



***Oak Ridge National Laboratory
Request for Proposals
DE-RP05-99OR22725***

Oak Ridge National Laboratory Overview

**Ed Cumesty
Assistant Manager for Laboratories**

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DOE Mission

To foster a secure and reliable energy system that is environmentally and economically sustainable, to be a responsible steward of the Nation's nuclear weapons, to clean up our own facilities, and to support continued United States leadership in science and technology

Oak Ridge Operations Office

Employment Breakout

EOY 1998 Federal Ceilings*

-ETTP	20
-Oak Ridge National Lab	45
-Oak Ridge Operations	474
-Paducah	9
-Portsmouth	13
-TJNAF	8
-Weldon Springs Site Office	8
-Y-12	30
Total	607

EOY 1998 Contractor Projections

-ORISE	640
-Oak Ridge National Lab	4,200
-Oak Ridge Operations (K-25, Paducah, & Portsmouth)	500
-TJNAF	500
-Weldon Springs	300
-Y-12	5,500
Total	13,540

LEGEND

 Operations Office

 Area Office

 Facilities



* Updated March 23, 1998 Filename:DOE.PRS



ORNL Missions

In support of the Department of Energy's missions, ORNL conducts basic and applied research and development to create scientific knowledge and technological solutions that strengthen the nation's leadership in key areas of science; increases the availability of clean, abundant energy; restores and protects the environment; and contributes to national security.



Oak Ridge National Laboratory

Staff: 4500 total; 1500 scientists and engineers

Budget: \$550 million; 80 percent Department of Energy,
20 percent work for other agencies

Replacement cost of buildings: \$7 billion

Total land area: Approximately 35 square miles

Guests: 4,000 annually; one quarter from industry

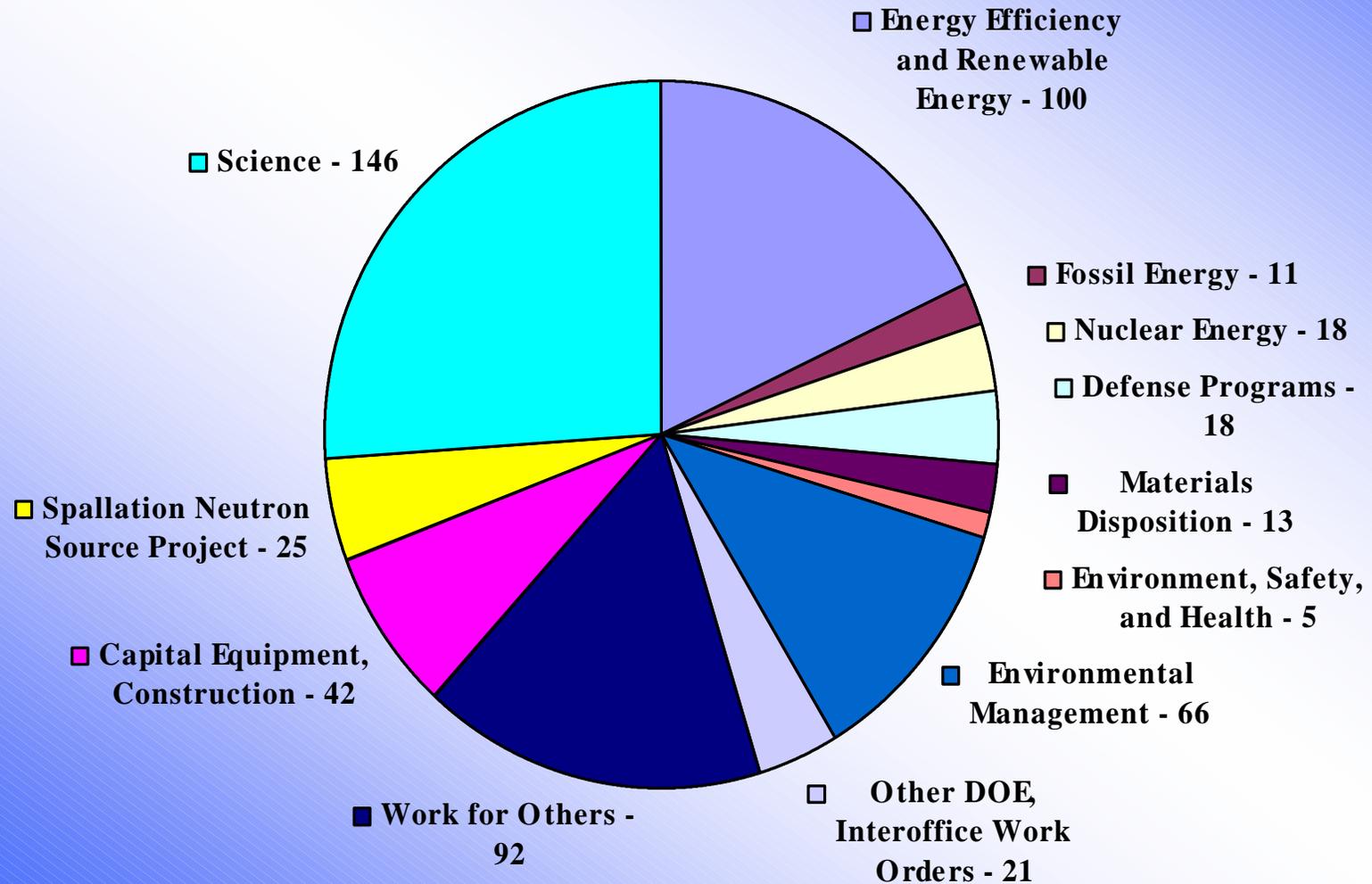
Visitors: 30,000 annually, plus 10,000 pre-college students



