monitoring, and instrument failure trend analyses by type and manufacturer.

User Arrangements:

DOE San Francisco Operations Office

**User Contact
at ETEC:**

K. T. Stafford (213) 700-5326

FERMI National Accelerator Laboratory

FERMILAB is located near Batavia, Illinois, some 35 miles west of Chicago. The laboratory, engaged principally in high energy physics research, is operated by the Universities Research Associates, Inc., a consortium of 54 universities throughout the United States and Canada. Its principal instrument, one of the world's most powerful accelerators, is capable of operating at 500 billion electron volts. Development of the Energy Doubler/Saver now under way will increase this energy to 1,000 billion

electron volts while decreasing power consumption. Currently, activities at the laboratory are divided into three parts: conducting a physics research program, improving the operation of the present facilities, and developing more powerful facilities for future research activities.

Designated User Facilities

Entire facility

**Name/Type of
User Facility:**

Fermilab High Energy Accelerator

Location:

Fermilab
Batavia, Illinois 60510

**Brief Narrative
Description:**

The principal scientific instrument at Fermilab is a system of four accelerators working in sequence to accelerate protons in the following manner: 1) Electrons are added to hydrogen atoms in an ion source contained inside a Cockcroft-Walton generator. The resulting ions, which are protons with two attached electrons, emerge from the high voltage accelerator with an energy of 750,000 electron volts (eV); 2) These ions enter the Linear Accelerator, approximately 500 feet long, which accelerates them to an energy of 200 million electron volts (MeV). The linac contains hundreds of copper electrodes between which oscillating electric fields are induced, tuned in such a way as to generate the electrical equivalent of a surf wave. The ions are accelerated as they ride this electrical wave; 3) Next, they are injected into the Booster Accelerator, which is a circular machine, a rapid-cycling synchrotron, approximately 500 feet in diameter, which goes through its accelerating cycle 15 times per second. The ions are stripped of their electrons, leaving protons which are increased in energy to 8 billion electron volts (GeV). It normally cycles 13 times in rapid succession, loading 13 Booster pulses into the main accelerator for further acceleration. The protons are injected from the Booster into the main accelerator — a synchrotron 6,562 feet in diameter, about four miles in circumference — and here they are accelerated to full energy (200-500 GeV). The main accelerator, also called the Main Ring, contains about 1,000 specially developed magnets, spaced along the protons' orbit, to guide and focus the beam within the 2-inch by 5-inch vacuum chamber built into the center of magnets; 4) The protons travel around the ring about 50,000 times per second. They receive a 3-million electron volt boost of energy on each turn through a series of radio frequency cavities. After reaching the desired energy, the protons up to now have been extracted from the Main Ring and transported to the experimental areas. They will then be injected into the Energy Doubler/Saver (a new superconducting synchrotron) for acceleration to 1000 GeV; they will then be extracted from the Energy Doubler/Saver and transported to the experimental areas.

User Arrangements:

All proposals to use the facilities at Fermilab require the approval of the Director. The procedures for submitting a proposal are described in a booklet "Procedures for Experimenters" which can be obtained from the Users Office at Fermilab.

User Contact:

Name: Rich Orr

Title: Head, Accelerator Division

Commercial Telephone No.: (312) 840-3245

FTS Telephone No.: 370-3245

**Name/Type of
User Facility:**

Fermilab Multiparticle Spectrometer (MPS)

Location:

Fermilab Meson Area, M6-West Beamline

**Brief Narrative
Description:**

The MPS is a spectrometer facility consisting of proportional wire chambers, spectrometer magnet, multicell Cerenkov counters, drift chambers, and calorimeters. To date five experiments have been run at the MPS, E-110, E-260, E-557, E-580, E-623. Users include university groups from Arizona, Caltech, Florida State, Indiana, Maryland, Notre Dame, UCLA, UICC, Serpukhov (USSR), Tufts, Vanderbilt, and VPI.

User Arrangements:

Proposals to use the MPS require the approval of the Director. The procedures for submitting a proposal are described in the booklet "Procedures for Experimenters" which can be obtained from the Users Office at Fermilab.

User Contact:

Name: Dan Green

Title: Physicist

Commercial Telephone No.: (312) 840-3104

FTS Telephone No.: 370-3104

**Name/Type of
User Facility:**

Fermilab Tagged Photon Spectrometer (TPS)

Location:

Fermilab Proton Area, P-East Beamline

**Brief Narrative
Description:**

The TPS is a spectrometer facility consisting of electron tagging, proportional wire chambers, spectrometer magnet, multicell Cerenkov counters, drift chambers, photon detectors, hadron calorimeters, and muon identifiers. To date two experiments have been run at the TPS, E-516 and E-612. Users include university groups from Colorado, UCSB, Rockefeller, and Toronto.

User Arrangements:

Proposals to use the TPS require the approval of the Director. The procedures for submitting a proposal are described in the booklet "Procedures for Experimenters" which can be obtained from the Users Office at Fermilab.

User Contact:

Name: Dan Green

Title: Physicist

Commercial Telephone No.: (312) 840-3104

FTS Telephone No.: 370-3104

**Name/Type of
User Facility:**

Neutrino Flux Monitoring Facility (NFM)

Location:

Fermilab Neutrino Area, Upstream Enclosures

**Brief Narrative
Description:**

The NFM facility consists of toroids and RF cavities to measure secondary particle flux, ion chambers and SWICs to measure secondary particle spatial distributions and muon rates from decays of secondary particles, and a Cerenkov counter to measure $\pi/K/p$ ratios. All experiments in the Neutrino Area require a measurement of the neutrino flux.

User Arrangements:

The Neutrino Flux Monitoring Facility is available to all approved neutrino experiments via the Fermilab controls system. Proposals for the Neutrino Area require the approval of the Director. The procedures for submitting a proposal are described in the booklet "Procedures for Experimenters" which can be obtained from the Users Office at Fermilab.

User Contact:

Name: Stephen Pordes

Title: Physicist

Commercial Telephone No.: (312) 840-3603

FTS Telephone No.: 370-3603

Fermilab Bubble Chamber Facility

15-foot bubble chamber at FERMI lab

**Name/Type of
User Facility:**

Fermilab Bubble Chamber Facility

Location:

Fermilab Neutrino Area, N. Beamline

**Brief Narrative
Description:**

The Fermilab 15' Bubble Chamber Facility consists of a cryogenic bubble chamber within a 3T magnetic field, an External Muon Identifier (EMI) and an Internal Picket Fence (IPF). Sufficient volumes of bubble chamber grade hydrogen, deuterium and neon to fill the chamber are stored at Fermilab. More than 20 university groups have used the 15' Bubble Chamber Facility for 13 experiments.

User Arrangements:

Proposals to use the Bubble Chamber Facility require the approval of the Director. The procedures for submitting a proposal are described in the booklet "Procedures for Experimenters" which can be obtained from the Users Office at Fermilab.

User Contact:

Name: Wes Smart

Title: Physicist

Commercial Telephone No.: (312) 840-3355

FTS Telephone No.: 370-3355

**Name/Type of
User Facility:**

Meson Experimental Area

Location:

Fermilab
Batavia, Illinois 60510

**Brief Narrative
Description:**

This area provides particle beams and research facilities for the 400 GeV (to become 1000 GeV) program. The individual beams currently available in this area are two accelerator energy proton beams and a mid-energy (≤ 200 GeV) test beam. General purpose charged hadron beams, a neutral beam, an additional test beam, and a polarized $p/\bar{p}$ beam, are being constructed.

User Arrangements:

All proposals to use the facilities at Fermilab require the approval of the Director. The procedures for submitting a proposal are described in a booklet "Procedures for Experimenters" which can be obtained from the Users Office at Fermilab.

User Contact:

Name: Roy Rubinstein

Title: Physicist

Commercial Telephone No.: (312) 840-4108

FTS Telephone No.: 370-4108

View of part of the first group of superconducting magnets in operation on a beam line.

**Name/Type of
User Facility:**

Neutrino Experimental Area

Location:

Fermilab
Batavia, Illinois 60510

**Brief Narrative
Description:**

This area provides particle beams and research facilities for the 400 GeV (to become 1000 GeV) program. The individual beams currently available in this area are: a neutrino beam, a charged hadron beam and two test beams. A muon beam and a beam-dump facility for prompt neutrino production are being constructed.

User Arrangements:

All proposals to use the facilities at Fermilab require the approval of the Director. The procedures for submitting a proposal are described in a booklet "Procedures for Experimenters" which can be obtained from the Users Office at Fermilab.

User Contact:

Name: Roy Rubinstein

Title: Physicist

Commercial Telephone No: (312) 840-4108

FTS Telephone No: 370-4108

**Name/Type of
User Facility:**

Proton Experimental Area

Location:

Fermilab
Batavia, Illinois 60510

**Brief Narrative
Description:**

This area provides particle beams and research facilities currently available for the 400 GeV (to become 1000 GeV) program at Fermilab. The beams available at this area are: a proton-east neutral beam (photons and neutrons); a proton-east electron beam for tagged photons; a proton-west charged hadron beam; and a proton-center charged hyperon beam or neutron / neutral hyperon beam.

User Arrangements:

All proposals to use the facilities at Fermilab require the approval of the Director. The procedures for submitting a proposal are described in a booklet "Procedures for Experimenters" which can be obtained from the Users Office at Fermilab.

User Contact:

Name: Roy Rubinstein

Title: Physicist

Commercial Telephone No.: (312) 840-4108

FTS Telephone No.: FTS 370-4108

Geothermal Test Facility (GTF)

Name/Type Geothermal Test Facility (GTF)
User Facility:

Location: Geothermal Test Facility
c/o WESTEC Services, Inc.
P.O. Box 791
Holtville, CA. 92250

Brief Narrative Description: The Geothermal Test Facility has been established to assist in the commercialization of the geothermal energy potential by providing geothermal fluid and supportive services for tests of heat extraction and energy conversion equipment and materials. It is located in the East Mesa area of California's Imperial Valley, 20 miles east of El Centro, California. Three geothermal fluid wells have been piped to the test pad to provide experimenters with a range of chemical characteristics for flexibility in testing. The usable space on the concrete pad designed for the placement of test equipment is about 80 feet by 160 feet, with a 15 foot wide access strip adjacent to the pad. There are four manifold arrangements for use by investigators. A chemical laboratory is also located at the GTF and is equipped with the following: atomic absorption spectrophotometer equipped for flame work; principal metal analysis with HGA furnace capability; gas chromatograph equipped with hot wire detector for non-condensable gases; and a scanning ultraviolet/visible dual beam spectrophotometer for various cation and anion determinations.

User Arrangements: Formal requests for use of the GTF should be made to A. J. Adduci, U.S. Department of Energy, San Francisco Operations Office, 1333 Broadway, Oakland, California 94612. Charges are assessed to experiments to cover utility costs.

User Contact: Name: A. J. Adduci

Commercial Telephone No.: (415) 273-7943

FTS Telephone No.: FTS 536-7943

Grand Junction Facility

The Grand Junction Office was established as the Colorado Raw Materials Office of the Atomic Energy Commission (AEC) in December 1947. Located on a 48.6 acre tract of land, south of Grand Junction, the Office's primary mission is to evaluate the potential uranium resources available in the U.S. Other areas of responsibility are: airborne radiometric surveys, calibration of borehole probes for ore reserves calculations, uranium-bearing land leasing, conducting uranium supply analysis studies and issuing long-term uranium supply forecasts. Uranium exploration equip-

ment aboard this Grumman S-2 Aircraft is being calibrated at DOE's Aerial Radiometric Calibration Facility at Walker Field. The calibration will allow geophysical service companies to measure low concentrations of uranium, thorium and potassium from an altitude of 400 feet.

Designated User Facility

Uranium Exploration Equipment Calibration Facilities

**Name/Type of
User Facility:**

Uranium Exploration Equipment Calibration Facilities

Location:

Primary facilities at Grand Junction, CO. Secondary facilities at Casper, WY; Spokane, WA; Reno, NV; Grants, NM; George West, TX; Morgantown, WV; Lake Mead, NV.

**Brief Narrative
Description:**

There have been few academic users, but the facilities are used routinely by the uranium exploration industry and more recently by the DOE Remedial Action Program (NE-24). The facilities consist of models containing distributed sources of the three naturally occurring radioelements and the models are of several types: "small pad" models for calibrating hand-held instruments, "large pad" models for calibrating vehicular or aircraft instruments, a large range for dynamically calibrating airborne instruments, and "borehole" models for calibrating borehole logging instruments. The models are designed principally for calibrating gamma ray measurement instrumentation but have been used for other types of instrumentation. Details and descriptions of the models are contained in the report "Field Calibration Facilities of Environmental Measurement of Radium, Thorium, and Potassium", report number GJ/TMC-01(82), available through NTIS.

**User Facility
Arrangements:**

The facilities are available to the public at all times during normal working hours. There are no fees and no restrictions other than declaring radioactive sources carried by the user. Users are requested to make schedule arrangements, prior to use, if neutron sources will be used.

**User Facility
Contact:**

Name: Dave George
Ken Kosanke

Commercial Telephone No.: (303) 242-8621, ext. 223 or 205

FTS Telephone No.: 322-9223 or 9205

Idaho National Engineering Laboratory

Idaho National Engineering Laboratory (INEL) has been the principal center for reactor safety testing since 1954. Three major test facilities, the Power Burst Facility (PBF), the Loss-Of-Fluid-Test (LOFT) and the Semiscale are continuing and expanding the scope of previous reactor studies. INEL also conducts programs in reactor fuels reprocessing, geothermal research, breeder reactor research, nuclear waste management, conservation, gas reactor safety, and other energy research programs. INEL is located in southeastern Idaho near Idaho Falls and is situated on some 572,000 acres.

Designated User Facilities

INEL Environmental Research Park

Other User Resources

Hot Cell Facilities
Thermal Hydraulics Experimental Facility

Power Burst Facility Reactor
Test and Evaluation Laboratory
Engineering Test Reactor
INEL Test Area North Hot Shop
Sodium Loop Safety Facility
Advanced Reactivity Measurement Facility
Coupled Fast Reactivity Measurement Facility
Materials Analysis Laboratory
On-Line Isotope Separator for Short-Lived Fission
Products Studies
Weld Diagnostics Laboratory
4 π B-Y Coincidence System for Precise Measure-
ment of Decay Rates of Radioactive Samples
A $\pi\sqrt{2}$, Iron-Free Magnetic Electron Spectrometer
Micro Raman Spectrometer
Spectrometry System for Precise Measurements of
Y-ray Intensities and Energies
Ultrasonic Fuel Scanner
The ESCA — Auger Spectrometer

**Name/Type of
User Facility:**

INEL National Environmental Research Park

Location:

Idaho National Engineering Laboratory
Idaho Falls, Idaho

**Brief Narrative
Description:**

A protected outdoor laboratory of approximately 560,000 acres is available for terrestrial and aquatic ecological and environmental research. The area is a cool desert, primarily shrub-steppe vegetation. Laboratory and office space are often available. Researchers from a variety of University, State and Federal agencies participate in the research. Over 45 scientists participated in 1982. Both short and long-term research is encouraged. Some funding and co-funding of projects is provided by the DOE.

**User Facility
Arrangements:**

Usually a proposal is required prior to using the NERP — whether or not DOE is participating in the funding. Users must abide by the various health and safety regulations. A short 2-4 hours orientation class is required. Usually no user fees are required.

**User Facility
Contact:**

Name: Dr. Doyle Markham

Title: Research Ecologist
DOE Idaho Operations Office

Commercial Telephone No.: (208) 526-2164

FTS Telephone No.: 583-2164

**Name/Type of
User Facility:**

Hot Cell Facilities

Location:

Idaho National Engineering Laboratory
Idaho Falls, Idaho 83401

**Brief Narrative
Description:**

Several large shielded hot cells with extensive capabilities for handling, testing, and examination of highly radioactive materials. Large Hot Shop permits work on large experiments, e.g. spent LWR fuel assemblies, large radioactive components. Other capabilities include remote machining, NDE, mechanical testing, gamma scanning, dimensioning, optical metallography, and scanning electron microscopy. Unique capabilities have been used by industry for characterization and failure analysis.

User Arrangements:

Costs are borne by user. Information on specific capabilities, costs, and availability can be obtained from office indicated below.

User Contact:

Name: R. E. Tiller

Title: Division Manager
Reactor Operations & Programs
DOE Idaho Operations Office

Commercial Telephone No.: (208) 526-1439

FTS Telephone No.: 583-1439

Hot Cell Facilities

**Name/Type of
User Facility:**

Thermal Hydraulics Experiment Facility

Location:

TAN
Idaho National Engineering Laboratory
Idaho Falls

**Brief Narrative
Description:**

The Two-Phase Flow Loop (TPFL) is a large, high-temperature, steam-water test system. The loop consists of four large steam-supply vessels that produce steam by centrifugal pump, a water-metering section, a steam-separator, and associated pressure and flow control valves. *The Blowdown Loop* is an experimental system designed for instrument and component testing and calibration, as well as for heat transfer conditions. The system simulates typical conditions encountered in loss-of-coolant experiments (LOCE). The major Blowdown Loop components include a pressure vessel, a test section, and a coolant injection system. Remotely controlled valves are installed in the system to allow flexibility in flow path selection. Piping provides a path for venting the blowdown effluent to the atmosphere or to a receiver tank supported on load cells. All testing is directed from the control room, which is separated from the test cell by a 1.5-m (5-ft) thick concrete wall.

The Blowdown Loop operates at a steady-state pressure of 15.5 MPa (2250 psi) and a temperature of 556 K (550 °F), and has a volume of 0.322 m³ (8.0 ft³) pressure vessel and has a quick opening blowdown valve (QOBV) that is capable of opening in 20 ms. Various break orifice sizes are available to control the fluid discharge rate. In this system, two different configurations, a small test loop and a large test loop, can be blown down. The test turnaround time for the system is very short. During a two-shift day of testing, three to five small-loop blowdowns and one large loop blowdown can be completed. Up to five of these test series can be performed weekly.

User Arrangements:

Case by case basis through arrangement with DOE-ID, Idaho Falls, ID

User Contact:

Name: R. E. Tiller

Title: Division Manager
Reactor Operations & Programs
DOE Idaho Operations Office

Commercial Telephone No.: (208) 526-1439

FTS Telephone No.: 583-1439

Power Burst Facility Reactor

**Name/Type of
User Facility:**

Power Burst Facility Reactor

Location:

INEL National Engineering Laboratory
Idaho Falls, Idaho

**Brief Narrative
Description:**

The Power Burst Facility is centered around a light water moderated reactor designed for up to 28 MW steady state or 270 GW burst operation in fuels research work. The high neutron flux region is a right circular cylinder about 0.2 meters in diameter and 1 meter long. Experiments are conducted within a high pressure central in-pile tube connected to an external loop. Heated, high pressure water is circulated through the loop and external equipment allows the generation of the specific environment to meet a wide variety of test conditions. A natural burst yields about 7×10^{17} nv peak neutron flux and a minimum asymptotic period of 1 ms. Reactor controls allow a variety of flux pulse shapes.

A wide assortment of instrumentation is used to record the experiment conditions and results with a high capacity data collection and display system.

The primary sponsor, the U.S. Nuclear Regulatory Commission, has conducted a wide variety of nuclear fuel behavior and fission product release experiments. A loss-of-coolant type experiment will be conducted for Atomic Energy of Canada, Limited and Ontario Hydro in 1983.

User Arrangements:

Time can be allocated for experiments in the Power Burst Facility in conjunction with the on-going test program. Any materials placed within the reactor in-pile tube would require analysis for compatibility. User fees would be on a cost recovery basis. Details of cost arrangements would be made with the Idaho Operations Office of the Department of Energy.

User Contact:

Name: R. E. Tiller

Title: Division Manager
Reactor Operations & Programs
DOE Idaho Operations Office

Commercial Telephone No. (208) 526-1439

FTS Telephone No. 583-1439

**Name/Type of
User Facility:**

Test and Evaluation Laboratory

Location:

Idaho National Engineering Laboratory
Scoville, Idaho

**Brief Narrative
Description:**

Environmental testing for pressure and temperature is accomplished utilizing the following equipment in the Temperature Test Facilities:

8 Ovens and Chambers — range from ambient to 1200°C

Vacuum Furnaces — the ultimate vacuum obtainable in the furnace chamber is approximately 2×10^{-6} torr. The maximum operating temperature is determined by the chamber atmosphere as follows:

- 1) 3000°C in vacuum
- 2) 2500°C in helium
- 3) 2000°C in Argon

6 Autoclaves — 5000 psig, 650°F

Pressure Transducer Test Facility — 100°F to 2192°F

Vibration Test System — The vibration test system includes a 200 force-pound (890 N-M) table, Unholtz Dickie Model 105, and associated instruments for sine wave testing. The exciter is air cooled and driven by vacuum tube power amplifier.