FY 1999 ORNL Projected Costs (in millions)

Total \$557 Million

(3/25/99)





Top R&D 100 Award Winners DOE National Laboratories

- Oak Ridge National Laboratory 96
- Lawrence Livermore National Laboratory 75
- Argonne National Laboratory 70
- Los Alamos National Laboratory 67
- Sandia National Laboratory 52
- Pacific Northwest National Laboratory 31



Key Research and Development Activities

Science and Technology

- Neutron science
- Materials science and engineering
- Genetics, genomics, and biotechnology
- Nuclear physics and astrophysics with radioactive ion beams
- Analytical and separations chemistry
- Fusion science and technology
- Isotope production
- Environmental and social sciences
- Computational sciences

Energy Resources

- Energy-efficient technologies for buildings, industrial, transportation, and utility end-use
- Applied materials in support of energy efficient technologies and fossil fuel use
- Nuclear technology and safety
- Biomass: renewable energy feedstock and conversion technologies
- Assessing natural energy use and projections of future energy supply and demand



Key Research and Development Activities (continued)

Environmental Quality

- Environmental technology development
- Health and environmental risk assessment

National Security

- Management and disposition of weapons-related nuclear materials
- Development of technologies that promote nonproliferation and international nuclear safety and safe stockpile stewardship



ORNL Core Competencies

- Neutron Based Science and Technology
- Computational Science and Advanced Computing
- Biological and Environmental Sciences and Technology
- Advanced Materials Synthesis, Processing, and Characterization
- Instrumentation, Controls, and Measurement Science and Technology
- Energy Production and End-use Technology



Technology Partnerships

- Approximately 161 active CRADAs with \$20.6M “funds in”
- Averaged 95 patent filings per year (1992-1998)
- Averaged 35 licenses per year (1994-1998)
- Averaged 4 East Tennessee “new business” starts with license per year (1994-1997)



ORNL User Facilities

Major User Facilities

Users

● Buildings Technology Center	132
● High Temperature Materials Laboratory	156
● Holifield Radioactive Ion Beam Facility	46
● Metals Processing Laboratory	55
● Neutron Scattering Facilities at HFIR	148
● National Environmental Research Park	136
● Shared Research Equipment Program	83
● Surface Modification and Characterization Research Facility	62

Other User Facilities

- Atomic Physics EN Tandem Accelerator
- Bioprocessing R&D Center
- Californium User Facility
- Computational Center for Industrial Innovation
- Oak Ridge Electron Linear Accelerator
- Metrology R&D Laboratories
- Mouse Genetics Research Facility

NOTE:

- FY 1997 Data
- 972 Experimenters from 342 organizations
- Includes 161 ORNL users
- Approximately 1000 users/year are estimated for SNS



High Flux Isotope Reactor (HFIR)

- **Mission:** HFIR is a user facility for scientific research in the area of neutron science and for the production of radiosotopes for scientific research and medical applications. The facility is also used for irradiation services and isotope production work for others.
- **Age:** HFIR achieved full power operation in September 1966.
- **Program Sponsorship:** The Office of Basic Energy Sciences (SC-10) exercises overall programmatic and scientific research responsibility for the HFIR. The Office of Nuclear Energy, Science and Technology (NE) is responsible for the safety and effectiveness of HFIR operations.
- **Items of Note:** Planning is underway to upgrade the scientific capability of HFIR in the year 2000. This upgrade will include installation of a cold neutron source facility, much improved user facilities, and redesign of beam tubes to achieve a purer and brighter neutron beam.



Radiochemical Engineering Development Center (REDC)

- **Mission:** REDC functions as the production, storage, and distribution center for the DOE heavy-element research program (elements 96-100)
- **Age:** Building 7920 of REDC started transuranium element processing in 1966. Building 7930 started processing, storing, and distributing californium in 1970.
- **Program Sponsorship:** The Office of Basic Energy Sciences (SC-10) exercises overall programmatic and scientific research responsibility for REDC. Defense Programs (DP) provides a substantial portion of the funds to operate REDC via the Mark 42 and Californium-252 programs. The Office of Nuclear Energy, Science and Technology (NE) is responsible for the safety and effectiveness of REDC operations.
- **Items of Note:** An EIS is currently in process that proposes REDC as one of the sites to be considered for the production of Pu-238. This would involve substantial upgrades to Building 7930. A Record of Decision is expected by early 2000.



Buildings Technology Center (BTC)

- **Mission:** To identify, develop, and deploy sustainable and energy-efficient building system technologies by forming partnerships between the public sector and private industry for analysis, experiments, technology development, and market outreach. The BTC is the premier U. S. research facility devoted to development of technologies that improve energy efficiency, and environmental compatibility of residential and commercial buildings.
- **Age:** The BTC was officially declared a user facility in 1988. Building 3144, the Buildings Technology Center, is 1980's vintage.
- **Program Sponsorship:** The Deputy Assistant Secretary for Building Technologies (EE-40) exercises overall programmatic responsibility for the BTC.
- **Items of Note:** To date nearly 300 organizations, such as Dow Chemical, Clayton Homes, Association of Home Appliance Manufacturers, and National Roofing Contractors Association, have used this facility. In addition, academic institutions have also served as partners with the BTC.



High Temperature Materials Laboratory (HTML)

- **Mission:** HTML is a world-renowned complex of sophisticated facilities designed to assist American industries, universities, and governmental agencies develop advanced materials, by providing a skilled staff and numerous sophisticated, often one-of-a-kind, pieces of materials characterization equipment.
- **Age:** The HTML building was opened in 1987.
- **Program Sponsorship:** The Deputy Assistant Secretary for Transportation Technologies (EE-30) exercises overall programmatic responsibility for the HTML.
- **Items of Note:** In the “HTML User Program,” either nonproprietary or proprietary research can be performed. The former is provided free of charge if the user publishes the information produced, while the latter requires payment. There were 380 nonproprietary user agreements and 55 proprietary agreements in place at the end 1998. These user agreements have resulted in over 800 approved research proposals in various stages of completion. Industrial user companies range from the very small to the very large (Ford, General Motors, GE, Westinghouse). Several governmental agencies have also sponsored work in the HTML, including NASA.



Holifield Radioactive Ion Beam Facility (HRIBF)

- **Mission:** HRIBF is a user facility capable of providing high-intensity radioactive ion beams for nuclear physics and nuclear astrophysics research. This includes study of nuclear matter and of nova and supernova (exploding stars that produce all the heavy elements, including carbon, nitrogen, and oxygen).
- **Age:** This facility, initially called the Holifield Heavy Ion Research Facility, was first operational in 1980. Recommissioned as the HRIBF in 1997, after major reconfiguration effort.
- **Program Sponsorship:** The Office of High Energy and Nuclear Physics (SC-20) exercises overall programmatic support for HRIBF.
- **Items of Note:** The Recoil Mass Spectrometer along with high-resolution gamma-ray detectors provides excellent capability for study of events and capture of data for nuclear physics experiments. The Daresbury Recoil Separator, transferred to ORNL from England, will provide direct measurement of nuclear reactions in support of nuclear astrophysics programs.