Flowmeter Calibration Facility — the system is a primary standard, traceable to NBS, with an accuracy of $\pm .05\%$ of reading.

Ambient Temperature Flow Loop Facility — ambient temperature water recirculating system used to characterize test articles in single phase flow.

High Temperature Flow Loop — 600°F, 2250 psig closed loop, single phase, recirculating system.

Contaminated Component Test Evaluation Facility — Facility consists of a 5 room 20 feet x 20 Feet x 8 feet high tent with positive ventilation system. Contaminated components and devices may be evaluated and calibrated in the contaminated state or may be decontaminated and evaluated.

User Arrangements:

No standing arrangements. Use would require negotiation and approval on a case-by-case basis.

User Contact:

Name: R. E. Tiller

Title: Division Manager
Reactor Operations & Programs
DOE Idaho Operations Office

Commercial Telephone No.: (208) 526-1439

FTS Telephone No.: 583-1439

Engineering Test Reactor (ETR) at the Test Reactor Area

Name/Descriptive Title: Engineering Test Reactor (ETR) at the Test Reactor Area

Location: Idaho National Engineering Laboratory

Brief Narrative Description: Status: The ETR Facility is presently inactivated.

Possible research uses: The ETR is a unique research reactor capable of sustained operation at 175 MW with limited over power transient capability on a case basis. In the past, the reactor has been used for research and development of light water reactor fuels, liquid metal fuels and specialized fuels and materials for DOD. Potential research for which the ETR is capable includes the research and development of improved light water reactor fuels, assessment of the safety of light water reactors during and after severe accidents, advance energy technology and safety experiments for fusion, gas cooled and liquid metal cooled test programs and production of radioisotopes for commercial and medical applications.

The ETR core is built of 3" X 3" fueled and core filler arrays with an active length of 36". This configuration allows great flexibility with space capability for several simultaneous experiments up to and including 9" diameter inpile tube.

The ample thermal and fast flux levels of the ETR allow flux and power profile tailoring to meet the demands of most experiment requirements.

User Arrangements:

Information on costs and availability can be obtained from the Department of Energy — Idaho Operations Office Manager listed below.

User Contact:

Name: R. E. Tiller

Title: Director, Reactor Opns. & Support Div.

Commerical Telephone No.: (208) 526-1439

FTS Telephone No.: 583-1439

**Name/Type of
User Facility:**

INEL Test Area North Hot Shop (TAN)

Location:

Idaho National Engineering Laboratory

**Brief Narrative
Description:**

The TAN Hot Shop is a shielded cell designed for remote handling of large radioactive components. The shop is 51 ft. wide by 165 ft. long by 35 ft. high. The walls are 7 ft. thick concrete. Shielded viewing is provided by 6 ft. thick glass windows filled with zinc bromide.

The hot shop is served by a variety of remote-operated handling equipment. The largest piece of equipment is the 150/15 bridge crane for moving heavy assemblies. This crane services the entire shop. A bridge-mounted overhead electromechanical manipulator (O-man) can also cover the entire shop. The manipulator can lift a 600 lb. load with its fingers and has a shoulder hook capable of supporting loads of up to 5000 lbs. Three wall-mounted manipulators are installed for light duty work. These manipulators can travel both horizontally and vertically along the hot shop walls and have jib booms which can be swung from the wall to the center of the shop. Two manipulators are installed on the south wall and one on the north wall. Window G, at the northwest corner of hot shop, contains heavy duty master-slave manipulators which can be used to work on objects at that window.

The hot shop contains a main door on its west end, capable of allowing heavy equipment to enter the hot shop. The floor loading for the shop is 250 lb/ft², but heavy concentrated loads can be located within the hot shop by positioning them over specific support areas.

If shipments are made by truck, the casks can be off-loaded directly in the hot shop. If shipments are made by rail, the shipping cask must be transferred to a transporter at the Central Receiving Area and then off-loaded in the hot shop.

The handling equipment described above is capable of performing a large variety of receiving and transfer operations. Casks can be lifted and off-loaded

at the hot shop using the 150-T crane. Either the 15-T bridge crane or the O-man can remotely lift and move a canister to the storage pool or to the RML at the east end of the shop. Decontamination operations can be performed within the hot shop on the cask or transporter, if required.

The hot shop is not a sealed alpha-containment facility. The seismic rating for the TAN-607 building conforms to the Uniform Building Code (UBC) Zone 2. The general condition of the hot shop is rated as good. A small area of the hot shop is presently being used to store TMI-2 EPICOR liners.

The TAN-607 storage pool adjoins the northeast end of the TAN hot shop. There is a pool vestibule in the hot shop where canisters can be lowered onto a truck located on rails in the bottom of the pool. Access to the main pool is gained by pulling the truck with a power winch from the vestibule to the main pool.

Possible research uses: Spent fuel, high level waste, toxic chemical waste and any other "special" or problem wastes handling and/or processing.

User Arrangements:

Information on costs and availability can be obtained from the Department of Energy — Idaho Operations Office Manager listed below:

User Contact:

Name R. E. Tiller

Title: Director, Reactor Opns. & Support Div.

Commerical Telephone No.: (208) 526-1439

FTS Telephone No.: 583-1439

**Name/Type of
User Facility:**

Sodium Loop Safety Facility (SLSF)

Location:

Idaho National Engineering Laboratory

**Brief Narrative
Description:**

This facility is used to test components for breeder reactor operations. It is made up of two systems: the Filling, Storage and Remelt System, and the Helium System. In the Filling, Storage, and Remelt Facility (FS&R) the in-pile loop is assembled, charged with sodium, and sealed. A vertical, shielded, electrically heated, cylindrical oven located within the test cell accommodates the loop during assembly. A sodium charging facility located on the main floor circulates and purifies sodium prior to charging the in-pile loop. The oven provides sufficient heating capability to maintain the sodium in the loop in a molten state. The Helium System provides the secondary coolant system for the heat produced within the in-pile loop. It was designed initially for a heat rejection of 1.5 MW. This is accomplished in an intermediate heat exchanger which is located at the top of the in-pile sodium loop and is integral with the loop. The primary sodium coolant, to which heat developed in the experiment is rejected, transmits its heat to the secondary coolant helium system via the loop (intermediate heat exchanger). The helium system in turn rejects its heat to a helium/water heat exchanger located in the shielded cubicle in the lower basement of the ETR.

Status: The SLSF is currently inactivated.

Possible research uses for the Filling, Storage and Remelt Facility includes the capability to test small components (Valves, etc.) in a sodium environment with less than 2 ppm oxide up to 1000° F. Helium System—Capable of testing components and instrumentation in an environment of 400° F, 250 psig, and 6600#/Sec mass rate of flow.

User Arrangements:

Information on costs and availability can be obtained from the Department of Energy—Idaho Operations Office Manager listed below.

User Contact:

Name: R. E. Tiller

Title: Director, Reactor Opns. & Support Div.

Commercial Telephone: (208) 526-1439

FTS telephone No.: FTS 583-1439

Sodium Loop Safety Facility (SLSF)

**Name/Type of
User Facility:**

Advanced Reactivity Measurement Facility (ARMF)

Location:

Idaho National Engineering Laboratory

**Brief Narrative
Description:**

The ARMF is a critical facility designed to do precise reactivity measurements. The core is 18" x 18" x 24" and composed of highly enriched uranium with aluminum-clad fuel plates. It is located in a light water canal and cooled by natural convection. It is licensed to operate up to 10 kW thermal power. Test positions are available inside fuel assemblies and in water holes up to a maximum of 6" x 6" in cross-sectional areas.

User Arrangements:

The ARMF is available upon request to DOE Idaho Operations Office. Counting and general laboratory facilities are located in the same complex. Quotations on user services will be provided on an individual basis.

User Contact:

Name: R. E. Tiller

Title: Division Manager
Reactor Operations & Programs
DOE Idaho Operations Office

Commercial Telephone No.: (208) 526-1439

FTS Telephone No.: 583-1439

**Name/Type of
User Facility:**

Coupled Fast Reactivity Measurement Facility (CFRMF)

Location:

Idaho National Engineering Laboratory

**Brief Narrative
Description:**

The CFRMF is a zoned-core low-power reactor. The central zone is made of highly depleted U-238. The neutron spectrum in the central zone is typical for a generic fast reactor and has been well characterized. The CFRMF is a benchmark neutron field for testing fast neutron cross-section data for dosimetry materials, fission products, and actinides. In addition irradiation positions are available in the outer thermal zone and a high-resolution neutron radiography facility is connected to the CFRMF. It is licensed to operate at 100 kW producing in-core flux levels up to 10^{12} n/cm² sec.

User Arrangements:

The CFRMF is available upon request to DOE Idaho Operations Office. Counting and general laboratory facilities are located in the same complex. Quotations on user services will be provided on an individual basis.

User Contract:

Name: R. E. Tiller

Title: Division Manager
Reactor Operations & Programs
DOE Idaho Operations Office

Commercial Telephone No.: (208) 526-1439

FTS Telephone No.: 583-1439

**Name/Type of
User Facility:**

Materials Analysis Laboratory

Location:

Idaho National Engineering Laboratory

**Brief Narrative
Description:**

Extensive capability for materials analysis including scanning Auger microprobe (with ESCA), scanning electron microscope with energy-dispersive x-ray analyzer, x-ray diffraction, transmission electron microscopy, optical metallography, Fourier transform infrared, spectrophotometer, and UV-VIS-NIR spectrophotometer.

User Arrangements:

Costs are borne by user. Information on costs and availability can be obtained from office indicated below.

User Contact:

Name: R. E. Tiller

Title: Division Manager
Reactor Operations & Programs
DOE Idaho Operations Office

Commercial Telephone No.: (208) 526-1439

FTS Telephone No.: 583-1439

**Name/Type of
User Facility:**

**On-Line Isotope Separator for Short-Lived Fission-Product
Studies**

Location:

Idaho National Engineering Laboratory
P.O. Box 1625
Idaho Falls, Idaho 83415

**Brief Narrative
Description:**

This facility has been developed for the on-line study of the decay properties of short-lived fission-product nuclides. The isotope separator is a Nucletec machine, with a 100-kV acceleration potential and a 90-degree bending magnet. The fission products are produced from spontaneous fission of "open" ^{252}Cf samples containing a total of ~ 1.6 mg of Cf and are carried from a shielded cell to the ion source of the isotope separator via a He-jet transport system. Instrumentation of the collector portion of the separator to permit nuclear spectroscopic measurements of individual fission-product nuclides is scheduled for completion in 1983.

User Arrangements:

This facility is currently being utilized for programmatic research within the Nuclear Physics Branch of EG&G Idaho at the INEL. No formalized procedures have been established for outside user participation, but requests to carry out experiments in this facility will be considered on a case by case basis. No laboratory funding is presently available to support work by outside users. A DOE Access Authorization (L or Q clearance) for participants is desirable, although arrangements can usually be made for those not having such a clearance.

User Contact:

Name: R. E. Tiller

Title: Division Manager
Reactor Operations & Programs
DOE Idaho Operations Office

Commercial Telephone No.: (208) 526-1439

FTS Telephone No.: 583-1439

**Name/Type of
User Facility:****Weld Diagnostics Laboratory****Location:**

Idaho National Engineering Laboratory

**Brief Narrative
Description:**

The welding diagnostics laboratory is devoted to temporal characterization of heat and mass transport in welding. The endeavors include temperature distributions using an optical multichannel analysis system interfaced to an emission spectrograph for arcs, interfacial and base metal temperature measurements (greater than 2000 K) using infrared thermography; flow dynamics and gas density using high-speed holographic interferometry; and gas velocity measurements using laser Doppler velocimetry.

User Arrangements:

Costs are borne by user. Information on cost and availability can be obtained from office indicated below.

User Contact:

Name: R. E. Tiller

Title: Division Manager
Reactor Operations & Programs
DOE Idaho Operations Office

Commercial Telephone No.: (208) 526-1439

FTS Telephone No.: 583-1439

Name/Descriptive Title: **$4\pi\beta-\gamma$ Coincidence System for Precise Measurement of Decay Rates in Radioactive Samples****Location:**

Idaho National Engineering Laboratory

**Brief Narrative
Description:**

This instrument is a $4\pi\beta\gamma$ coincidence system which can be used to determine the disintegration rate of samples or dried aliquots of solutions. Measurement uncertainties of approximately 0.5% are typical. This system can be used in either a conventional mode or in a high-count-rate mode which allows accurate measurements of sources with strengths up to $\sim 10^9$ dis/sec.

Status:

Presently being upgraded.

Possible research uses:

Determination of disintegration rate of samples of beta-decaying radionuclides.

User Arrangements:

Information on costs and availability can be obtained from the Department of Energy—Idaho Operations Office Manager listed below.

User Contact:

Name: R. E. Tiller

Title: Director, Reactor Opns. & Support Div.

Commercial Telephone No.: (208) 526-1439

FTS Telephone No.: 583-1439

Name/Descriptive Title:

A $\pi\sqrt{2}$ Iron-Free Magnetic Electron Spectrometer

Location:

Idaho National Engineering Laboratory

**Brief Narrative
Description:**

This instrument is a $\pi\sqrt{2}$, iron-free magnetic electron spectrometer of the Chalk River design with an optic circle radius of 35 cm. It is capable of measuring electron and positron spectra up to ~ 3.3 MeV with a resolution of from 1 to 0.01%. The spectrometer uses a computer to automatically operate and monitor the system. The instrument is housed in a specially constructed iron-free facility which has a heating/cooling system and coils to cancel the earth's magnetic field. (Described in detail in U.S. ERDA Report ANCR-1179.)

Status:

Presently on inactive status. Some electronic and mechanical components are in use elsewhere and would need to be replaced.

Possible research uses:

Measurements of internal-conversion electron spectra and continuous beta or positron spectra. Atomic and solid state structure studies by means of electron spectroscopy (ESCA). Production of monoenergetic electrons.

User Arrangements:

Information on costs and availability can be obtained from the Department of Energy—Idaho Operations Office Manager listed below.

User Contact:

Name: R. E. Tiller

Title: Director, Reactor Opns. & Support Div.

Commercial Telephone No.: (208) 526-1439

FTS Telephone No.: 583-1439

Name/Descriptive Title: **Micro Raman Spectrometer**

Location: Idaho National Engineering Laboratory

**Brief Narrative
Description:**

The Micro Raman Spectrometer, sold under the commercial name of MOLE, applies the Raman effect to material investigation on a scale down to one micrometer. As little as a picogram of Raman active material can be identified. The system also has a sample chamber for macro Raman investigation and can be used for liquids, gases or solids encapsulated in salts.

Status:
Operational.

Possible research uses:
Identification of chemical compounds, crystalline structure and crystal orientation.

User Arrangements: Information on costs and availability can be obtained from the Department of Energy—Idaho Operations Office Manager listed below.

User Contact: Name: R. E. Tiller

Title: Director, Reactor Opns. & Support Div.

Commercial Telephone No.: (208) 526-1439

FTS Telephone No.: 583-1439

Name/Descriptive Title: **A Spectrometry System of Precise Measurements of Y-ray Intensities and Energies**

Location: Idaho National Engineering Laboratory

**Brief Narrative
Description:**

Two Ge semiconductor detectors provide a capability for precise γ -ray energy and emission-rate measurements. The efficiencies of these detectors have been calibrated for γ -ray energies from 30 to 2800 keV. The estimated uncertainties in the intensity data for point sources varies from 2% below 85 keV to 0.5% from 400 to 1400 keV.

Status:
Operational.

Possible research uses:
Precise γ -ray emission rates of radioactive samples.

User Arrangements: Information on costs and availability can be obtained from the Department of Energy—Idaho Operations Office Manager listed below.

User Contact: Name: R. E. Tiller

Title: Director, Reactor Opns. & Support Div.

Commercial Telephone No.: (208) 526-1439

FTS Telephone No.: 583-1439

Name/Descriptive Title: **Ultrasonic Fuel Scanner**

Location: Idaho National Engineering Laboratory

Currently located in Canoga Park, CA, at Rockwell International, eventually to be moved to the Test Reactor Area.

**Brief Narrative
Description:**

Two years have demonstrated the usefulness of an ultrasonic scanning system designed and developed at the Idaho National Engineering Laboratory (INEL) for inspecting fuel plates for experimental nuclear reactors.

During this time, the scanner has been used to inspect fuel plates at INEL's Advanced Test Reactor (ATR) and at experimental reactors at several universities, including the Massachusetts Institute of Technology and the University of Missouri.

The ultrasonic inspection is performed to ascertain whether the cladding over the fuel is of the proper thickness.

Able to detect fuel particles as small as 0.002 inch, the scanning system is a one-of-a-kind in the industry. It employs two transducers which emit ultrasonic signals to collect some four million data points for each fuel plate inspected. For a single plate, this is accomplished in about five minutes.

One of the unusual aspects of the scanner is the six-ton granite tank used to provide the extreme stability needed for the scanning mechanism. The tank, which was fabricated by a tombstone manufacturer, helps to maintain the distance from the transducer to the fuel plate to within 0.004 inch during highspeed scanning. The tank is eight feet long and three feet deep and has walls six-inches thick.

Status:

The use of the scanner can be coordinated with its scheduled use for inspecting fuel plates at the Babcock and Wilcox facility in Lynchburg, VA; however, the end location for this equipment will most likely be at the INEL.

Possible research uses:

Inspection of ceramic material for material characterization; also used to supplement inspections using the acoustic microscope especially for items of large size and when faster scanning rates would be desirable.

User Arrangements:

Information on costs and availability can be obtained from the Department of Energy—Idaho Operations Office Manager listed below.

User Contact:

Name: R. E. Tiller

Title: Director, Reactor Opns. & Support

Commercial Telephone No.: (208) 526-1439

FTS Telephone No.: 583-1439

**Name/Type of
User Facility:**

The ESCA-Auger Spectrometer

**Location
(Laboratory Site):**

Idaho Chemical Processing Plant
Idaho National Engineering Laboratory
Idaho Falls, Idaho 83401

**Brief Narrative
Description:**

The ESCA-Auger Spectrometer can be used to determine and characterize the elements and chemical composition present in the outer few layers of atoms on a material (0.5–2.5 nm). Fast, high sensitivity analyses of surface constituents can be prepared. This technique can provide accurate quantitative data as well as chemical bonding information. A scanning Auger Microscope also is available to provide significantly more detailed information on surface composition. This facility interfaces with a complete inorganic analytical laboratory.

User Arrangements:

Arrangements for use must be made on a case-by-case basis through the Idaho Operations Office of the Department of Energy.

User Contact:

Name: J. P. Hamric

Title: Division Manager
Nuclear Fuel Cycle and
Waste Management Division
DOE Idaho Operations Office

Commercial Telephone No.: (208) 526-1395

FTS Telephone No.: 583-1395

Lawrence Berkeley Laboratory

The major role of the Lawrence Berkeley Laboratory is to conduct basic research programs that are appropriate for an energy research laboratory but not suited to the program goals or resources of a university campus. Thus, the development and utilization of large experimental facilities is emphasized, and the interdisciplinary team approach to research is stressed. Lawrence Berkeley Laboratory is a multi-program laboratory with major programs in areas including Accelerator and Fusion Research, Biology and Medicine, Materials and Molecular Research, Nuclear Science, Earth Science, Chemical Biodynamics, Energy and Environment, Physics, Computer Science and Mathematics. The laboratory is located in Berkeley, California.

Designated User Facilities

Bevalac
88-Inch Cyclotron
National Tritium Labeling Facility
The National Center for Electron Microscopy
SuperHILAC

Other User Resources

Neutral Beam Engineering Test Facility
Heavy Charged Particle Treatment Facility
2.5 MeV Van de Graaff Facility

Bevalac Accelerator Complex

The Bevalac at LBL provides at very high (relativistic) energies ions as heavy as uranium. The arrow shows the path of the ions, which are produced and accelerated at the SuperHILAC (rear), then steered through a transfer line into the Bevatron (the circular building in the foreground).

**Name/Type of
User Facility:**

Bevalac Accelerator Complex

Location:

Lawrence Berkeley Laboratory
University of California
Berkeley, CA 94720

**Brief Narrative
Description:**

The proximity of two existing accelerators at LBL—the SuperHILAC and the Bevatron—has permitted a combination of accelerator capabilities which is not available anywhere else in the world. This combined accelerator system is called the Bevalac. The Bevalac is operated as a national research facility for studies in nuclear and atomic physics, biophysics, nuclear chemistry, biomedicine, and astrophysics. One third of the Bevalac operating time is in support of biomedical research.

The Bevalac has recently completed several large detector facilities. Among them are: (a) HISS, a very large volume superconducting magnetic spectrometer system; (b) the plastic ball and wall, a United States/West German jointly-funded multiplicity detector with over 1000 detector elements; (c) TASS, a two armed magnetic spectrometer system; (d) a pion detector system jointly funded by the United States and Japan; (e) LEBL, a beam line designed to host a variety of experiments at the lower energies; and (f) a magnetically surrounded streamer chamber which is used by several experimental groups.

The Bevalac supports research programs in: (1) peripheral fragmentation reactions and studies of internal momentum; (2) central collisions that create nuclear matter complexes under extreme conditions of compression and temperatures; (3) production mechanisms of pions, kaons, hyperons, and antiparticles in nuclear matter; and (4) creation of new forms of matter such as pion condensates, nuclear isomers, and the "anomalon."

The Bevalac scientific program has been able to delve deeply into new regions of nuclear equations of state by making high-temperature (100 MeV or 10^{12} K) compressed matter. Measurements have been made to the size of "hot spots" created when heavy nuclei collide. Evidence has been found at the Bevalac for an exotic reaction product that interacts 10 times more strongly than does ordinary matter. This possible new state of nuclear matter has been called the "anomalon." Studies of central collisions of relativistic heavy ions have uncovered a puzzle in the production of mesons. Pions (pi mesons) are produced several times less abundantly than predicted, but the strange and rare kaons (K mesons) are produced several times more copiously than expected.

User Arrangements:

Time allocation by Program Advisory Committee, which advises the LBL Director on approval and scheduling of experiments. There are no user fees for the basic research done on the Bevalac. Fraction of beam time to outside users: 50%

User Contact:

Name: Dr. Howell G. Pugh

Title: Scientific Director

Commercial Telephone No.: (415) 486-4119

FTS Telephone No.: 451-4119

88-Inch Cyclotron

The experimental area of the 88-inch cyclotron at LBL.

**Name/Type of
User Facility:**

88-Inch Cyclotron

Location:

Lawrence Berkeley Laboratory
University of California
Berkeley, California 94720

**Brief Narrative
Description:**

The 88-inch Cyclotron is a multipurpose facility available to scientists from LBL and from outside the Laboratory. The facility consists of a sector-focused cyclotron which began operation in 1963 for both heavy and light ion beams. It has an atomic-beam polarized ion source capable of providing microamperes of polarized protons and deuterons. Heavy ion beams are provided by an internal Penning Ion Gauge source and a newly installed external Penning Ion Gauge source, with the planned addition of an Electron Cyclotron Resonance high charge state source. The maximum energy for protons is 55 million electron volts (MeV) while the energy constant for heavy ions is 160 MeV. The cyclotron delivers beams to a wide variety of experimental apparatus including a new, large volume scattering chamber; a high resolution magnetic spectrometer system; a time-of-flight arm; high radioactivity cave; and an on-line, recoil atom mass analyser (RAMA) for the study of exotic nuclei. Two ModComp computers are available for data acquisition and off-line data analysis.

The basic research program is focused in four major areas: (1) study of few nucleon systems and fundamental aspects of nucleon-nucleon force using beams of polarized protons and deuterons; (2) investigation of heavy ion reaction mechanisms over a wide range of energy up to 35 MeV per atomic mass units (AMU); (3) production and study of exotic nuclei far from stability; and (4) structure of nuclei at high angular momentum.

In addition to the above, the cyclotron provides beams for the application of nuclear techniques to other areas of research including biology and medicine, ^{14}C dating, and the study of cosmic-ray damage to satellite electronic components.

User Arrangements:

User fees depend on the nature of, and the support for, the proposed research. Scheduling is done by the Cyclotron's staff following advice from an outside advisory committee. Fraction of beam time to outside users: 25%

User Contact:

Name: Dr. Claud Lyneis
Dr. Robert Stokstad

Title: Staff Senior Scientists

Commercial Telephone No.: (415) 486-5088

FTS Telephone No.: 451-5088

**Name/Type of
User Facility:**

National Tritium Labeling Facility

Location:

Lawrence Berkeley Laboratory
University of California
Berkeley, California 94720

**Brief Narrative
Description:**

For several years a tritium-labeling facility has been in operation at the Lawrence Berkeley Laboratory (LBL). It has been used to prepare high specific activity ^3H labeled compounds to further the biologically oriented research of many laboratories. The facility is also used for research into the mechanisms by which tritium atoms are incorporated into bio-organic compounds. The facility is equipped to handle safely up to 10,000 curies of T_2 , making it unique in the nation. It is also equipped to achieve tritium labeling by several techniques, such as exchange, catalytic hydrogenation, and microwave discharges in T_2 .

During the past 2-3 years, requests to use the facility have come from researchers all over the nation; these requests have outstripped the capacities of the LBL personnel and equipment. It is apparent that an ability to meet this rising demand for high specific activity tritiated compounds would be a considerable service to the nation's research in biology and biochemistry. It was therefore proposed that the facility be expanded to make it a national facility for tritium research and for tritium-labeling services that are not available commercially.

The proposed facility has now been funded by the NIH. It enables researchers to come from all over the nation, to take part in tritium research, to consult with tritium-labeling experts regarding the best method for tritium incorporation into biologically valuable compounds, to carry out the labeling under close supervi-

sion, and to purify the labeled compound to a degree suitable for research in the home laboratory. This effort is conducted simultaneously with a research program designed to add to our knowledge of tritiation reaction mechanisms.

User Arrangements:

Time allocation by facility staff; open to all qualified investigators. User fees have been established for Federal and non-Federal users.

User Contact:

Name: R. M. Lemmon

Title: Principal Investigator

Commercial Telephone No.: (415) 486-4532

FTS Telephone No.: 451-4532

The main laboratory of the National Tritium Labeling Facility

The National Center for Electron Microscopy

**Name/Type of
User Facility:**

The National Center for Electron Microscopy

Location:

Lawrence Berkeley Laboratory
University of California
Berkeley, CA 94720

**Brief Narrative
Description:**

The National Center for Electron Microscopy is a user-oriented facility designed to make available a wide range of microstructural and microchemical characterization techniques for concentrated application to materials problems. Its first year of operation, 1981, has seen the installation of the High-Voltage Electronic Microscope (HVEM), the most powerful and versatile such instrument in the United States. Capable of operation at a beam energy of 1.5 MeV, the HVEM's major advantage is that it can penetrate more deeply into materials than can other electron microscopes, providing images previously thought unattainable. The Center has other equipment available such as a variable voltage 400 kV to 1 MeV atomic resolution microscope, two analytical transmission electron microscope instruments with both energy dispersive x-ray and electron energy loss spectrometers, and two experimental transmission electron microscopes for development work and design modification. Specimen preparation facilities include vacuum evaporation, sputtering, and ion-beam milling; an optical diffractometer; a scanning microdensitometer; a microcomputer with interface and peripherals for communicating with the LBL mainframe; and all necessary darkroom and photographic equipment.

User Arrangements:

No user charges are levied provided that the proposed work is of documented programmatic interest to DOE and the results are published in the open literature; otherwise full cost recovery is charged. Time allocation is the responsibility of the Facility Manager. Criteria for accepting research proposals are established by an outside Steering Committee.

User Contact:

Name: Dr. K. H. Westmacott

Title: HVEM Manager

Commercial Telephone No.: (415) 486-5663

FTS Telephone No.: 451-5663

SuperHILAC

The SuperHILAC, shown here during modifications, without its normal shielding.

Name/Type of User Facility:	SuperHILAC
Location:	Lawrence Berkeley Laboratory University of California Berkeley, CA 94720
Brief Narrative Description:	<p>IN 1974, the injector capability of the SuperHILAC (built in 1972 from the earlier HILAC) was combined with the high energy capability of the Bevatron (LBL's weak focusing proton synchrotron built in 1954). Ions from carbon (12 atomic mass units (AMU)) to uranium (238 AMU) are accelerated to energies up to 8.5 million electron volts (MeV) per AMU at the SuperHILAC. Beams of three different ions can be produced on a pulse-to-pulse basis and delivered to one or two experiments at the SuperHILAC or delivered to Bevatron researchers at energies up to 2.1 GeV per AMU. Upon completion of a \$6.5 million construction project in FY 1982, operation of the Bevalac with beams of uranium (the heaviest naturally occurring element) began.</p> <p>The SuperHILAC research program focuses on: (1) discovery and evaluation of new elements with more than 100 protons; (2) investigation of partial equilibration in very heavy systems via deep inelastic scattering; and (3) measurement of band structure and properties of very high spin states in very heavy nuclei.</p> <p>The SuperHILAC has long been the United States' vanguard of discovery of new heavy elements, such as ^{102}No and ^{103}Lr, in strong competition with a U.S.S.R. effort at JINR, Dubna, and, more recently, a West German effort at the UNILAC. A pioneering and continuing program in damped reactions is illuminating the processes by which two massive nuclei in close proximity transfer energy, angular momentum, mass, and charge between them.</p> <p>The SuperHILAC program will continue with increased emphasis on the heaviest projectiles. Explanations for the mass, energy, and charge transfers and better characterization of nuclear collective bands will be evoked for comparisons with nuclear model calculations. Attempts to produce superheavy elements will be pursued based on recent theoretical developments in our understanding of the fusion process.</p>
User Arrangements:	Time allocations made by the Program Advisory Committee which advises the LBL Director on approval and scheduling of experiments. There are no user fees for the basic research done on the SuperHILAC. Fraction of beam time to outside users: 60%
User Contact:	<p>Name: Dr. Richard Diamond</p> <p>Title: Scientific Director</p> <p>Commercial Telephone No.: (415) 486-5720</p> <p>FTS Telephone No.: 451-5720</p>

**Name/Type of
User Facility:**

Neutral Beam Engineering Test Facility

Location:

Lawrence Berkeley Laboratory
University of California
Berkeley, CA 94720

**Brief Narrative
Description:**

LBL, in its work on neutral beam injectors, has developed the positive ion sources and beam lines for the TFTR (120 kV) fusion experiments, both of which require 0.5-sec pulses. The emphasis is now on longer pulse lengths, specifically an 80-kV, 40-A, 30-sec source for MFTF-B, and a 120-kV, 40-A, 30-sec source for the TFTR upgrade. This development of long-pulse sources requires advanced test facilities. The Neutral Beam Engineering Test Facility is capable of providing power, beam stops, and diagnostics for beams up to 120 kV, 65 A, 30 sec with a 10% duty cycle. Its first mission is the evaluation of long-pulse MFTF-B sources developed at LBL and ORNL.

User Arrangements:

Requests to use the NBETF should be directed to Klaus Berkner of the LBL Accelerator and Fusion Division. A steering committee composed of representatives from LBL, Princeton, General Atomics, and LLNL provides oversight and advice on the use of the NBETF.

User Contact:

Name: Klaus Berkner

Title: Director NBETF

Commercial Telephone No.: (415) 486-5501

FTS Telephone No.: 451-5501

**Name/Type of
User Facility:**

Heavy Charged-Particle Treatment Facility

Location:

Lawrence Berkeley Laboratory
University of California
Berkeley, CA 94720

**Brief Narrative
Description:**

The Heavy Charged-Particle Treatment Facility is used to benefit certain cancer patients who have been referred to LBL by individual physicians and groups of physicians. The medical staff at LBL reviews each case with the patient's physician to determine whether or not this type of radiotherapy is warranted. If the treatment seems to be appropriate, the therapy is planned and carried out by the specialized LBL medical staff. Both the 184-Inch Cyclotron and the Bevalac are used in these treatments.

User Arrangements:

Proposals to use the Facility are submitted to the LBL Division of Biology and Medicine. Cooperative clinical trials are coordinated with the Northern California Oncology Group, the National Therapy Oncology Group, and the Surgical Oncology Group of the Veterans Administration hospitals.

User Contact:

Name: John Ainsworth

Title: Director

Commercial Telephone No: (415) 486-5394

FTS Telephone No.: 451-5394

**Name/Type of
User Facility:****2.5 MeV Van de Graaff Facility****Location:**

Lawrence Berkeley Laboratory
University of California
Berkeley, CA 94720

**Brief Narrative
Description:**

This facility is available to outside users for applications that involve a variety of positive ions at accelerated energies from 300 keV to 2.5 MeV. The machine is currently configured for acceleration of protons, alphas, and ^3He ions, although other heavier gaseous sources can be accommodated for specific projects. A complete facility for Rutherford backscattering spectroscopy (RBS) is available for surface analysis and channeling studies. The system can be modified to perform proton-induced x-ray fluorescence analysis (PIXE), if necessary. Current outside users include University of California faculty members and a number of groups representing semiconductor companies in the area. Activities include the study of ion-implanted layers in semiconductor materials and the characterization of semiconductor surfaces under various fabrication processes.

User Arrangements:

Information regarding the Facility, and procedures for its use, is available from Dr. Joseph Jaklevic, Building 70A, LBL.

User Contact:

Name: Dr. Joseph Jaklevic

Title: Director

Commercial Telephone No.: (415) 486-5647

FTS Telephone No.: 451-5647

Los Alamos National Laboratory

Los Alamos National Laboratory (LANL) is a multiprogram facility encompassing approximately 37 square miles of Los Alamos County in New Mexico, 200 miles north of Albuquerque. LANL was established in 1943 as Site Y of the U.S. Army's Manhattan Engineer District to design, construct, and (for one design) test World War II atomic bombs. In 1947, the site was renamed Los Alamos Scientific Laboratory and in 1981 was renamed Los Alamos National Laboratory. In the weapons area, LANL has retained responsibility for developing nuclear warheads, designing and testing advanced technology concepts, and conducting research programs. LANL also works in other fields such as advanced nuclear reactor designs, nuclear science research, conservation, environmental and safety areas, fossil energy, geothermal energy, and solar heating and cooling.

Designated User Facilities

National Flow Cytometry and Sorting Research
National Stable Isotopes Resource
Weapons Neutron Research Facility
Clinton P. Anderson Meson Physics Facility
National Genetic Sequence Data Bank
Los Alamos National Environmental Research Park

Other User Resources

Ion Beam Research Facilities
Omega West Reactor
Automated Mass Spectrometer for Isotopic Nitrogen
Laser and Laser Spectroscopy Facilities
Laser-Based Optical Instrumentation
R&D Support-Mechanical Fabrication
Atmospheric Light Detection & Ranging Facility
Ionospheric High Frequency Radar Facility
High Altitude Instrument Platform
Heavy Methane Atmospheric Tracer System
Instrument Sonde Test Facility
Oil Shale Test Retort
Rock Mechanics: High Pressure Creep Apparatus
Rock Mechanics: Large Volume Apparatus
Radiation Instrument Calibration
Medical Radioisotopes Resource
Exotic Radioisotopes for Physical Science Analysis
Standard Graphite Pile Neutron Source Calibration Facility
Deep Wellbore Equipment Test Station
Plasma Calibration Facility
Solar Wind Plasma Data
Radio Frequency (RF) Power Sources
Los Alamos Geostationary Orbit Synoptic Data
Base on Energetic Particles

**Name/Type of
User Facility:**

**National Flow Cytometry and Sorting Research Resource
(NFCR)**

Location:

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

**Brief Narrative
Description:**

The National Flow Cytometry Resource (NFCR) is funded by the Division of Research Resources of the National Institute of Health and the Department of Energy. It is designed to make state-of-the-art flow cytometric instrumentation available to the biomedical research community. Flow cytometry uses electro-optical techniques to provide quantitative analyses of various cell properties which are sequentially studied in a continuous flow system. On the basis of these measured properties, the cells may then be physically isolated for their use in various biological studies. Cells and subcellular constituents, such as chromosomes, can be analyzed and sorted at rates of up to a few thousand per second. Unique capabilities either exist or are being established in the following areas: chromosomes image analysis and sorting, high resolution analysis, super high speed sorting, and multilaser excitation systems. The facilities are used for a series of user and collaborator generated studies and applications. On-site experts work directly with these individuals to elaborate new and demanding techniques, and to train them in the use of the instrumentation. Techniques include: analysis of fluorescence polarization; kinetic measurements; correlated data analysis procedures; high resolution DNA studies; straining protocol development; fluorescence distribution analysis and multiparameter procedures. Research fields include immunology, cell biology, gerontology, tumor biology, infectious disease, parasitology, molecular biology, and radiobiology. Biomedical research investigators from around the nation are involved in the use and management of this user designated facility.

User Arrangements:

The facility and the resource staff are available to assist biomedical research investigators and to respond to unique research requirements. Pilot projects are approved by a local review committee, major projects are reviewed by an external advisory committee.

User Contact:

Name: Dr. L. Scott Cram

Title: Director, National Flow Cytometry Resource

Commercial Telephone No.: (505) 667-2785

FTS Telephone No.: 843-2785

**Name/Type of
User Facility:**

National Stable Isotopes Resource

Location:

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

**Brief Narrative
Description:**

The National Stable Isotope Resource (SIR) is operated as part of the larger isotopes of Carbon, Oxygen and Nitrogen (ICONS) Program at the Los Alamos National Laboratory. The ICONS program encompasses: the production of large quantities of isotopes separated by the low temperature distillation of carbon monoxide and nitric oxide; the development of efficient synthetic methods for the incorporation of the isotopes into complex molecules; the improvement of

techniques—especially nuclear magnetic resonance (NMR) and mass spectroscopy—for the analysis of isotopically-labeled compounds and participation with extramural investigators in cooperative research and development program to develop the utility of stable isotopes in the biosciences and in environmental studies.

User Arrangements:

The SIR is available to properly accredited biomedical investigators through formal proposals which are reviewed and given a priority ranking based on scientific merit, relevance to the objectives of the SIR, and the capacity of the resource. Materials which are available commercially are not supplied by the Resource.

The advisory committee is composed of biomedical investigators extramural to the Los Alamos National Laboratory, representing the following fields: medicine, pharmacology, biochemistry, organic chemistry and natural products, nuclear magnetic resonance spectroscopy and mass spectrometry.

User Contact:

Name: Dr. R. E. London

Title: Staff Member
Inorganic and Structural Chemistry Group

Commercial Telephone No.: (505) 667-5324

FTS Telephone No.: 843-5324

Weapons Neutron Research Facility

The High-Resolution Proton Spectrometer at the Los Alamos Meson Physics Facility

**Name/Type of
User Facility:**

Weapons Neutron Research Facility

Location:

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

**Brief Narrative
Description:**

The Weapons Neutron Research (WNR) Facility is a pulsed spallation neutron source used to study neutron interactions both in the materials science and nuclear physics disciplines. At WNR, a portion of the 800-MeV proton beam from the Clinton P. Anderson Meson Physics Facility is used to bombard a target and produce an intense white-neutron source. By choosing different target and moderator configurations and by varying the proton pulse structure, the WNR can provide neutrons with energies spanning the range from a few MeV to several hundred MeV. The capability of the WNR will be enhanced by the addition of a proton storage ring (PSR) presently under construction and scheduled for operation in 1986. The PSR will be able to alter the intensity, time structure and repetition rate of the WNR proton pulse and will increase the present neutron intensity by as much as a factor of 1000 for some experiments.

The nuclear physics facilities at WNR presently consist of four flight paths for neutron time of flight (TOF) studies. These flight paths may have experiments located at distances from five to several hundred meters to optimize the experimental resolution and counting rate. In general, fast neutron experiments are performed using individual micropulses (200 ps FWHM) with time spacings from 1.0 to 500 μ s (micropulse mode). Lower energy neutrons are produced using a moderated system and proton pulses from 0.1 to eight μ s in duration (microsecond mode).