Mouse Genetics Research Facility (MGRF)

Mission: MGRF represents the largest experimental mouse colony in the world, with a highly-qualified staff of mouse geneticists and molecular biologists that use the resources for basic research in analyzing gene function and identifying mouse models of human genetic diseases. The facility also contains office and laboratory space for the associated staff, which is part of the ORNL Life Sciences Division. The MGRF was officially designated a user facility in 1997.

Age: Building 9210 is approximately 50 years old.

Program Sponsorship: The Office of Biological and Environmental Research (SC-70) is the primary program sponsor.

Items of Note: The current facility can house approximately 170,000 mice and presently has an occupancy of approximately 70,000 animals, representing nearly 1,000 genetic strains generated over five decades of experimental mutagenesis. The proposed Laboratory for Comparative and Functional Genomics would replace this facility.



Oak Ridge National Environmental Research Park

- **Description:** The DOE Oak Ridge National Environmental Research Park, an ORNL user facility, consists of approximately 22,500 acres of the Oak Ridge Reservation officially designated as an ecosystem sanctuary, open to researchers for ecological studies and to the general public for environmental education. The Park has field research sites supported by maintenance and support facilities sufficient to permit sophisticated environmental experiments. Since the land is under the jurisdiction of the federal government, the integrity of land and water resources and the preservation of undisturbed lands are ensured. The Park is now one of the most intensively and extensively studied parcels of land its size in the world.
- **Age:** The Oak Ridge Reservation was set aside in 1942 and the Research Park was officially designated in 1980.
- **Program Sponsorship:** The Office of Biological, and Environmental Research (SC-70) exercises overall responsibility for the operation of Research Park.
- **Items of Note:** The Oak Ridge Research Park is one of seven national environment research parks. It is also a Tennessee Wildlife Management Area and one of five elements of the Southern Appalachian Biosphere Reserve (part of the International Biosphere Program).



ORNL Infrastructure

Electrical

- Power is fed by two 161 kV TVA feeders
- System consists of 32 miles of overhead lines and 4 miles of underground cable

Natural Gas

- Line to ORNL is maintained by East Tennessee Natural Gas
- Used in steam production and some labs but not for general heating
- Long-range plans are to convert steam plant to gas primary/oil backup operation

Compressed Air

- 100 psig instrument quality air for labs is supplied by compressors at steam plant

Water

- Potable and process water systems are fed by Oak Ridge central water plant
- System consists of approximately 100,000 feet of cast iron and steel pipe



ORNL Infrastructure (continued)

Sanitary Sewer

- System consists of approximately 32,000 feet of clay, cast iron, and pvc piping with 194 brick and concrete manholes
- Treatment plant has 300,000 gallons per day capacity; it presently operates at approximately 200,000 gallons per day

Chilled Water

- A central plant serves 13 buildings
- There are 31 additional self-contained systems and 34 additional separate chillers
- There are 14 cooling towers
- Majority of CFC's in the system have been replaced through ongoing activities, and is estimated to be complete by FY 2000



ORNL Infrastructure (continued)

Roads

- ORNL is responsible for approximately 180 miles of unpaved roads and 25 miles of paved roads within ORNL and the NERP

Steam

- Supplied by boilers (coal/gas/oil) at the ORNL steam plant
- Used primarily for heating
- Used to drive the emergency off-gas system in 3039 stack during a power outage
- System consists of approximately 27,000 feet of piping, 50 regulating stations, and 360 major valves



Major Laboratory Initiatives

- Neutron Science
- Functional Genomics
- Teraflops Computing and Simulation Science



Critical Ongoing Activities

- Integrated Safety Management
- Reactor Operations
- Spallation Neutron Source Project
- Interface with the Management and Integration Contractor
- Reengineering
- Contract Transition