The Weapons Neutron Research/Proton Storage Ring (WNR/PSR) Facility at Los Alamos is a pulsed spallation neutron source with especially useful capability for neutron scattering research in materials science and chemistry. By 1985, it will provide the world's highest peak thermal neutron flux (10^{16} n/cm²-s) for neutron scattering experiments on materials by time-of-flight methods. It is already a source of epithermal neutrons superior to the best research reactors. Instrumentation available at present includes a filter difference spectrometer for vibrational spectroscopy by inelastic neutron scattering, a Laue TOF single crystal diffractometer and a general purpose diffractometer for structural studies of liquids, amorphous materials and crystalline powders.

User Arrangements:

Collaboration with members of the Laboratory is strongly encouraged to outside users proposing experiments.

A formal user program has been initiated for Neutron Scattering Research. Interested scientists should contact the Neutron Scattering Group Leader for further information.

User Contact:

Name: Dr. Paul W. Lisowski

Name: Dr. Richard Silver

Title: Asst. Group Leader
Nuclear Physics Group

Title: Group Leader
Neutron Scattering

Commercial Telephone No.:
(505) 667-7106

Commercial Telephone No.:
(505) 667-3631

FTS Telephone No.: 843-7106

FTS Telephone No.: 843-3631

Clinton P. Anderson Meson Physics Facility (LAMPF)

Aerial View of Clinton P. Anderson Meson Physics Facility (LAMPF)

**Name/Type of
User Facility:**

Clinton P. Anderson Meson Physics Facility (LAMPF)

Location:

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

**Brief Narrative
Description:**

LAMPF is a national facility which provides a high-intensity proton beam of variable energy up to 800 MeV. This beam may be used directly to supply protons for experimental research, or used to produce a prolific supply of subatomic research particles known as mesons. LAMPF splits its beam and directs portions of it to several experimental areas in such a way that as many as a dozen experiments using both protons and mesons can operate simultaneously.

Facilities are available for experiments in nuclear, particle, and atomic physics, solid-state physics, nuclear chemistry, isotope production, radiation effects, and radiobiology. These facilities are too numerous to describe in detail, but their principal features are pointed out here. That is followed by an illustrative list of less-well-known user facilities that may be of particular interest to persons outside the current LAMPF Users Group who are seeking irradiation services.

More detail on all these facilities may be found in the descriptive publication, "LAMPF" (LALP-82-5), and a precise description of requirements and how to submit proposals is available in a LAMPF Users Handbook. The present LAMPF Users Group consists of about 1000 U.S. and foreign scientists representing some 200 universities and ten industrial organizations.

One LAMPF experimental area (Area A) is devoted primarily to meson research. It has subareas with an Energetic Pion Channel and Spectrometer (EPICS); a Low-Energy Pion Channel (LEP); a high-energy, high-intensity pion (π meson) beam for research emphasizing Pion and Particle Physics (P^3); and a Stopped Meson Channel (SMC) for research with intense beams of low-energy and very-low-energy mesons (μ mesons).

Experimental Area B is the Nucleon Physics Laboratory, where chemistry irradiations and physics experiments are performed using proton and high-energy neutron beams from nucleon-nucleon interaction studies.

Experimental Area C contains a massive high-resolution proton spectrometer (HRS) consisting of focusing and high-precision bending magnets which analyze and transport reaction products to detectors 12 meters above the floor. The spectrometer can be moved on air pads around its center point to study reactions at various angles to the incoming beam. This facility is used for studies of the interaction of protons with various nuclei.

Other experimental areas permit radiobiology and cancer therapy research, neutrino research, radiation damage studies, and special isotope production. (An associated but separate Weapons Neutron Research Facility is described elsewhere in this list.)

The following entries illustrate some of the numerous specialized irradiation facilities and services available at LAMPF which might not be inferred from the above general description. A contact for each is given. The overall LAMPF User Arrangements described later apply to all such facilities, which may also be accessed through the general LAMPF Users contact.

Isotope Production Facility: This production facility contains nine independent stations and targets that can be irradiated with protons in the range of 500-750 MeV at very high currents (350-500 μ A). Service irradiations at full cost recovery are performed for the radiopharmaceutical industry. A wide variety of radioisotopes are recovered by chemical processing and distributed to the nuclear medicine research community. Exotic radioisotopes are prepared and made available to the physical research community.

Contact H. A. O'Brien, Jr., Group Leader, INC-3, Medical Radioisotope Research; (505) 667-4675 or FTS 843-4675, for specific information.

Nuclear Chemistry Laboratory: This laboratory consists of four double radiochemistry labs, three counting/spectrometry labs, a computer room, and nine offices. The radiochemistry labs are well-equipped with centrifuges, analytical balances, ovens, refrigerators, and other standard items. The counting rooms are equipped with α - and β - counters, γ -scintillation counters, and high-resolution Ge(Li) γ -spectrometers. A sophisticated computer-based data acquisition and data processing system is available.

Contact B. J. Dropesky, Assoc. Group Leader, Nuclear and Radiochemistry Group; (505)667-4372 or FTS 843-4372, for specific information.

Nuclear Chemistry Hot Cell & Intermediate-Level Chemistry Bench: This is a four-station hot cell designed for handling radioactive sources up to the 10kCi level. Two stations are presently equipped with lead glass windows and remote manipulators. One station is developed for loading, unloading, monitoring, and carrier-exchanging operations involving a pneumatic "rabbit" system. The other station is designed for high-level chemical operations on irradiated targets in a containment box. Adjacent to the hot cell is a radiochemistry lab bench with two high-velocity fume hoods for intermediate-level operations. This area is equipped with a centrifuge, analytical balance, oven, and other standard items.

Contact B. J. Dropesky Assoc. Group Leader, Nuclear and Radiochemistry Group; (505)667-4372 or FTS 843-4372, for specific information.

Proton Irradiation Facilities: A Nuclear Chemistry Cave for irradiating targets with a 1-5 μ A beam of high-energy protons is available. The Cave presently contains, in the beam line; a wire scanner, a toroid current monitor, a remote "rabbit" targeting station, a simple T-shaped scattering chamber (under vacuum), and a plastic in-air targeting box with a fluorescent screen viewed by a TV camera. A command trailer is equipped with a telephone, an intercom station, a TV monitor, and a control panel for remotely inserting and removing a target in the in-air box from the proton beam.

Contact B. J. Dropesky, Assoc. Group Leader, Nuclear and Radiochemistry Group; (505)667-4327 or FTS 843-4372, for specific information.

Thin Target Area: The Thin Target Area was designated to permit on-line studies of nuclear reactions induced by 800-MeV protons. This area consists of a scattering chamber with seven 4m-long flight tubes at angles of 20°, 45°, 60°, 90°, 120°, 135°, and 160° with respect to the high-intensity (1mA) proton beam available at LAMPF. A remote retractor and positioning mechanism can hold two targets. The targets are limited in thickness to $<10^{-4}$ radiation lengths (0.6 mg/cm² for uranium).

Contact D. J. Vieira, Staff Member, Nuclear and Radiochemistry Group; (505)667-7231 or FTS 843-7231, for specific information.

Pneumatic Target Transport ("Rabbit") System: The "rabbit" system is a complex array of 76mm (3-inch) diameter underground tubes, a blower package, remotely-operated air valves, receiving terminals, irradiation stations, and a control console. This system is designed to transport in a carrier or "rabbit" to an irradiation station and, at the end of a bombardment, to quickly return the target to one of several receiving stations for the experimenters either to directly commence the nuclear measurements or to carry out radiochemical separations followed by the nuclear measurements. Normally, stations for target irradiations with protons and with energetic neutrons and receiving terminals in the hot cell area and the Nuclear Chemistry Laboratory are operational.

B. J. Dropesky, Assoc. Group Leader, Nuclear and Radiochemistry Group; (505)667-4372 or FTS 843-4372, for specific information.

User Arrangements:

Research proposals are reviewed and rated by an external program advisory committee and beam time is scheduled by a LAMPF committee. Electronic instrumentation, some magnets, cryogenics, and engineering support are available for approved experiments. Data acquisition and analysis facilities are also

provided. A comprehensive LAMPF Users Handbook is available on request which includes descriptions of the experimental channels, research proposal format, safety matters, and operations and technical support.

User Contact:

Name: James N. Bradbury

Title: Asst. Medium Energy
Physics Division Leader

Commercial Telephone No.: (505) 667-5051

FTS Telephone No.: 843-5051

**Name/Type of
User Facility:**

National Genetic Sequence Data Bank

Location:

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

**Brief Narrative
Description:**

The blueprint prescribing each organism's biological growth and development is encoded in the DNA sequences of its cells. A veritable explosion is taking place in our knowledge of these blueprints, and computers have become indispensable in understanding how they are decoded and implemented by the organism, and how they are changed to produce sickness or health or an otherwise modified organism. Thus, a national Genetic Sequence Data Bank—GENBANK—has been established by the National Institutes of Health with co-sponsorship by DOE, NSF, and DOD. Los Alamos and an industrial partner, Bolt, Beranek, and Newman, Inc. of Cambridge, MA, have undertaken to develop and operate this facility.

Los Alamos collects, organizes, and annotates the data in a way to make it useful to a wide spectrum of research activities. As an essential tool of data management, we develop and apply methods of computational analysis for discerning significant features and relationships within the data. To encourage direct contribution, correction, and criticism of data, we also make these available for dial-up execution by researchers active in determining genetic sequences. Bolt, Beranek, and Newman distributes the data, offering both magnetic tapes of the database and on-line access to it.

User Arrangements:

In general, preference will be given to research in which laboratory staff are collaborators or which is supportive of laboratory programs. Use of this facility by outside users will be on a non-interference basis. When substantial incremental costs are involved, charges will be negotiated on a case-by-case basis.

User Contact:

Name: Dr. Walter Goad

Title: Staff Member
Theoretical Biology and
Biophysics Group

Commercial Telephone No.: (505) 667-7510

FTS Telephone No.: 843-7510

**Name/Type of
User Facility:**

Los Alamos National Environmental Research Park

Location:

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

**Brief Narrative
Description:**

The Park consists of 111 km² containing the Laboratory and adjacent lands. This area has been set aside to study the impact of man's activities on his environment; that is, the interaction between man-altered systems and adjacent natural ecosystems. Park resources can be made available to individuals and organizations outside the Laboratory to facilitate self-supported environmental research on appropriate subjects that are compatible with the Laboratory's programmatic mission. Detailed information on the geology, hydrology, meteorology, ecology, soils, and archeology are available.

Users include UCLA, Colorado State University, University of New Mexico, Utah State University, Alma College, New Mexico Dept. of Game and Fish, and the Colorado Division of Wildlife.

User Arrangements:

Space, consultation services, and project coordination will be furnished, as available, to cooperating research entities that are financially independent. Site use procedures will govern the assignment and use of LANERP study areas.

User Contact:

Name: Kenneth V. Bostick

Title: Staff Member
Environmental Studies Group

Commercial Telephone No.: (505) 667-2050

FTS Telephone No.: 843-2050

**Name/Type of
User Facility:**

Ion Beam Research Facilities

Location:

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

**Brief Narrative
Description:**

Los Alamos ion accelerators provide highly collimated and energy resolved beams with energy variable from 20 keV to 25 MeV by means of a complex of three accelerators. These include:

1. A large 7 million volt (MV) single ended Van de Graaff accelerator which delivers positive or negative light ions and negative heavy ions to two floors of experimental area totaling 6000 square feet with 10 beam lines.
2. A 9 MV Model FN tandem Van de Graaff accelerator with 6 independent ion sources serving 11 experiment positions covering 7000 square feet.
3. A low energy (10-120 KV), highly stable accelerator of the hydrogen isotopes.

The facilities are well arranged for experiments by users. In the past four years, 109 users from 43 institutions have been accommodated conducting experiments in nuclear physics, nuclear data measurements, materials science, surface science and analytical chemistry.

The capabilities of each accelerator and its experimental facilities are summarized below along with the associated data acquisition system.

The two Van de Graaffs can be operated in series with the single ended machine injecting negative ions into the tandem giving three stages of acceleration. This yields an energy of 25 MeV for a singly charged ion and much higher energies for multiply charged heavy ions. The acceleration of tritons in all three accelerators is the house specialty, including polarized tritons from the tandem. Carbon-14 is accelerated in both Van de Graaffs. A wide spectrum of experimental equipment is available including a Q3D magnetic spectrograph, scattering chambers and a nuclear microprobe. Experimental data is interfaced through CAMAC to a tri-computer system for data acquisition, analysis and reduction.

User Arrangements:

In general, preference will be given to research in which laboratory staff are collaborators or which is supportive of laboratory programs. Use of this facility by outside users will be on a non-interference basis. When substantial incremental costs are involved, charges will be negotiated on a case-by-case basis.

User Contact:

Name: Dr. Joseph R. Tesmer

Title: Associate Group Leader
Van de Graaff Operations Group

Commercial Telephone No.: (505) 667-5211

FTS Telephone No.: 843-5211

Los Alamos Three-Stage Van de Graaff Facility

Ion Beam Research Facilities

Omega West Reactor (OWR)

Cut-away view of the 8-MW Omega West Reactor. The fuel assembly sits at the bottom of a water-filled tank, 8 ft. dia. by 24 ft. high.

**Name/Type of
User Facility:**

Omega West Reactor (OWR)

Location:

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

**Brief Narrative
Description:**

The Omega West Reactor provides high-intensity fluxes of thermal and epithermal neutrons and is used for isotope production, in-core irradiation of instrumented capsules, neutron radiography, neutron-capture gamma-ray studies, cross-section measurements, and neutron-activation analysis measurements.

Principal Parameters

Power level: 8 MW
Maximum thermal flux: 9×10^{13} n/cm²s
Operating schedule: 40 h/week

Irradiation and Beam Facilities

9 Beam ports, 6-in. dia.
2 In-core irradiation positions (2-in. dia. $\times$ 24 in.)
16 thermal and epithermal rabbit facilities
Graphite thermal column, with numerous ports up to 12 $\times$ 12 in.

Auxiliary Facilities

2 capture gamma-ray spectrometers
2 multiple-axis neutron spectrometers, for neutron diffraction and transmission studies
Neutron radiography facility
Automated neutron-activation-analysis systems, able to analyze up to 400 samples/day for over 30 elements

User Arrangements:

In general, preference will be given to research in which laboratory staff are collaborators or which is supportive of laboratory programs. Use of this facility by outside users will be on a non-interference basis. When substantial incremental costs are involved, charges will be negotiated on a case-by-case basis.

User Contact:

Name: Merle E. Bunker

Title: Group Leader
Research Reactor Group

Commercial Telephone No.: (505) 667-4151

FTS Telephone No.: 843-4151

Automated Mass Spectrometer for Isotopic Nitrogen Analysis

**Name/Type of
User Facility:**

Automated Mass Spectrometer for Isotopic Nitrogen Analysis

Location:

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

**Brief Narrative
Description:**

Nitrogen isotopes are widely used for field studies in agricultural and other sciences to obtain balances of the nitrogen cycle. Previously the mass spectrometric analysis of the thousands of samples generated by these studies were performed using manual operations. A single instrument could handle about 2000 samples annually. In 1980 Los Alamos developed an automated mass spectrometer capable of analyzing 40,000 samples annually. During the test and demonstration period, the equipment has displayed a high accuracy of analyses combined with a far smaller sample size requirement. Analyses are performed in duplicate with about 150 seconds required for each aliquot. Samples are loaded into disposable trays with 96 sample wells and the machine is programmed to change trays automatically.

User Arrangements: In general, preference will be given to research in which laboratory staff are collaborators or which is supportive of laboratory programs. Use of this facility by outside users will be on a non-interference basis. When substantial incremental costs are involved, charges will be negotiated on a case-by-case basis.

User Contact: Name: B. B. McInteer
Title: Associate Group Leader
Isotopic and Structural Chemistry
Commercial Telephone No.: (505) 667-4761
FTS Telephone No.: 843-4761

**Name/Type of
User Facility:**

Laser and Laser Spectroscopy Facilities

Location: Los Alamos National Laboratory
Los Alamos, New Mexico 87545

**Brief Narrative
Description:**

Extensive, well-staffed, laser facilities are available which can provide laser output energy across the ultraviolet, visible, and infrared portions of the electromagnetic spectrum. There are tunable laser-pumped dye lasers; electrically discharged, rare-gas-excimer lasers; solid-state and semiconductor lasers; HF, CF₄ and NH₃ gas lasers, and both pulsed and continuous-wave CO₂ lasers. Some of the latter attain powers as high as one kilowatt at one kilohertz repetition rate. Various frequency-shifting and Raman scattering devices are available. Hardware and software are available to theoretically model the laser physics of ultraviolet and infrared systems and to study geometrical and physical optics, radiation transport, and propagation effects.

There is a facility to fabricate and test optical components and a facility to evaluate optical materials—including the evaluation of optical damage under conditions of high reflectivity or transmission at high average or high peak powers.

Conventional spectrometers are available for low resolution spectroscopic surveys; pulsed and continuous-wave tunable dye laser systems support high resolution studies in the ultraviolet.

A full complement of computational facilities support the experimental spectroscopic studies.

User Arrangements: In general, preference will be given to research in which laboratory staff are collaborators or which is supportive of laboratory programs. Use of this facility by outside users will be on a non-interference basis. When substantial incremental costs are involved, charges will be negotiated on a case-by-case basis.

User Contact:

Name: Dr. Larry Blair

Title: Assistant Chemistry
Division Leader

Commercial Telephone No.: (505) 667-6250

FTS Telephone No.: 843-6250

**Name/Type of
User Facility:****Laser-Based Optical Instrumentation****Location:**

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

**Brief Narrative
Description:**

A variety of laser-based optical instrument systems has been and is being developed for point and remote detection and identification of chemical agents. These instruments rely on the selective reaction of the agents to lasers at various wavelengths. In experiments, concentrations below 10 parts per billion have been detected. Past efforts include remote detection of military chemical agents and real-time monitoring of effluent gases. The techniques rely on modulated, tunable lasers having a wide range of wavelengths.

User Arrangements:

In general, preference will be given to research in which laboratory staff are collaborators or which is supportive of laboratory programs. Use of this facility by outside users will be on a non-interference basis. When substantial incremental costs are involved, charges will be negotiated on a case-by-case basis.

User Contact:

Name: Dr. Larry Blair

Title: Assistant Chemistry
Division Leader

Commercial Telephone No.: (505) 667-6250

FTS Telephone No.: 843-6250

**Name/Type of
User Facility:****R & D Support—Mechanical Fabrication****Location:**

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

**Brief Narrative
Description:**

In support of R and D activities but without regard to the sponsors identity, the services of the Mechanical Fabrication facility are available. The staff of that facility has extensive experience with manufacturing prototype, close-tolerance components and apparatus and in fabrication of radioactive and toxic materials. This facility also has the capability to machine metal laser mirrors by diamond turning.

In general, preference will be given to research in which laboratory staff are collaborators or which is supportive of laboratory programs. Use of this facility by outside users will be on a non-interference basis. When substantial incremental costs are involved, charges will be negotiated on a case-by-case basis.

User Contact:

Name: Joseph F. B. Szoo

Title: Mechanical Division Leader

Commercial Telephone No.: (505) 667-4849

FTS Telephone No.: 843-4849

Atmospheric Light Detection and Ranging Facility (LIDAR)

Name/Type of User Facility: Atmospheric Light Detection and Ranging Facility (LIDAR)

Location: Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Brief Narrative Description: The Los Alamos Atmospheric Light Detection and Ranging (LIDAR) facility has been used by the U.S. DOE environmental research, the U.S. Environmental Protection Agency, the Harvard School of Public Health, the Air Force, and the University of California. The system uses several pulsed lasers to probe the atmospheric molecules and aerosols out to 90 km range. The scattered return is recorded with the 16" Cassegrain telescope at a 10 bit 10 Mhz rate and is processed to obtain atmospheric aerosol profiles or absolute pollutant concentration in three dimensions.

Process: Elastic scattering LIDAR and Direct Absorption LIDAR (DIAL) measure absolute concentrations of aerosols by monostatic backscatter technique.

Restrictions: Available laser wavelengths determine analytical capabilities, measurements of additional molecular concentrations feasible with other laser wavelengths.

Special Provisions: Portable instrument capable of stand-alone remote operation; trained crew is available to operate and analyze 3-D data.

User Arrangements: In general, preference will be given to research in which laboratory staff are collaborators or which is supportive of laboratory programs. Use of this facility by outside users will be on a non-interference basis. When substantial incremental costs are involved, charges will be negotiated on a case-by-case basis.

User Contact: Name: Robert R. Karl
Title: Staff Member
Atmospheric Science Group
Commercial Telephone No.: (505) 667-4702
FTS Telephone No.: 843-4702

Name/Type of User Facility: Ionospheric High Frequency Radar Facility

Location: Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Brief Narrative Description: This facility will consist of an advanced digital ionospheric sounder operating under computer control which will measure ionospheric motions from the E-region to the upper F-region. Using an array of four spaced antennas North-South and East-West tilts and motions can be derived. Identical systems will be located at the European Ionospheric Incoherent Scattering Facilities in Tromso, Norway and Sonderstomfyord, Greenland. This facility is under construction and should be available in 1983.

User Arrangements:

In general, preference will be given to research in which laboratory staff are collaborators or which is supportive of laboratory programs. Use of this facility by outside users will be on a non-interference basis. When substantial incremental costs are involved, charges will be negotiated on a case-by-case basis."

User Contact:

Name: David J. Simons

Title: Associate Group Leader
Atmospheric Sciences Group

Commercial Telephone No.: (505) 667-5930

FTS Telephone No.: 843-5930

**Name/Type of
User Facility:****High Altitude Instrument Platform (Aircraft)****Location:**

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

**Brief Narrative
Description:**

This atmospheric trace constituent measurement and sampling platform has been utilized by a number of non-DOE users including Utah State University, University of Denver, University of Miami, National Center for Atmospheric Research (NCAR), and Environment Canada-Atmospheric Environment Service. Measurements have been made on the platform (remote or in situ) or made on samples gathered during routine or special experimental missions. The aircraft can be flown at altitudes of 60,000+ feet (MSL) for periods of 5-6 hours. The routine flights in April, July, and October cover latitudes from 0° to 75° north and are part of DOE's High Altitude Sampling Program (HASP) called Project Airstream.

Aircraft is based at Ellington AFB, TX with routine lower stratospheric and upper tropospheric flights currently scheduled in April, July, and October each year.

User Arrangements:

The aircraft's data, samples, and instrumentation may be made available on a negotiated basis. The same is true for new experimenters' equipment (space available basis) with installation fees required when special aircraft modifications are required. Once an experiment requirement is established, samples may be gathered or measurements made on routine Airstream flights without additional fees. Special flights may be flown but incremental charges will generally be made.

User Contact:

Name: Paul R. Guthals

Title: Assistant Group Leader
for Atmospheric Studies
Isotope-Geochemistry Group

Commercial Telephone No.: (505) 667-4039

FTS Telephone No.: 843-4039

**Name/Type of
User Facility:**

Heavy Methane Atmospheric Tracer System

Location:

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

**Brief Narrative
Description:**

This system employs the use of small quantities of methane-20 ($^{12}\text{CD}_4$) and methane-21 ($^{13}\text{CD}_4$) to study atmospheric transport and diffusion over ranges of a few kilometers to a few thousand kilometers. Air samples are gathered from which a methane fraction (masses 16, 20, 21) is separated. The resultant methane fractions are mass spectrometrically analyzed to derive a tracer (mass 20 and/or 21) to methane-16 ratios and hence tracer to air ratios. This provides a quantitative tracer number and a mechanism to study atmospheric transport and diffusion of natural or man-made tracer constituents in air. The sensitivity of tracer detectability ($\sim 1 \times 10^{-17}$ in one part of air) makes this technique suitable for a wide range of atmospheric physics and chemistry problems.

User Arrangements:

In general, preference will be given to research in which laboratory staff are collaborators or which is supportive of laboratory programs. Use of this facility by outside users will be on a non-interference basis. When substantial incremental costs are involved, charges will be negotiated on a case-by-case basis.

User Contact:

Name: Paul R. Guthals

Title: Assistant Group Leader
for Atmospheric Studies
Isotope-Geochemistry Group

Commercial Telephone No.: (505) 667-4039

FTS Telephone No.: 843-4039

**Name/Type of
User Facility:**

Instrument Sonde Test Facility (ISTF)

Location:

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

**Brief Narrative
Description:**

The ISTF was designed to test downhole well-logging instrument packages for geothermal applications. It is a well-instrumented test facility in which downhole packages up to 6-in. diameter and 20-ft. long can be tested at pressures and temperatures up to 6000 psi at 275°C. It has been used to investigate the properties and behavior of many experimental and commercial products under conditions simulating those that exist in geothermal wells. Examples include testing of commercial seals, wiper plugs, packers, cements, pressure housings, and detonator firing systems. Tests lasting 24 hours have been conducted.

User Arrangements:

In general, preference will be given to research in which laboratory staff are collaborators or which is supportive of laboratory programs. Use of this facility by outside users will be on a non-interference basis. When substantial incremental costs are involved, charges will be negotiated on a case-by-case basis.

User Contact:

Name: Bert R. Dennis

Title: Group Leader
Earth Science Instrumentation

Commercial Telephone No.: (505) 667-5697

FTS Telephone No.: 843-5697

**Name/Type of
User Facility:****Oil Shale Test Retort****Location:**

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

**Brief Narrative
Description:**

The nature of the products—gases, liquids and solids—evolved from oil shale depend not only on the nature of the original shale but on the conditions under which it is retorted. To study these products, to learn what factors influence their formation, and to determine their biological activity, the Laboratory now employs two non-pressurized test retorts and has a third, larger, pressurized test retort under construction. These units allow the shale to be heated directly by its own combustion or indirectly by exogenously supplied heat. Heating can occur in the presence of inert gases or combustion gases. The attained temperature, time at temperature, and gas mix can all be varied. Inhalation experiments using the evolved gases are routinely performed, and the chemistry and toxicology of the byproducts and waste products is also studied. Multiples of 17 pound batches can be run each day. Current users are all at Los Alamos, but others—e.g., the American Petroleum Institute—are considering design of experiments.

User Arrangements:

In general, preference will be given to research in which laboratory staff are collaborators or which is supportive of laboratory programs. Use of this facility by outside users will be on a non-interference basis. When substantial incremental costs are involved, charges will be negotiated on a case-by-case basis.

User Contact:

Name: L. M. Holland

Title: Toxicology Group Leader

Commercial Telephone No.: (505) 667-2754

FTS Telephone No.: 843-2754

**Name/Type of
User Facility:**

Rock Mechanics: High Pressure Creep Apparatus

Location:

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

**Brief Narrative
Description:**

10 kbar creep apparatus with pore pressure control. Capacity to 10 kbar p_p and P_c and 500° C temperature. Will accept samples to 3cm diameter and 12cm length.

Academic users: Texas A & M, University of South Carolina, UCLA

User Arrangements:

In general, preference will be given to research in which laboratory staff are collaborators or which is supportive of laboratory programs. Use of this facility by outside users will be on a non-interference basis. When substantial incremental costs are involved, charges will be negotiated on a case-by-case basis.

User Contact:

Name: Robert E. Riecker

Title: Associate Group Leader
Geophysics Group

Commercial Telephone No.: (505) 667-2631

FTS Telephone No.: 843-2631

**Name/Type of
User Facility:**

Rock Mechanics: Large Volume Appartus

Location:

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

**Brief Narrative
Description:**

This apparatus consists of a 5000 ton press capable of deforming meter-size cubes of rock. This facility provides a substitute for *in situ* testing and offers the ability to determine the scale-dependent properties of rock and the validity of small-scale tests and instrumentation. The apparatus has been used in conjunction with the University of Colorado and American Oil Company.

User Arrangements:

In general, preference will be given to research in which laboratory staff are collaborators or which is supportive of laboratory programs. Use of this facility by outside users will be on a non-interference basis. When substantial incremental costs are involved, charges will be negotiated on a case-by-case basis.

User Contact:

Name: Robert Riecker

Title: Associate Group Leader
Geophysics Group

Commercial Telephone No.: (505) 667-2631

FTS Telephone No.: 843-2631

**Name/Type of
User Facility:**

Radiation Instrument Calibration

Location:

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

**Brief Narrative
Description:**

The radiation instrument calibration facility consists of six vertical shielded tubes of which three contain ^{60}Co , one ^{226}Ra , and one ^{239}Pu -Be neutron sources, mounted on elevator mechanisms. The sixth tube is for experimental source use. The gamma sources, which range from 2mCi to over 200 Ci, produce exposure rates of from 0.145 mR/h to 1692 R/h. Effective neutron fluxes of from 1.5 to 1250 mRem/h are available, depending on the type of instrument being calibrated. Details of the construction and calibration of the facility and methods used for calibration of levels are traceable to the National Bureau of Standards. Past users have included personnel from other government associated laboratories, the military, and industry—e.g., Eberline Instrument Co., Santa Fe.

User Arrangements:

In general, preference will be given to research in which laboratory staff are collaborators or which is supportive of laboratory programs. Use of this facility by outside users will be on a non-interference basis. When substantial incremental costs are involved, charges will be negotiated on a case-by-case basis.

User Contact:

Name: Robert Scarlett

Title: Space Astronomy and
Astrophysics Group Leader

Commercial Telephone No.: (505) 667-5127

FTS Telephone No.: 843-5127

**Name/Type of
User Facility:**

Medical Radioisotopes Resource

Location:

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

**Brief Narrative
Description:**

A wide variety of radioisotopes, produced by proton spallation reactions, are made available by the Medical Radioisotope Research Group to the nuclear medicine research community and the radiopharmaceutical industry. Through collaborative research agreements, individual radioisotopes are prepared and shipped to extramural research groups to facilitate the development of improved diagnostic and therapeutic procedures in nuclear medicine. Some radio-isotopes are currently being supplied to industry. The current list of medically-useful radio-isotopes available from Los Alamos includes: ^{48}V , ^{52}Fe , ^{67}Cu , ^{68}Ge , ^{77}Br , ^{82}Sr , ^{109}Cd , ^{123}I , and ^{127}Xe . Other radio-isotopes of interest are being developed.

User Arrangements:

In general, preference will be given to research in which laboratory staff are collaborators or which is supportive of laboratory programs. Use of this facility by outside users will be on a non-interference basis. When substantial incremental costs are involved, charges will be negotiated on a case-by-case basis.

User Contact:

Name: H. A. O'Brien, Jr.

Title: Group Leader
Medical Radioisotope Research

Commercial Telephone No.: (505) 667-4675

FTS Telephone No.: 843-4675

**Name/Type of
User Facility:**

Exotic Radioisotopes for Physical Science Research

Location:

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

**Brief Narrative
Description:**

With the unique combination of medium-energy protons (800 MeV) and high beam currents (700–750 μ A) available from the LAMPF accelerator, it is possible to reach nuclides far from the beta line of stability and produce them in quantities hitherto unattainable. For example, irradiation of a silicon target over a two-year period produced $11\mu\text{Ci}$ (-0.7 mg) of $7 \times 10^5\text{-yr}^{26}\text{Al}$, following chemical processing. This and other rare radioisotopes are of great importance to the physical science research community.

User Arrangements:

In general, preference will be given to research in which laboratory staff are collaborators or which is supportive of laboratory programs. Use of this facility by outside users will be on a non-interference basis. When substantial incremental costs are involved, charges will be negotiated on a case-by-case basis.

User Contact:

Name: H. A. O'Brien, Jr.

Title: Group Leader
Medical Radioisotope Research

Commercial Telephone No.: (505) 667-4675

FTS Telephone No.: 843-4675

**Name/Type of
User Facility:**

Standard Graphite Pile Neutron Source Calibration Facility

Location:

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

**Brief Narrative
Description:**

Neutron sources of unknown source strength can be calibrated against the standard RaBe No. 44 source or the secondary standard ^{239}Pu -Be 2000 source by comparison of thermal neutron intensities in the Standard Graphite Pile. Observations are made of the relative counting rate in a BF_3 proportional counter placed in the pile. Neutron Sources have been calibrated for other government associated Laboratories and for Nuclear Materials and Equipment Corporation

Plutonium Laboratory, Leechburg, Pa. in 1974. History regarding neutron sources and the LANL Standard Graphite Pile is presented in Chapter 2 of "Miscellaneous Physical and Chemical Techniques of the Los Alamos Project," Volume No. 3 published by McGraw Hill.

User Arrangements:

In general, preference will be given to research in which Laboratory staff are collaborators or which is supportive of Laboratory programs. Use of this facility by outside users will be on a non-interference basis. When substantial incremental costs are involved, charges will be negotiated on a case-by-case basis.

User Contact:

Name: Robert Scarlett

Title: Space Astronomy and
Astrophysics Group Leader

Commercial Telephone No.: (505) 667-5127

FTS Telephone No.: 843-5127

**Name/Type of
User Facility:**

Deep Wellbore Equipment Test Station

Location:

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

**Brief Narrative
Description:**

The borehole (GT-2) used for Hot Dry Rock geothermal energy experiments is 8900 ft. deep, is cased to 8577 ft. with 6.75-in. i.d. casing and is uncased in granite (6-1/2-in. diameter) to total depth. It is water filled and has a bottom hole temperature of 160°C. Possible users include U.S. Geological Survey, National Laboratories, and petroleum industry service companies (logging).

User Arrangements:

In general, preference will be given to research in which Laboratory staff are collaborators or which is supportive of Laboratory programs. Use of this facility by outside users will be on a non-interference basis. When substantial incremental costs are involved, charges will be negotiated on a case-by-case basis.

User Contact:

Name: Robert H. Hendron

Title: Geological Engineering
Group Leader

Commercial Telephone No.: (505) 667-7811

FTS Telephone No.: 843-7811

**Name/Type of
User Facility:**

Plasma Calibration Facility

Location:

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

**Brief Narrative
Description:**

The plasma calibration facility has been used to determine the response functions of Los Alamos plasma analyzers flown aboard Vela, IMP, ISEE and ISPM spacecraft. It has also been used by the Southwest Research Institute to calibrate a rocket mass spectrometer before launch. It consists of a duoplasmatron ion source capable of supplying collimated, uniform (in cross section) beams of H^+ , H_2^+ , He^+ , He^{++} , N^+ and N^{++} ions having energies in the range between about 1 keV and 20 keV. Instruments with dimensions less than about 1 ft³ can be mounted on a two-axis gimbal within a vacuum chamber at the end of a roughly 20 foot beam line. Data can be acquired and recorded semi-automatically using a MINC computer.

User Arrangements:

In general, preference will be given to research in which Laboratory staff are collaborators or which is supportive of Laboratory programs. Use of this facility by outside users will be on a non-interference basis. When substantial incremental costs are involved, charges will be negotiated on a case-by-case basis.

User Contact:

Name: S. J. Bame

Title: Staff Member
Space Plasma Physics Group

Commercial Telephone No.: (505) 667-5308

FTS Telephone No.: 843-5308

**Name/Type of
User Facility:**

Solar Wind Plasma Data

Location:

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

1-hour and 3-hour averages of solar wind plasma density, velocity, and proton and electron temperatures are available. They are based on measurements using Los Alamos instrumentation aboard the Interplanetary Monitoring Platform (IMP) 6, 7 and 8 satellites between 1971 and 1978. Data can be made available on magnetic tapes and have been used in many published scientific investigations in collaboration with a variety of U.S. and foreign space scientists.

User Arrangements:

In general, preference will be given to research in which Laboratory staff are collaborators or which is supportive of Laboratory programs. Use of this facility by outside users will be on a non-interference basis. When substantial incremental costs are involved, charges will be negotiated on a case-by-case basis.

User Contact:

Name: S. J. Bame

Title: Staff Member
Space Plasma Physics Group

Commercial Telephone No.: (505) 667-5308

FTS Telephone No.: 843-5308

**Name/Type of
User Facility:****Radio Frequency (RF) Power Sources****Location:**

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

**Brief Narrative
Description:**

A variety of radio frequency power sources exists for powering accelerator structure experiments. Listed below are the available sources:

- 3 ea 80 MHz, 600 kW CW (FMIT)
- 2 ea 400-450 MHz, 60 kW CW/1.25 MW peak for 1 ms (WHITEHORSE)
- 1 ea 456 MHz, 150 kW peak for 300 μ s (GYROCON)
- 1 ea 1300 MHz, 20 kW CW/20 MW peak for 3 μ s (FEL)
- 3 ea 1300 MHz, 10 kW CW/5 MW peak for up to 200 μ s (FEL)
- 1 ea 2380 MHz, 500 kW CW (RTM)
- 1 ea 201 MHz, 500 kW CW/3 MW peak for 1.2 ms
- 2 ea 805 MHz, 150 kW CW/1.25 MW peak for 1 ms

The DC power supplies and the de-ionized water systems that support the radio frequency power sources may be utilized independently for applications requiring high DC voltages. The characteristics of these supplies are:

- 17 kV - 84.0 A (FMIT)
- 65 kV - 16.5 A (RTM)
- 37.5 kV - 2.4 A (PIGMI)
- 75 kV - 1.2 A (PIGMI)
- 105 kV - 0.6 A (PIGMI)
- 125 kV - 2.0 A (White Horse)
- 300 kV - 0.25 A (White Horse)

These sources, power supplies, and cooling systems may be made available for a few weeks duration for a variety of uses, such as: materials heating (coal gasification), plasma heating, chemical excitation, radar, power transmission, communication, heat transfer phenomena, and testing insulators, transmission lines, and switches.

User Arrangements:

In general, preference will be given to research in which Laboratory staff are collaborators or which is supportive of Laboratory programs. Use of this facility by outside users will be on a non-interference basis. When substantial incremental costs are involved, charges will be negotiated on a case-by-case basis.

User Contact:

Name: Dr. Robert Jameson

Title: Accelerator Technology
Division Leader

Commercial Telephone No.: (505) 667-5634

FTS Telephone No.: 843-5634

**Name/Type of
User Facility:****The Los Alamos Geostationary Orbit Synoptic Data Base on
Energetic Particles****Location:**

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

**Brief Narrative
Description:**

This data base is a broad compilation of information concerning the radiation environment at a geostationary orbit. Satellites placed in such an orbit appear to remain above fixed points on the earth's geographic equator, since the satellites have an orbital speed exactly matched to the earth's rotation beneath them. These satellites' stationary positions (as seen from earth) give them important practical applications in such diverse fields as weather observation, communication, navigation and military use. Knowledge of the radiation environment at geostationary orbit is thus important to spacecraft design, communications, and satellite operations and to such scientific purposes as understanding the structure and dynamics of the earth's magnetosphere.

Los Alamos has placed charged particle analyzers on a number of satellites in geostationary orbit and has made continuous observations on their radiation environments over many years, measuring both the flux and energy distribution of electrons (30-2000 keV) and protons (145 keV to 150 meV) as a function of arrival direction and time. These data have been computer-processed and assembled into a data base suitable for general use. The data have been used in many published scientific investigations in collaboration with a variety of US and foreign space scientists.

User Arrangements:

In general, preference will be given to research in which Laboratory staff are collaborators or which is supportive of Laboratory programs. Use of this facility by outside users will be on a non-interference basis. When substantial incremental costs are involved, charges will be negotiated on a case-by-case basis.

User Contact:

Name: P. Higbie, D. Baker, R. Belian

Title: Staff Members
Space Plasma Physics Group

Commercial Telephone No.: (505) 667-4040

FTS Telephone No.: 843-4040

Oak Ridge National Laboratory

Located in Oak Ridge, Tennessee, Oak Ridge National Laboratory is a multiprogram laboratory operated by Union Carbide for the U.S. Department of Energy. Its major programs are: nuclear energy development; basic energy sciences; biomedical and environmental research, and magnetic fusion energy. Facilities include the High Flux Isotope Reactor, Electron Linear Accelerator, Transuranium Processing Plant, and the Environmental Sciences Laboratory.

Designated User Facilities

Oak Ridge Environmental Research Park
Surface Modification and Characterization Facility
Neutron Scattering Facility
National Center for Small Angle Scattering Research
Health Physics Research Reactor
Hollifield Heavy Ion Research Facility
Atomic Physics E-N Tandem Accelerator
Oak Ridge Electron Linear Accelerator
SHARE Microanalysis Facility

**Name/Type of
User Facility:**

Oak Ridge National Environmental Research Park

Location:

The NERP consists of 5,500 hectares of the Department of Energy Oak Ridge Reservation, Oak Ridge, Tennessee

**Brief Narrative
Description:**

The National Environmental Research Parks (NERPs) were established under the policy of the Department of Energy for the purpose of providing protected land areas for research and education in the environmental sciences and demonstration of the environmental compatibility of energy technology developments. The Oak Ridge NERP lies in the heart of an Eastern deciduous forest area of streams and reservoirs, mesic hardwood forests, and extensive upland mixed forests. Continuing characterization of the Oak Ridge NERP lands, which is supported by DOE funds, includes meteorological, geological, and hydrology data and a catalog of terrestrial and aquatic fauna and flora. Elaborate monitoring systems enable users to measure environmental factors precisely and accurately for extended periods. Various sites in the park offer opportunities for aquatic and terrestrial ecosystem analysis, such as biogeochemical cycling of pollutants resulting from energy-producing facilities, landscape alterations, and forest and wildlife management. Users of the NERP include ORNL staff, professors and students of The University of Tennessee and Tennessee Technological University, the Army Corps of Engineers, and the Tennessee Wildlife Resources Agency. Current research programs which take advantage of the Oak Ridge NERP include a study of the effects of acid deposition on vegetation, a study of the effects of whole-tree harvesting on biomass production and soil nutrients, and evaluation of the U.S. Fish and Wildlife Services Habitat Suitability Index models.

User Arrangements:

Investigators desiring to use the Oak Ridge NERP for environmental research should submit a research request with sufficient detail to allow determination of:

1. scientific merit,
2. compatibility and noninterference with established DOE programs,
3. suitability of the Oak Ridge NERP to the proposed research, and
4. the level of logistical support needed.

The proposal must also include the name and citizenship of each person requiring access to the NERP. The user is expected to bear the full cost of the research performed except in selected cases where the research proposed is of sufficient programmatic interest to DOE that partial or full DOE support may be considered.

A brief semiannual report (letter) and a more detailed annual technical report will be required of NERP users. Highlights of significant findings and pre-prints and reprints of published articles will also be required.

User Contact:

Name: Elizabeth L. Preston

Title: NERP Project Manager,
UCC-ND

Commercial Telephone No.: (615) 574-4334

FTS Telephone No.: 624-4334

Surface Modification and Characterization Facility

Technicians working in the Surface Modification and Characterization Facility

**Name/Type of
User Facility:**

Surface Modification and Characterization Facility

Location:

Building 3003
Oak Ridge National Laboratory

**Brief Narrative
Description:**

The combined techniques of ion implantation doping, ion induced mixing and pulsed-laser processing are utilized to alter the near-surface properties of a wide range of solids in ultrahigh vacuum. Through *in situ* analysis by ion beam, surface, and bulk properties techniques, the fundamental materials interactions leading to these property changes are determined. Since both ion implantation doping and pulsed-laser annealing are nonequilibrium processing techniques, they can be used to produce new and often unique materials properties not possible with equilibrium fabrication techniques. This makes them ideal tools for fundamental materials research. They are equally useful for modifying surface properties for practical applications in areas such as friction, wear, corrosion, catalysis, surface hardness, solar cells, semiconducting devices, superconductors, etc.

This program is funded through the Division of Materials Sciences with primary emphasis on long-range basic research. Consequently, most collaborative research involving scientists from industry, universities and other laboratories

has been the investigation of new materials properties possible with these processing techniques or the determination of the mechanisms responsible for observed property changes.

User time amounts to 35% of the total use of this facility and includes several industries, e.g., Motorola and Westinghouse.

User Arrangements:

User interactions are through mutually agreeable collaborative research projects between users and research scientists at ORNL which utilize the unique alteration/analysis capabilities of the facility. Because of the tremendous interest expressed in these techniques and the broad range of existing collaborations, plans for a users' facility have been initiated. Until this program has been established, the informal arrangement will be continued. It should be emphasized that the goal of these interactions is to demonstrate the usefulness or feasibility of these techniques for a particular materials application and not to provide routine service alterations or analyses. Technical data details are available from the contact person below.

User Contact:

Name: B. R. Appleton

Title: Research Staff Member

Commercial Telephone No.: (615) 574-6283

FTS Telephone No.: 624-6283

Neutron Scattering Facility

Research performed in the Neutron Scattering Facility

**Name/Type of
User Facility:**

Neutron Scattering Facility

Location:

High Flux Isotope Reactor
Oak Ridge National Laboratory

**Brief Narrative
Description:**

The neutron scattering facilities at the High Flux Isotope Reactor (HFIR) are used for long-range basic research on the structure and dynamics of condensed matter. Active programs exist on the magnetic properties of matter, lattice dynamics, defect-phonon interactions, fluxoid lattices in superconductors, liquid structures, and crystal structures. The HFIR is a 100 MW, light-water moderated reactor with an unsurpassed record of operating time (better than 90%). The central flux is 5×10^{15} neutrons/cm² sec and the flux at the inner end of the beam tubes is slightly greater than 10^{15} neutrons/cm² sec. A wide variety of neutron scattering instruments has been constructed with the support of the Division of Materials Sciences. Three of these are unique within this country: the triple-axis polarized-beam spectrometer, the double-crystal small-angle diffractometer, and the correlation chopper.

Outside users in CY-1981 came from a dozen universities, five foreign countries and other DOE laboratories.

User Arrangements:

These facilities are open for use by outside scientists on problems of high scientific merit. Written proposals are reviewed for scientific feasibility by an internal review committee. It is expected that all accepted experiments will be scheduled within six months of the receipt of the proposal. No charges for the use of the beams will be assessed for research to be published in the open literature. The cost of extensive use of ORNL shop or computer facilities must be borne by the user. Travel and living expenses are also the user's responsibility. Inexperienced users will normally collaborate with an ORNL staff member. Proprietary experiments can be carried out after a contract has been arranged based on full cost recovery including a charge for beam time. A procedure describing the facilities and a booklet giving user procedures are available on request.

User Contact:

Name: H. A Mook

Title: Research Staff Member

Commercial Telephone No.: (615) 574-5242

FTS Telephone No.: 624-5242

**Name/Type of
User Facility:**

National Center for Small-Angle Scattering Research (NCSASR)

Location:

High Flux Isotope Reactor
Oak Ridge National Laboratory

**Brief Narrative
Description:**

The National Center for Small-Angle Scattering Research is a user-dedicated facility supported by the National Science Foundation and the Department of Energy under an interagency agreement. The two main instruments available to users are the NSF-constructed 30-m small-angle neutron scattering facility (SANS) and the DOE-constructed 10-m small-angle x-ray scattering camera (SAXS). These instruments are intended to provide state-of-the-art capability for investigating structures of condensed matter on a global scale, e.g., from a few tens to several hundreds of angstroms. They are intended to serve the needs of scientists in the areas of biology, polymer science, chemistry, metallurgy and materials science, and solid state physics.

The facility has been heavily utilized since its inception. Proprietary research (e.g., DuPont) and heavy use by the university community highlight the CY-1981 operation with a total user count of 113.

User Arrangements:

Beam time on these instruments is assigned, in general, on the basis of proposals submitted in advance. These are then reviewed by a panel of experts external to the laboratory and are rated on the basis of scientific merit. When a favorable review has been received, a staff member of the NCSASR and the user agree, usually by telephone, on a time and duration for the experiment. Ordinary charges are borne by the Center, but extensive use of facilities (shop, computing, etc.) must be paid by the user. Users may work in collaboration with one or more staff member if they wish but such collaboration is not required. Proprietary experiments can be carried out after contractual agreement has been reached. Detailed technical information is available in a pamphlet which can be obtained from the user facility contact below.

User Contact:

Name: W. C. Koehler

Title: Director of the NCSASR

Commercial Telephone No.: (615) 574-5232

FTS Telephone No.: 624-5232

Health Physics Research Reactor (HPRR)

A radiation dosimeter test at the Health Physics Research Reactor.

**Name/Type of
User Facility:**

Health Physics Research Reactor (HPRR)

Location:

Oak Ridge National Laboratory

**Brief Narrative
Description:**

The HPRR is a small, unmoderated fast reactor which can be operated in the steady-state or pulse mode. The reactor core is a right circular cylinder (20-cm diameter and 23-cm height) containing enriched ^{235}U fuel alloyed with molybdenum. During steady-state operation, power levels between 0.1 to 10^4 W can be maintained for time periods as long as several hours. The maximum allowed nominal yield during pulse operation is 10^{17} fissions which corresponds to a peak power of about 50,000 megawatts and a pulse half-width of 60 μs . Neutron dose rates can be varied over 15 orders of magnitude (10^{-6} to 10^8 rads/h) depending on the location of the experiment relative to the core, the type of operation, and reactor power levels. The energy distribution of neutrons reaching the experiment ($\bar{E} = 0.6$ to 1.3 MeV) and the neutron-to-gamma dose ratio ($n/\gamma = 0.5$ to 10.0) can be varied using Lucite, steel, or concrete spectral modifying shields which are available at the facility. Following experimental irradiations, accurate reference neutron and gamma dose values are provided to reactor users.

The HPRR was operated for non-staff users 119 times in 1981, about 50% of the total use. Users from 23 organizations including government agencies, industry, universities, and medical centers used the facility for radiobiological research, radiation dosimetry development and testing, and nuclear engineering research and training. The physical facilities can also accommodate large or small scale experiments in such diverse areas as laser technology, materials testing, weapons development, and internal dosimetry.

User Arrangements:

Experiment scheduling and user fees (if any) are determined on a case-by-case basis. Staff approval of the experimental design is required for reactor safety determination. The staff provides dosimetry in most cases.

User Contact:

Name: C. S. Sims

Title: Dosimetry Applications Research
Group Leader

Commercial Telephone No.: (615) 574-5851

FTS Telephone No.: 624-5851

Holifield Heavy Ion Research Facility (HHIRF)

**Name/Type of
User Facility:**

Holifield Heavy Ion Research Facility (HHIRF)

Location:

Oak Ridge National Laboratory
Oak Ridge, TN 37830

**Brief Narrative
Description:**

The Holifield Facility operates two accelerators: the new 25 MV tandem electrostatic accelerator and the Oak Ridge Isochronous Cyclotron. The two accelerators operate either independently or in combined mode with the cyclotron having been modified to serve as an energy booster for the tandem. The facility also boasts a number of unique state-of-the-art experimental devices and a powerful data acquisition computer system. This facility is operated to support the national program of accelerator based research with heavy ions.

Among the major experimental devices available are the on-line electromagnetic isotope separator UNISOR, the spin-spectrometer, two magnetic spectrometers, two in-beam gamma-ray facilities, a time-of-a-flight facility, and two general purpose scattering chambers.

User Arrangements:

Use of the facility is open to all scientists with an approved research program. Such approval is obtained through formal submission of research proposals to a Program Advisory Committee (PAC). This committee, constituted of knowledgeable scientists representing the entire research community, reviews proposals and recommends approval or disapproval to the facility director.

The Holifield Facility has a formal Users Organization which elects annually its own Executive Committee and chairman. This group interacts directly with the facility management through the Liaison Scientist. In 1982, there were about 425 members of the Users Organization. Of these, slightly more than 50% were from U.S. universities, 30% from government laboratories, and the remainder from industry and overseas.

Those interested in using the Holifield Facility are encouraged to join the Users Organization. Further information may be obtained by contacting the Holifield Users Liaison Office (Telephone 615-574-4113).

User Contact

Name: R. L. Robinson

Title: Liaison Officer
HHIRF Users Group

Commercial Telephone No.: (615) 574-4113

FTS Telephone No.: 624-4113

Atomic Physics E-N Tandem Accelerator

A temporary user-type experiment, in this case for measurement of electron capture by fast, highly-charged ions from atomic hydrogen, is shown set up at the end of the E-N tandem beam lines.

**Name/Type of
User Facility:**

Atomic Physics
E-N Tandem Accelerator

Location:

Building 5500
Oak Ridge National Laboratory

**Brief Narrative
Description:**

Principal use is for high energy atomic collisions in gases and solids. Ion beams of most species through Ar are available (Ne, Na, Ar are not available) and selected heavier ions are available. Typical beams of Cl ions are $1 \mu\text{A}$ of Cl^{4+} or 3 nA of Cl^{7+} at several times 10 MeV energies. An Elbek magnetic spectrograph with energy resolution about $1/10^4$ is available for analysis purposes. A PDP 11/45 computer with magnetic disc storage and analog to digital converters is available for data acquisition and analysis. Several beam lines are available which can accommodate a wide range of space requirements. Beam height is 69".

User Arrangements:

Time for user activities is usually available. Typically 5 to 10 user-type experiments are scheduled per year, usually undertaken by university physicists. Typical experiment run-times are one week. Specific user fees are not required but availability of accelerator operation is frequently limited by budget.

User Contact:

Name: P. D. Miller

Title: E-N Tandem Lab Director

Commercial Telephone No.: (615) 574-4781

FTS Telephone No.: 624-4781

**Name/Type of
User Facility****Oak Ridge Electron Linear Accelerator (ORELA)****Location:**

Oak Ridge National Laboratory
Oak Ridge, TN 37830

**Brief Narrative
Description:**

An intense pulsed-neutron source is available for neutron time-of-flight measurements with a variety of detectors and flight paths. Measurements as a function of neutron energy emphasize the keV energy range, although measurements have been made from thermal energies to beyond 50 MeV. Most types of neutron-induced reactions have been studied at some time at ORELA.

User Arrangements:

Measurements at ORELA provide good energy resolution and thereby require many time channels. Measurements usually last months or years and therefore virtually all visitors collaborate with regular ORELA staff. In a few cases, complex detection equipment has been brought to ORELA by visitors. However, most visitors use equipment which is already available. For all measurements, a powerful data-handling system is available.

Approximately 78 visitors have used ORELA through 1981. Both universities and U.S. and foreign research institutes were represented. There are no user fees nor any special provisions since all visitors work with regular staff members.

User Contact:

Name: R. W. Peelle

Title: ORELA Coordinator

Commercial Telephone No.: (615) 574-6113

FTS Telephone No.: 624-6113

**Name/Type of
User Facility:**

Shared Research Equipment (SHaRE Microanalysis Facility)

Location:

Building 5500
Oak Ridge National Laboratory

**Brief Narrative
Description:**

The microanalysis facilities for use in materials science have been made available for collaborative research by members of universities or industry with ORNL staff members. The facilities include state-of-the-art analytical transmission electron microscopy, high voltage electron microscopy, surface analysis, and nuclear microanalysis. The electron microscopy capabilities include high resolution, high voltage, and analytical (energy dispersive X-ray spectroscopy and electron energy loss spectroscopy). Surface analysis facilities include four Auger electron spectroscopy (AES) systems; ion backscattering and nuclear reaction techniques using the 0.4 and 5.0 MV Van de Graaff accelerators in the Metals and Ceramics Division.

These facilities were used 30% of the time by outside users in CY 1981. This included industrial, university and foreign users.

User Arrangements:

User interactions are through collaborative research projects between users and researchers on the Materials Sciences Program at ORNL. Proposals are reviewed by an executive committee which consists of ORAU, ORNL, and university members. Proposals are evaluated on the basis of scientific excellence and relevance to DOE needs and must identify one ORNL staff member who will share responsibility for the project.

The SHaRE program provides technical help and limited travel expenses for academic participants through the Oak Ridge Associated Universities (ORAU).

User Contact:

Name: E. A. Kenik

Title: Research Staff Member

Commercial Telephone No.: (615) 574-5066

FTS Telephone No.: 624-5066

Pacific Northwest Laboratory

The Pacific Northwest Laboratory (PNL) is operated for the Department of Energy by Battelle Memorial Institute and is located near the city of Richland in south-central Washington. PNL is a multiprogram laboratory with a focus on the advancement and use of multienergy scientific and engineering technology for national initiatives. Three roles guide PNL efforts 1) research and engineering for support of the Hanford and National defense mission, 2) research and development to resolve key nuclear issues, and 3) developments which use our experience in working with and involving the private sector. These primary roles are supported by a strong expertise aimed at timely identification and resolution of environmental, health, and safety issues. Because of the transferability of laboratory scientific and engineering skills to other technology needs, significant contributions are being made in support of national initiatives to develop technology bases for alternate energy sources and conservation. The Laboratory has traditionally developed and maintained strong ties with the academic community and with the private sector. A major programmatic emphasis is on waste management and for

many years PNL has been the principal laboratory in the development of technology for the management of high-level waste. Because of this long-standing expertise in contributing to the understanding and solving a broad spectrum of other waste management problems including carbon dioxide, acid rain, and hazardous industrial chemical waste disposal, PNL can be viewed nationally as a center of expertise in the development and application of solutions to complex waste management problems.

Other User Resources

Arid Lands Ecology Reserve and Hanford National Environmental Research Park
Supercritical Fluid Chromatography/Mass Spectrometry
Accelerator Laboratory
Low-Level Radionuclide Measurement Instrumentation
Surface Science Facility
Materials Characterization Center
Gas Chromatography/Mass Spectrometry

Arid Lands Ecology Reserve and Hanford National Environmental Research Park

**Name/Type of
User Facility:**

Arid Lands Ecology Reserve and Hanford National
Environmental Research Park

Location:

Pacific Northwest Laboratory
P. O. Box 999
Richland, Washington

**Brief Narrative
Description:**

The Arid Lands Ecology (ALE) Site provides a protected study area for short- and long-term ecological research concerning wildlife and environments of semi-arid areas of the western United States. The ALE Site is a large area of about 120 square miles that is completely fenced to exclude stray livestock, and access to the site is for research and education purposes only. Natural impacts such as wildfires are studied as well as man-induced disturbances such as the severe soil disturbances related to shallow land burial of radioactive wastes, the biological effects of controlled livestock grazing, and the short- and long-term fate and effects of chemical contaminants introduced to soil and surface waters in experimental quantities.

The ALE Site includes on-site laboratories needed for the maintenance of plants and animals under controlled environmental conditions and outdoor facilities designed to safely contain experimental quantities of toxic materials and yet expose growing plants to realistic environmental conditions of temperature, sunlight, wind and soil water variations.

User Arrangements:

Availability for use by non-PNL researchers is subject to management decisions concerning scheduling, resource, priority of use, and personnel accessibility. In addition, PNL operations permit Laboratory staff to use most of the facilities and equipment in the PNL in work for non-DOE sponsors on a cost recovery basis.

User Contact

Name: W. H. Rickard

Title: Senior Staff Scientist,
Environmental Sciences

Commercial Telephone No.: (509) 376-5011

FTS Telephone No.: 444-5011

Supercritical Fluid Chromatography/Mass Spectrometry

Supercritical Fluid Chromatography/Mass Spectrometry

**Name/Type of
User Facility:**

Supercritical Fluid Chromatography/Mass Spectrometry

Location:

Pacific Northwest Laboratory
P.O. Box 999
Richland, Washington 99352

**Brief Narrative
Description:**

A Supercritical Fluid Chromatography/Mass Spectrometer provides a new instrument that is particularly effective for the analysis of high molecular weight, polar or thermally unstable compounds. The new technique under development by PNL is undoubtedly one of the most significant recent developments in organic analysis. In this new instrument, supercritical fluid chromatography has been combined with mass spectrometry. The method derives its effective separation characteristics from the ability to control compound solubility as a function of pressure at relatively low temperatures. The system is presently being used to determine nitrogen containing compounds in coal derived oils and to track the solubilization of raw coals in supercritical solvents. Other SFC/MS uses include extraction and analysis of organic emissions absorbed on sampling traps or on particulates analysis of metabolites of environmental toxins, and identification of procarcinogens in biological substrates. SFC/MS is also extremely effective for the direct monitoring and evaluation of engineering parameters pertinent to newly developing supercritical processes (e.g. coal conversion).

User Arrangements:

Availability for use by non-PNL researchers is subject to management decisions concerning scheduling, resource, priority of use, and personnel accessibility. In addition, PNL operations permit Laboratory staff to use most of the facilities and equipment in the PNL in work for non-DOE sponsors on a cost recovery basis.

User Contact:

Name: W. D. Felix

Title: Manager, Chemical Methods
& Kinetics

Commercial Telephone No.: (509) 376-5247

FTS Telephone No.: 444-5247

Accelerator Laboratory

Beam lines available in the experimental room in the Accelerator Lab.

**Name/Type of
User Facility:**

Accelerator Laboratory

Location:

Pacific Northwest Laboratory
P. O. Box 999
Richland, Washington 99352

**Brief Narrative
Description:**

The accelerator laboratory at PNL includes two positive ion electrostatic accelerators. A 2 MV Van de Graaff Accelerator provides beams of protons, deuterons, helium and carbon ions in the energy range of 100 keV to 2 MeV. A 2 MV Tandem Accelerator with Duoplasmatron and Sputter Ion Sources creates commonly accelerated ions including H^+ , He^{2+} , C^{n+} , Cu^{n+} , Ni^{n+} , I^{n+} , and Ta^{n+} (where $n = 1$ to 4) from both gas and solid sources.

The 2 MV single stage Van de Graaff with r-f ion source is capable of providing beams of protons, deuterons, helium and carbon ions in the energy range from 100 keV to 2 MeV. One beam line is equipped with a high voltage r-f oscillator which provides a pulsed beam of approximately .5 ns FWHM with repetition rate of 3 MHz. In addition, this accelerator is routinely used as a source of monoenergetic neutrons through D-T, D-D, and other reactions. The second accelerator is a 2 MV tandem with both, duoplasmatron and sputter ion sources.

Ions formed from both gas and solid sources are readily available. Commonly accelerated ions include H^+ , He^{2+} , C^{n+} , Cu^{n+} , Ni^{n+} , I^{n+} , and Ta^{n+} in the energy range from 1 meV to $2(1+n)$ MeV where $n=1-4$.

In addition to independent operation, the physical arrangement enables simultaneous irradiation of a common target with both accelerators. In dual beam irradiation the angle of incidence of the two beams differ by approximately 30 degrees at the point of intersection.

The accelerator facility presently supports work in radiation physics, radiation biology, fusion energy, and materials research. Specific programs include the study of ionization, including measurement of energy and angular distributions of electrons ejected in ionizing collisions as well as total ion and electron yields; measurement of charge transfer cross sections; trace elements analysis and profiling using Rutherford backscattering techniques; radiation damage to materials using heavy ion bombardment and dual beam irradiation, and biological damage at the cellular level employing direct irradiation of cells with high LET ion beams. The PNL accelerator laboratory provides a unique facility for low energy heavy ion irradiations.

User Arrangements:

Availability for use by non-PNL researchers is subject to management decisions concerning scheduling, resource, priority of use, and personnel accessibility. In addition, PNL operations permit Laboratory staff to use most of the facilities and equipment in the PNL in work for non-DOE sponsors on a cost recovery basis.

User Contact:

Name: L. H. Toburen

Title: Manager, Radiological Physics

Commercial Telephone No.: (509) 376-3348

FTS Telephone No.: 444-3348

**Name/Type of
User Facility:**

Low Level Radionuclide Measurement Instrumentation

Location:

Pacific Northwest Laboratory
P. O. Box 999
Richland, WA 99352

**Brief Narrative
Description:**

Unexcelled low-level radionuclide measurement instruments are available which provide the capability to instrumentally detect and measure radionuclides in complex mixtures and matrices without prior chemical separation. The systems use multiple detectors (generally NaI (Ti), Ge(Li), or Intrinsic Germanium or an assortment of these) inside other detectors used as background-reducing shields and further protected from background interferences by additional shields of borated paraffin and lead. The multiple detectors provide high selectivity through coincidence or anticoincidence operation and high sensitivity is obtained by low background construction practices and the extensive shielding used. Multichannel analyzers and dedicated computers provide immediate data evaluation and presentation. The systems are used on programs from the basic nuclear physics of neutrinos to the measurement of ultralow quantities of radionuclides in waste streams and the environment.

User Arrangements:

Availability for use by non-PNL researchers is subject to management decisions concerning scheduling, resource, priority of use, and personnel accessibility. In addition, PNL operations permit Laboratory staff to use most of the facilities and equipment in the PNL in work for non-DOE sponsors on a cost recovery basis.

User Contact:

Name: N. A. Wogman

Title: Manager, Radiological &
Inorganic Chemistry

Commercial Telephone No.: (509) 376-3003

FTS Telephone No.: 444-3003

Shielded low-level multidetector assembly.

Surface Science Facility

One of the analytical systems available in the surface science facility. This system has AES, XPS, and SIMS.

**Name/Type of
User Facility:**

Surface Science Facility

Location:

Pacific Northwest Laboratory
P. O. Box 999
Richland, Washington 99352

**Brief Narrative
Description:**

A multiprobe analysis capability is available to perform experiments on free surfaces, solid-solid interfaces and solid-gas interfaces. The type of information obtained from the analytical equipment include atomic composition, three-dimensional atomic distributions and chemical forms (valence state) of the elements at the surface or interface. The surface science facility has four analytical instruments. Auger Electron Spectroscopy (AES) is used to identify elemental distribution on a surface layer and to develop compositional distribution along the surface and depth profiles. X-ray Photoelectron Spectroscopy

(XPS), sometimes called Electron Spectroscopy for Chemical Analyses (ESCA) is used to determine surface composition and elemental chemistry (valence). Secondary Ion Mass Spectroscopy (SIMS) is used to detect elements, especially trace elements, in concentrations as low as 1 ppm. The sensitivity of SIMS ranges from 10^{-4} to 10^{-8} atom fraction, while that of AES and XPS is 10^{-3} atom fraction. The SIMS has a mass resolution of 1/2 amu which allows isotope identification and it has the ability to detect hydrogen. Rutherford Backscattering (RBS) and Nuclear Resonance Spectroscopy are used to provide absolute concentration measurements and nondestructive depth profiles. RBS is done with a 2 MEV Van de Graaf accelerator with p, d, ^3He and ^4He ions. Also a tandem accelerator is used with ^{15}N for hydrogen analyses. The facility has a wide range of specimen handling capabilities which includes: heating to 1000°C , cooling to -150°C , in situ slow tensile fracture and in situ straining of foil samples. Specimens can be exposed to a variety of gases including H_2S at a temperature during analysis. Two of the AES/XPS systems have a rapid specimen introduction chamber and computer data acquisition and spectrometer control. It is possible to perform AES, XPS, and SIMS on one location on the specimen in the same apparatus without having to move the specimen. One AES instrument has a thin window energy dispersive x-ray analyzer for simultaneous bulk analysis. This x-ray analyser has a thin light barrier window which allows low Z elements such as carbon and oxygen to be measured.

User Arrangements:

Availability for use by non-PNL researchers is subject to management decisions concerning scheduling, resource, priority of use, and personnel accessibility. In addition, PNL operations permit Laboratory staff to use most of the facilities and equipment in the PNL in work for non-DOE sponsors on a cost recovery basis.

User Contact:

Name: M. T. Thomas

Title: Technical Leader, Surface Science

Commercial Telephone No.: (509) 375-2757

FTS Telephone No.: 375-2757

**Name/Type of
User Facility:**

Materials Characterization Center

Location:

Pacific Northwest Laboratory
P. O. Box 999
Richland, Washington 99352

**Brief Narrative
Description:**

The Materials Characterization Center assesses the performance of nuclear waste materials in candidate waste systems required for the delivery of qualified waste materials for all repository concepts under consideration. Certified analytical and testing methods and waste materials data are being provided for use in the evaluation, design, licensing, and safety analysis of the waste treatment process and in the interim storage transportation and repository disposal of treated wastes.

The Center operates a set of shielded research quality analytical instruments that permit measurements to be made on full-level short-cooled high-level waste

materials to the same high degree of precision and accuracy previously only attainable on simulated nonradioactive waste materials. The instruments include a shielded X-ray diffraction (XRD) unit, an inductively-coupled plasma emission spectrometer (ICP) and a scanning electron microscope (SEM).

User Arrangements:

Availability for use by non-PNL researchers is subject to management decisions concerning scheduling, resource, priority of use, and personnel accessibility. In addition, PNL operations permit Laboratory staff to use most of the facilities and equipment in the PNL in work for non-DOE sponsors on a cost recovery basis.

User Contact:

Name: J. E. Mendel

Title: Manager, Materials
Characterization Center

Commercial Telephone No.: (509) 375-2905

FTS Telephone No.: (509)375-2905

**Name/Type of
User Facility:**

Gas Chromatography/Mass Spectrometry

Location:

Pacific Northwest Laboratory
P. O. Box 999
Richland, Washington 99352

**Brief Narrative
Description:**

A Gas Chromatograph/Mass Spectrometer (GC/MS) permits the qualitative and quantitative analyses of organic components for a wide range of sample types. Principal uses include qualitative and quantitative analyses of coal liquefaction and gasification products and effluents. The GC/MS systems have provided key information, which when coupled with biological data, has led to the identification of the materials responsible for mutagenic and carcinogenic responses in animal test systems. The high resolution mass spectrometer, coupled with a gas chromatograph input led to the definitive study on the effect of electrical fields on circadian rhythm as determined by measurement of minute trace compounds in brain extracts.

GC/MS capabilities include 3 quadrupole instruments and a high resolution mass spectrometer system. Two of the quadrupole systems are equipped with dual systems and extensive mass storage capability. The high resolution mass spectrometer is operable in many modes including the use of gas chromatograph, solids probe and field emission sources. The instrument is expected to be available for fast atom bombardment capability.

User Arrangements:

Availability for use by non-PNL researchers is subject to management decisions concerning scheduling, resource, priority of use, and personnel accessibility. In addition, PNL operations permit Laboratory staff to use most of the facilities and equipment in the PNL in work for non-DOE sponsors on a cost recovery basis.

User Contact:

Name: W. D. Felix

Title: Manager, Chemical Methods & Kinetics

Commercial Telephone No.: (509) 376-5247

FTS Telephone No.: 444-5247

Sandia National Laboratories, Livermore

Sandia National Laboratories, Albuquerque

"Sandia National Laboratories are located in Albuquerque, New Mexico; Livermore, California; and near Tonopah, Nevada. Established in 1945 to assemble a Nuclear Weapon stockpile and to develop new weapons, Sandia has evolved into a multiprogram laboratory. Its primary mission remains the development of non-nuclear portions of nuclear weapon systems. Sandia also conducts research and development programs in the follow-

ing energy fields: fossil, solar, geothermal, magnetic fusion, fission, nuclear waste management, environment, and energy research."

Designated User Facilities

Combustion Research Facility (Livermore, CA)
Central Receiver Test Facility (Albuquerque, NM)

Combustion Research Facility

Laser Doppler Velocimetry Experiment

Low Pressure Ammonia Flame Measurements at the Combustion Research Facility

**Name/Type of
User Facility:**

Combustion Research Facility

Location:

Sandia National Laboratories
Livermore California 94550

**Brief Narrative
Description:**

The Combustion Research Facility (CRF), dedicated in 1980, promotes research in combustion sciences and provides support to visiting scientists from both industry and universities. Current research activities at the CRF emphasize development and application of new diagnostic techniques to the study of combustion processes.

Complete facilities for resident and visiting researchers are available: office for 60 staff, a meeting room accommodating 250 people, a laboratory building housing special laser systems, a dedicated VAX computer, access to a Cray 1 computer, and 14 independent experiments which include low pressure flames,

high-pressure flames, turbulent flames, coal combustion flow reactors, multifuel flow reactors, combustion bombs, internal combustion engines, spectroscopy laboratories, and kinetics laboratories.

User Arrangements:

Prospective participants should submit a brief proposal to the CRF. Criteria for selection include technical merit, the extent to which the facility is to be used, relationship to DOE program objectives, and availability of specific apparatus. Researchers with active government contracts can usually make arrangements on an informal basis with the contract manager.

User Contact:

Name: Danny L. Hartley

Title: Director of
Combustion Sciences

Commercial Telephone No.: (415) 422-2747

FTS Telephone No.: 532-2747

Name: Peter L. Mattern

Title: Manager
Combustion Sciences Department
Sandia National Laboratories

Commercial Telephone No.: (415) 422-2520

FTS Telephone No.: 532-2520

**Name/Type of
User Facility:**

Solar Central Receiver Test Facility (CRTF)

Location:

Sandia National Laboratories
Albuquerque, New Mexico, 87185

**Brief Narrative
Description:**

The CRTF consists of 222 focusable, individually controlled heliostats, each with 37 square meters of reflecting surface. These heliostats collect and concentrate more than 5 million watts (thermal) of solar power with a peak flux level of 2.5 megawatts per square meter. The heliostats are positioned north of the 61-meter-tall test tower. The tower has north-facing test bays at heights of 36, 42, and 48 meters, and test bays and knock-out panels facing east and west at heights of 36 and 48 meters.

A number of industrial companies have used the CRTF to test designs of heliostats, high-temperature solar receivers, and a thermal storage system for use in plants for solar electric power. The high-intensity solar beam at the facility has also been used by industry to test ceramic and ablative materials, to simulate aerodynamic heating, for combustion studies, for solar chemistry studies, and for other thermal effects tests.

User Arrangements:

The facility is presently being used for a long-term project in which molten salt will be heated and employed to produce steam for electricity-generation ex-

periments. However, prospective users should contact the manager of the solar central receiver test facility to inquire about facility status, experimental capabilities, and scheduling. Incremental costs of facility operation (manpower and materials) in support of experiments are recovered from user projects.

User Contact:

Name: J. B. Wright

Title: Manager
Solar Central Receiver Department

Commercial Telephone No.: (415) 422-2566

FTS Telephone No.: 532-2566

Name: J. V. Otts

Title: Supervisor
Central Receiver Test Facility Division

Commercial Telephone No.: (505) 844-2280

FTS Telephone No.: 844-2280

Heliostat Mirrors Concentrate Sunlight on a Test Panel Atop the CRTF

Hot Air Receiver Being Evaluated at the CRTF

Savannah River Laboratory

Facilities at Savannah River range from numerous well-equipped laboratories to semi-works-scale plants and include many shielded facilities designed for work with radioactive materials. Among these research facilities are, a heat transfer laboratory with 3 MW of electrical power, a hydraulics test facility, a limnology laboratory, a weather center-analysis laboratory, activation analysis facilities, facilities for handling both small and large amounts of radioactive material, a computer center, analytical chemistry laboratories, and semi-works laboratories for small, intermediate, and

full scale testing of plant equipment and processes. Other programs which have been added to SRL within the past several years include experimental facilities for the Defense Waste Processing Facility, Naval Technology Transfer Laboratory, and test facilities for the Laser Isotope Separation and Plutonium Isotope.

Other User Resources:

Aquatic Research Laboratory

**Name/Type of
User Facility:**

Aquatic Research Laboratory

Location:

Savannah River Laboratory
Aiken, S. C. 29808

**Brief Narrative
Description:**

The Aquatic Research Laboratory consisting of 4 laboratory modules is located on the shore of Par Pond, a 2700-acre recirculating cooling pond for a nuclear reactor. The laboratory facilities include boats for sampling, a supply of Par Pond water, and appropriate aquatic biology measurement capabilities. The laboratory has examined biofouling and biocorrosion of various heat exchanger materials, impact of chlorination on aquatic life and response of the Par Pond ecosystem to discharges of cooling water from the nuclear reactor.

User Arrangements:

This facility is available under a "Facility User Agreement" for use by outside organizations if their impact does not curtail programmatic activities.

User Contact:

Name: E. W. Wilde

Title: Senior Biologist

Commerical Telephone No.: (803) 725-7400

FTS Telephone No.: 239-7400

Savannah River Ecology Laboratory

Savannah River Ecology Laboratory (SREL) conducts extensive studies on the site surrounding the Savannah River Nuclear Plant to determine what negative effects nuclear reactor operations have on the environment and what can be done to minimize those effects. Seen here is a paddle wheel sampler — a water/sediment testing device.

**Designated User
Facilities:**

SR National Environmental Research Park

**Name/Type of
User Facility:**

Savannah River National Environmental Research Park (SR NERP)

Location:

Savannah River Plant near Aiken, South Carolina

**Brief Narrative
Description:**

The United States' First National Environmental Research Park (NERP) consists of 192,000 acres used for the operation of the U.S. Department of Energy's Savannah River Plant (SRP), and offers unique opportunities to study interactions between a nuclear industrial site and the environment.

The site has natural and hot water streams, cooling ponds, forests, fields, and abundant species of plants and wildlife; it is ideal as a research site.

The various areas offer unusual opportunities for observing and comparing ecosystem changes brought about by heated water, flooding, emissions from fossil fuel plants, uptake and retention of radioactive materials, forest management activities, and other industrial stresses on the environment.

User Arrangements:

Scientists from universities, private foundations, and state, local, and federal agencies can propose research at a research park. AT SRP, all research proposals must be reviewed for compatibility with plant activities. Potential participants are encouraged to acquire research funding from agencies and foundations interested in their studies. Previously, NERP research at SRP has been funded by the U. S. Department of Energy, Environmental Protection Agency, Nuclear Regulatory Commission, U. S. Fish and Wildlife Service, National Science Foundation, state agencies, universities, and private foundations.

NERP scientists work closely with one of the onsite contractors to benefit from their familiarity with the site and its operations. The onsite contractors are E. I. du Pont de Nemours & Co., (Savannah River Plant and Savannah River Laboratory), the University of Georgia (Savannah River Ecology Laboratory), and the U. S. Forest Service (Savannah River Forest Station). These contractors can provide the researcher with information on data bases, geography, biota, previous research, the environmental effects of SRP operations, and administrative procedures.

User Contact:

NERP
U.S. Department of Energy
Savannah River Operations Office
P.O. Box A
Aiken, SC 29808

Commerical Telephone No: (803) 725-3965

FTS Telephone No: 239-3965

Solar Energy Research Institute

The Solar Energy Research Institute (SERI), located in Golden, Colorado, was established in 1977 as the national center for federally sponsored solar energy research and development. SERI's focus is on the exploration of those areas within the renewable energy technologies that have the greatest promise. Current major efforts are in solar electric conversion, solar fuels and chemicals, and solar thermal and materials. In addition to the User Resources listed below, other special laboratories/facilities are available in photovoltaic energy, alcohol fuels, biomass energy, solar energy storage, solar thermal energy, active heating and cooling, passive heating and cooling, building energy research and development, ocean energy, and basic energy sciences for collaborative research and for guest researchers such as

postdoctoral and sabbatical researchers and industry research associates. SERI is operated for the Department of Energy by Midwest Research Institute.

Other User Resources:

Photovoltaic Devices and Measurements Laboratory
Surfaces and Interfaces Laboratory
Heat and Mass Transfer Research Laboratory
Mid-Temperature Collector Research Facility
Modular Industrial Solar Retrofit Facility
SERI Daylighting Laboratory
Mobile Wind Acoustic Noise Characterization Laboratory
Gasification and Pyrolysis Facility

Photovoltaics Devices and Measurement Laboratory

**Name/Type of
User Facility:**

Photovoltaic Devices and Measurements Laboratory

Location:

Solar Energy Research Institute
1617 Cole Boulevard
Golden, CO 80401

**Brief Narrative
Description:**

The PV Devices and Measurements Laboratory is designed to provide full support to researchers concerned with interfacial, electro-optical and chemical problems in the development of photovoltaic devices. It provides a combination of equipment, resources, and scientific and technical skills, unique in the field. Some of the capabilities are:

Auger Electron Spectroscopy, AES
(Scanning capabilities; 300Å, 1500Å single-pass analyzers; 2 μm double pass analyzer; pulse counting or lockin detection)

Secondary Ion Mass Spectroscopy, SIMS

(Three quadrupole mass analyzer system; 1-1000 amu; 100 μm and 30 μm minimum diameter ion guns)

Secondary Ion Mass Spectroscopy, High-Resolution SIMS

Cameca 3F, dedicated analysis system, ion imaging, $10^{14}/\text{cm}^3$ detection limit, duoplasmatron and cesium ion sources)

X-Ray Photoelectron Spectroscopy, XPS

(10kV Mg Anode; 30kV Mg/Al anode)

Ultraviolet Photoelectron Spectroscopy, UPS

(Multi-line UPS source)

Electron Energy Loss Spectroscopy, EELS

(Double-pass analyzer system)

Molecular Beam Epitaxy, MBE

(III-V growth, AES, RHEED, SIMS, 8-sources, dual chamber, sample introduction system)

Electron Probe microanalyzer, EPMA

(High spatial resolution energy dispersive and wavelength spectroscopy, cathodoluminescence, EBIC, digital beam con mapping, 70Å resolution imaging)

Scanning Electron Microscope, SEM (better than 60Å resolution, EBIC, electron channeling, EDX)

Scanning Transmission Electron Microscope, STEM

(EDX, high spatial resolution)

X-Ray Fluorescence

X-Ray Diffraction

Image Analyzer

Acoustic Microscope

User Arrangements:

Access to this laboratory can be provided to academic or industrial users, subject to DOE program priorities. User fees to be determined in accordance with DOE policy and SERI contractual requirements. The facility is unclassified and is not designed for handling classified studies; however, arrangements can be made for the protection of proprietary rights.

User Contact:

Name: Larry Kazmerski

Title: Chief, PV Devices & Measurements Branch

Commercial Telephone No.: (303) 231-1115

FTS Telephone No.: 327-1115

Surfaces and Interfaces Laboratory

**Name/Type of
User Facility:**

Surfaces and Interfaces Laboratory

Location:

Solar Energy Research Institute
1617 Cole Boulevard
Golden, CO 80401

**Brief Narrative
Description:**

This laboratory is designed and equipped to undertake exacting studies of surface and interface characteristics, with particular attention on the degradation of materials under environmental stress. Current studies are concerned with the effects of environment, including sunlight, on glass and glass-metal interfaces, and on the development of reflector systems resistant to such degradation.

Smooth Surface Profilometers—used for measuring 20 micron or smaller step heights or pit depths. A Sloan Dek-Tak is used for samples with surface variations having widths larger than 3 mm and a Tencor Alpha-Step is used for samples having variation widths smaller than 3 mm.

Physical Electronics 545C Surface Analysis System—contains Scanning Auger Microscopy (SAM) and Secondary Ion Mass Spectroscopy (SIMS) subsystems as well as a two-chamber fast entry system with a reaction chamber and a UHV analysis chamber. The 545C is used for absorbed current or secondary electron imaging to 500 $\times$ magnification and for small area elemental analysis. The SAM unit has an analysis diameter of ≥ 3 μm and the SIMS unit has an analysis diameter of ≥ 100 μm .

Leybold-Heraeus, LHS-10, Surface Analysis System—contains X-ray Photoelectron Spectroscopy (XPS), Ion Scattering Spectroscopy (ISS), SIMS, SAM, and Residual Gas Analysis (RGA) subsystems as well as data storage and manipulation using an HP-1000 computer. The system also has a three-chamber fast entry system consisting of a high pressure chamber, an UHV reaction chamber, and a UHV analysis chamber.

User Arrangements:

Access to this laboratory can be provided to academic or industrial users, subject to DOE program priorities. User fees to be determined in accordance with DOE policy and SERI contractual requirements. The facility is unclassified and is not designed for handling classified studies; however, arrangements can be made for the protection of proprietary rights.

User Contact:

Name: Gordon Gross

Title: Chief, Materials Research Branch

Commercial Telephone No.: (303) 231-1228

FTS Telephone No.: 327-1228

Heat and Mass Transfer Research Laboratory

Name/Type of User Facility: Heat and Mass Transfer Research Laboratory

Location: Solar Energy Research Institute
1617 Cole Boulevard
Golden, CO 80401

Brief Narrative Description: The laboratory is designed for the study of methods of transferring heat and mass under the small driving forces which often exist in solar conversion processes. Adjacent warm and cold water loops in a 4-ft. by 6-ft. test chamber have the capacity to supply and remove one million Btu per hour. The instrumented test chamber can be evacuated or filled with non-condensable gases for varied experimental purposes.

At the present time, the laboratory is being used to evaluate the performance of Claude-cycle concepts, but it has flexibility for the measurement of characteristics of a variety of evaporator and condenser designs.

User Arrangements: Access to this laboratory can be provided to academic or industrial users, subject to DOE program priorities. User fees to be determined in accordance with DOE policy and SERI contractual requirements. Arrangements can be made for the protection of proprietary rights.

User Contact: Name: Frank Kreith

Title: Chief, Thermal Research Branch

Commercial Telephone No.: (303) 231-1109

FTS Telephone No.: 327-1109

Name/Type of User Facility: Mid-Temperature Collector Research Facility

Location: Solar Energy Research Institute
1617 Cole Boulevard
Golden, CO 80401

Brief Narrative Description: MTCRF is designed to investigate a variety of technical issues relating to the thermal performance of solar collectors. Its test loop can be connected to up to three collector work stations permitting the evaluation of the performance of individual collections as well as hybrid systems. A variety of sensors allow precise measurements of operating and environmental characteristics.

MTCRF has been used to evaluate parabolic and flat-plate collectors, seasonally-adjusted and tracking systems, and a number of innovative designs.

User Arrangements: Access to this facility can be provided to academic or industrial users, subject to DOE program priorities. User fees to be determined in accordance with DOE policy and SERI contractual requirements. Arrangements can be made for the protection of proprietary rights.

User Contact:

Name: John Thornton

Title: Chief, Thermal Systems and Engineering Branch

Commercial Telephone No.: (303) 231-1269

FTS Telephone No.: 327-1269

Mid-Temperature Collector Research Facility

**Name/Type of
User Facility:**

Modular Industrial Solar Retrofit Facility

Location:

Solar Energy Research Institute
1617 Cole Boulevard
Golden, CO 80401

**Brief Narrative
Description:**

In an attempt to standardize solar components and systems for industrial process heat applications, the Department of Energy has sponsored the design, construction, installation and test of five modular designs for retrofitting existing steam processes. Four of the systems utilizing organic working fluid systems are being tested by Sandia National Laboratory. SERI is testing a system that uses pressurized water as the working fluid. The SERI facility is in two parts:

Qualification Test System (QTS)

The main elements of the QTS are:

Collector Field. 2320 ft² (216 m²) representing 1/12 of a full-size MISR system of single axis tracking, parabolic trough, line-focus solar collectors. The two 120-ft rows have an east-west orientation for this evaluation with 20-ft nominal collector spacing. A master controller and two local controllers provide tracking signals to 24Vdc direct-drive motors on each collector assembly. The working fluid in these collectors is pressurized water with a design outlet temperature of 520° F (271° C) at about 820 psig.

Equipment Skid. Under peak solar insolation the skid is capable of generating up to 5500 lb/h of 250 psig steam from its kettle-type heat exchanger. Also on the skid, which weighs about 60,000 lb., are an accumulator tank, a thermal fluid circulation pump, an air compressor, interconnecting piping, and control and instrumentation components.

Test Facility

The major elements of the test facility are:

Thermal Fluid Heater. A propane-fired 4,000,000 Btu/hr heater simulates the remaining 11/12 of a full sized MISR collector field by raising the temperature of the thermal fluid the same amount as the fluid is heated in the QTS collector field. This permits full load testing of the equipment skid.

Deaerator. The deaerating feedwater heater and condensate storage unit conditions the feedwater supplied to the steam generator by removing dissolved gases and other impurities and preheats the feedwater when necessary.

Condenser. This unit condenses the steam generated by the QTS and dissipates surplus heat to the atmosphere.

Propane Tanks. 1000-gallon tanks store liquid fuel for the auxiliary heater.

Propane Vaporizer. The unit vaporizes and pressures propane for the thermal fluid heater.

Equipment Shed. A weathertight shed houses auxiliary mechanical and electrical equipment.

Control Trailer. The trailer contains office space and the Data Acquisition and Control System (DACS). An HP 9845B minicomputer is the heart of the DACS, which records information from facility controls and instrumentation and processes performance data.

User Arrangements:

Access to this laboratory can be provided to academic or industrial users, subject to DOE program priorities. User fees to be determined in accordance with DOE policy and SERI contractual requirements. The facility is unclassified and is not designed for handling classified studies; however, arrangements can be made for the protection of proprietary rights.

User Contact:

Name: John Thornton

Title: Chief, Thermal Systems and Engineering Branch

Commercial Telephone No.: (303) 231-1269

FTS Telephone No.: 327-1269

Modular Industrial Solar Retrofit Facility

**Name/Type of
User Facility:**

SERI Daylighting Laboratory

Location:

Solar Energy Research Institute
1617 Cole Boulevard
Golden, CO 80401

**Brief Narrative
Description:**

The use of natural light as a substitute for artificial light in commercial buildings offers significant savings in energy costs. Sky conditions are continuously mapped and maintained in a reference data base. The facility is the only temperate clear climate daylighting laboratory in the United States.

All of the instrumentation associated with the Lab is mounted on top of a mobile home which contains data acquisition equipment. The 15+ foot elevation of all instruments and models above grade allows a relatively unobstructed view of the horizon in all directions.

In addition to data being collected directly at the Lab, there are many other meteorological variables being monitored by other groups at the SERI test site. For example, data readily available include wet and dry bulb temperatures, humidity and wind speed. This data is used to correlate daylight availability with meteorological data. Moreover, the Lab has facilities to monitor daylight levels inside scale models of building configurations. These models are used to characterize the daylighting performance of various building configurations, develop and validate daylight prediction techniques, and to examine the impact of daylighting on building energy consumption.

User Arrangements:

Access to this laboratory can be provided to academic or industrial users, subject to DOE program priorities. User fees are to be determined in accordance with DOE policy and SERI contractual requirements. Arrangements can be made for the protection of proprietary rights.

User Contact:

Name: Meir Carasso

Title: Chief, Buildings Systems Research Branch

Commercial Telephone No.: (303) 231-1353

FTS Telephone No.: 327-1353

SERI Daylighting Laboratory

Mobile Wind Acoustic Noise Characterization Laboratory

**Name/Type of
User Facility:**

Mobile Wind Acoustic Noise Characterization Laboratory

Location:

Solar Energy Research Institute
1617 Cole Boulevard
Golden, CO 80401

**Brief Narrative
Description:**

The laboratory is designed for analysis and data reduction in connection with research and development programs on Wind Turbines.

All data recorded on instrumentation tape for playback from the SERI Mobile Lab, NASA-Lewis Turbine Site tapes are brought here for detailed analysis.

One of the major capabilities is the identification of the dominant physical mechanisms responsible for the observed characteristics of both the normally audible and low frequency regions of the radiated acoustic pressure spectrum. Another capability is the identification of the interaction between low-frequency acoustic radiation associated with the operation of large wind turbines and the structural, pneumatic, and acoustic resonances of the interiors of typical residential buildings.

User Arrangements: Access to this laboratory is limited to DOE Wind program priorities.

User Contact: Name: Roland Hulstrom

Title: Chief, Renewable Resource Assessment & Instrumentation Branch

Commercial Telephone No.: (303) 231-1220

FTS Telephone No.: 327-1220

Name/Type of User Facility: **Gasification and Pyrolysis Facility**

Location: Solar Energy Research Institute
1617 Cole Boulevard
Golden, CO 80401

Brief Narrative Description: The gasification and pyrolysis facility consists presently of two units. A high bay engineering laboratory in the new Field Test Laboratory Building contains (1) a pressurized, O₂ or air, one-ton/day downdraft gasifier for synthesis gas product on with a variety of feedstocks; (2) a test bench, with associated analytical equipment, for characterizing small downdraft gasifiers; and (3) a one-ton/day entrained flow, ablative pyrolysis gasifier for optimization of olefins, aromatics, and other valuable intermediate pyrolysis products.

The second unit is a unique mass spectrometer sampling system for the real time, direct observation of the molecular processes of pyrolysis of carbonaceous materials under realistic heating conditions and environments. This system is located in SERI's main research building.

At the present time these systems are used for the study of biomass, peat, and MSW.

User Arrangements: Access to this laboratory can be provided to academic or industrial users, subject to DOE program priorities. User fees to be determined in accordance with DOE policy and SERI contractual requirements. The facility is unclassified and is not designed for handling classified studies; however, arrangements can be made for the protection of proprietary rights.

User Contact: Name: Thomas A. Milne

Title: Chief, Thermochemical & Electrochemical Research Branch

Commercial Telephone No.: (303) 231-1440

FTS Telephone No.: 327-1440

Gasification and Pyrolysis Facility

Stanford Linear Accelerator Center

The Stanford Linear Accelerator Center (SLAC) is operated by Stanford University for the Department of Energy. The Center's main instrument for support of research is a 2-mile-long linear electron accelerator that can produce intense beams of electrons at energies up to 30 billion electron volts (GEV), or produce beams of positrons with energies up to 15 GEV. SLAC researchers conduct experimental and theoretical research in high energy physics, and developmental work in new techniques for particle acceleration and for experimental instrumentation. SLAC facilities include the accelerator for producing the high energy particle

beams, two electron-positron colliding beam storage rings, plus a complement of large experimental detection devices used in particle physics experiments, including a bubble chamber and several magnetic spectrometers of different design.

Designated User Facilities

- Positron-Electron Storage Ring (PEP)
- SPEAR Storage Ring
- Spectrometer Facilities
- Hybrid Bubble Chamber Facility

PEP (Positron-Electron Storage Ring)

Technician installing the quadruple and bend magnets on one of the injection lines at Positron-Electron Storage Ring (PEP)

**Name/Type of
User Facility:**

PEP (Positron-Electron Storage Ring)

Location:

Stanford Linear Accelerator Center
2575 Sand Hill Road
Menlo Park, CA 94025

**Brief Narrative
Description:**

PEP is a Positron-Electron collider with a maximum energy of 18 GeV per beam with an average luminosity of 3×10^{30} . It has six interaction regions five of which have large experimental halls to accommodate the large detectors used in this field of research. At the time of this writing, each interaction region is occupied by a large detector. Proposals for experiments using these detectors will be considered.

The facility has been in use since 1980 by collaborations from universities throughout the U.S. and from other countries.

User Arrangements:

Proposals for specific experiments using SLAC facilities should be submitted to the SLAC Experimental Program Advisory Committee (EPAC). The proposal will then be considered at the next EPAC meeting. The decision to accept or reject the proposal is made by the SLAC Director with the advice of the EPAC. Scheduling depends on availability of the facility and of manpower and funds. There are no user fees. Apparatus and procedures must conform to SLAC safety standards.

User Contact:

Name: L. P. Keller

Title: Head
Experimental Facilities Department

Commercial Telephone No.: (415) 854-3300

FTS Telephone No.: 461-9300

SPEAR

Aerial view of SSRL and the SPEAR ring. SSRL is located in the two experimental halls on the North and South side of the ring.

**Name/Type of
User Facility:**

SPEAR

Location:

Stanford Linear Accelerator Center
2575 Sand Hill Road
Menlo Park, CA 94025

**Brief Narrative
Description:**

SPEAR is a 4.0 GeV positron-electron storage ring. It has two interaction regions where detectors may be installed for high energy physics experiments. Since 1972, experimental work at SPEAR and at the similar German Storage ring, DORIS, has established much of the fundamental physics in this energy region. Experimental physics areas under way at SPEAR are the F meson, charmed bayrons, the psi family, D mesons, the tau lepton, the total hadronic cross section in the 4-5 GeV region and the total hadronic cross section above 5 GeV.

User Arrangements:

Proposals for specific experiments using SLAC facilities should be submitted to the SLAC Experimental Program Advisory Committee (EPAC). The decision to accept or reject the proposals is made by the SLAC director with the advice of the EPAC. Scheduling depends on the availability of the facility, manpower and funds. There are no user fees. Apparatus and procedures must conform to SLAC safety standards.

User Contact:

Name: K. P. Keller

Title: Head
Experimental Facilities Department

Commercial Telephone No.: (415) 854-3300

FTS Telephone No.: 461-9300

**Name/Type of
User Facility:**

Spectrometer Facilities

Location:

Stanford Linear Accelerator Center
2575 Sand Hill Road
Menlo Park, CA 94025

**Brief Narrative
Description:**

The SLAC Spectrometer Facilities consist of 3 spectrometers: 20 GeV, 8 GeV, and 1.5 GeV and all necessary controls and instrumentation. They have been in use since 1967 for high energy scattering experiments. They have been used by experimenters from universities throughout the U.S. and from other countries. All of the spectrometers are mounted on wheeled carriages which ride on circular rails. The fixed end of each spectrometer is connected to a common pivot point at which the experimental targets are located. The path of the incoming electron or photon beams comes in from the Beam Switchyard, through the target, and then out to a power-absorbing beam dump. Both elastic and inelastic electron scattering experiments have been performed as well as photoproduction research.

User Arrangements:

Proposals for specific experiments using SLAC facilities should be submitted to the SLAC Experimental Program Advisory Committee (EPAC). The proposal will then be considered at the next EPAC meeting. The decision to accept or reject the proposal is made by the SLAC Director with the advice of the EPAC. Scheduling depends on availability of the facility and of manpower and funds. There are no user fees. Apparatus and procedures must conform to SLAC safety standards.

User Contact:

Name: L. P. Keller

Title: Head
Experimental Facilities Department

Commercial Telephone No.: (415) 854-3300

FTS Telephone No.: 461-9300

**Name/Type of
User Facility:****SLAC Hybrid Bubble Chamber Facility****Location:**

Stanford Linear Accelerator Center
2575 Sand Hill Road
Menlo Park, CA 94025

**Brief Narrative
Description:**

The SLAC Hybrid Facility is an instrument for High Energy Physics research. It consists of a system of multiwire proportional chambers, Cerenkov and scintillation counters and an on-line computer which in 2-3 msec can make a decision whether to trigger the lights in the 40 inch hydrogen/deuterium bubble chamber.

The facility has been in use since 1976 by collaborations from universities throughout the U.S. and from other countries.

User Arrangements:

Proposals for specific experiments using SLAC facilities should be submitted to the SLAC Experimental Program Advisory Committee (EPAC). The proposal will then be considered at the next EPAC meeting. The decision to accept or reject the proposal is made by the SLAC Director with the advice of the EPAC. Scheduling depends on availability of the facility and of manpower and funds. There are no user fees. Apparatus and procedures must conform to SLAC safety standards.

User Contact:

Name: L. P. Keller

Title: Head
Experimental Facilities Department

Commercial Telephone No.: (415) 854-3300

FTS Telephone No.: 461-9300

**Name/Type of
User Facility:**

Stanford Synchrotron Radiation Laboratory (SSRL)

Location:

Stanford Linear Accelerator Center
Building 120
2575 Sandhill Road
Menlo Park, CA 94205

**Brief Narrative
Description:**

SSRL is a National Users' Research Laboratory for the application of synchrotron radiation to research in biology, chemistry, engineering, materials science, medicine and physics. SSRL is also developing specialized techniques and instrumentation for the generation and experimental utilization of synchrotron radiation. The most important of these efforts are the continuing development of wiggler and undulator sources for ultra-high photon fluxes and brightnesses. The primary experimental programs are in photoemission, x-ray diffraction and x-ray absorption spectroscopy. In addition, there are programs involving fluorescent lifetime measurements and occasional work in x-ray microscopy and lithography. SSRL functions in a parasitic mode for 50% of the operations shifts on SPEAR. At these times, the energy and current in the storage ring are determined by the high energy physics program. During the other 50%, the ring is dedicated to the production of synchrotron radiation. SSRL currently provides excellent research facilities on 17 simultaneously operating experimental stations functioning on five beam lines.

User Arrangements:

To obtain experimental time at SSRL, users submit proposals for either single experiments or a program of experiments. These proposals are reviewed by the SSRL Proposal Review Panel with the assistance of the SSRL staff and outside evaluators. Experiments are scheduled at SSRL based on the ratings provided by the Proposal Review Panel and other relevant factors, such as the length of time the experiment has been waiting to receive beam time. Requests for beam time on most SSRL experimental stations has historically exceeded the available time. There are no costs associated with non-proprietary use of the beam time and there are no charges for incidental services provided by the SSRL staff. Charges are made for special materials, SLAC services, etc., and all users must provide funds to cover such costs as well as their travel and living costs while at SSRL. Each experimenter must have his institution/firm sign a User Agreement covering intellectual rights and indemnification. Further information on all of the above can be obtained from the booklet "SSRL Proposal Guidelines and General Information" available from the facility on request.

User Contact:

Name: Katherine Cantwell

Title: Assistant to the Director

Commercial Telephone No.: (415) 854-3300 ext 3191

FTS Telephone No.: 461-9300

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