



# ANNUAL ECONOMIC REPORT

## FISCAL YEAR 2004

United States Department of Energy  
Oak Ridge, Tennessee



# Table of Contents

<b>Introduction.....</b>	<b>i</b>
<b>Executive Summary Excerpt.....</b>	<b>3-5</b>
<i>“The Economic Benefits of the U.S. Department of Energy for the State of Tennessee”</i>	
<b>Department of Energy Overview.....</b>	<b>6</b>
<b>Profiles.....</b>	<b>7-12</b>
<b>Oak Ridge Office.....</b>	<b>7</b>
<b>National Nuclear Security Administration, Y-12 Site Office.....</b>	<b>8</b>
<b>Office of Scientific and Technical Information.....</b>	<b>8</b>
<b>Oak Ridge National Laboratory.....</b>	<b>9</b>
<b>Oak Ridge Institute for Science and Education.....</b>	<b>10</b>
<b>East Tennessee Technology Park.....</b>	<b>11</b>
<b>Y-12 National Security Complex.....</b>	<b>12</b>
<b>Wackenhut Services Incorporated.....</b>	<b>12</b>
<b>Highlights.....</b>	<b>13-24</b>
<b>Science.....</b>	<b>13</b>
<b>Environmental Management.....</b>	<b>18</b>
<b>Nuclear Fuel Supply.....</b>	<b>20</b>
<b>National Security.....</b>	<b>22</b>

# Introduction

This report provides an overview of the Department of Energy's operations in the State of Tennessee. The report also summarizes many of the notable highlights and accomplishments for DOE programs during Fiscal Year 2004.

Without question, this is a unique time in the history of Oak Ridge, with the construction of new facilities, such as the Spallation Neutron Source and Center for Nanophase Materials Sciences. There is more growth of new facilities and new construction in Oak Ridge than at any other DOE site. This growth includes modernization activities at the Oak Ridge Institute for Science and Education and the Y-12 National Security Complex. Also, work continues in creating an environment for improved cooperation in technology transfer and making available an array of world class technologies to help start new companies in the region.

## **Key Highlights on the Oak Ridge Reservation for Fiscal Year 2004:**

- Tennessee's gross state product increased almost \$3.7 billion in 2004 as a result of direct, indirect, and multiplier effects of DOE spending
- 6.3 million square feet of plant floor space has been transitioned via innovative contracting and leasing initiatives, with the added benefit of creating 1,600 jobs
- The Community Reuse Organization of East Tennessee (CROET) has successfully consummated 75 leases with more than 35 diverse private-sector companies
- Formal agreement between CROET New Business Development Loan Fund and the Knox County government was reached to create the Knox County Technology and Jobs Fund
- Oak Ridge Associated Universities completed construction of a new 55,000 square-foot facility on main campus
- The DOE/USEC lease of the Advanced Gas Centrifuge Test Facility and accompanying Cooperative Research and Development Agreement has resulted in the creation of more than 150 jobs for local Tennessee residents

## **ORNL**

- the first of three major investments by the State of Tennessee, the Joint Institute for Computational Sciences, was completed at a total cost of \$10 million
- dedicated the William L. and Liane B. Russell Laboratory for Comparative and Functional Genomics in May
- selected by DOE to lead establishment of the National Leadership Computing Facility
- 12 new companies or product lines were developed using ORNL technologies
- won three R&D 100 awards; pushing the total to 119
- The Joint UT-ORNL Center for Homeland Security and Counterproliferation was formed

## **Bechtel Jacobs Company**

- made dramatic progress under its Accelerated Cleanup and Closure contract with DOE

- achieved 85 percent completion of K-25 and K-27 hazardous materials abatement and start of excess equipment removal
- completed removal of more than 3,400 tons of scrap metal from the East Tennessee Technology Park (ETTP)
- completed demolition of more than 180 decommissioned facilities at ETTP
- shipped 1,800 cylinders of depleted uranium hexafluoride
- completed defueling of the Tower Shielding Reactor
- dispositioned 70,000 tons (5,725 truck loads) of waste at the Environmental Management Waste Management Facility

### **BWXT Y-12 National Security Complex**

- a key player in the blending and conversion of highly enriched uranium for use in commercial power reactors
- completed the W-87 life extension program in autumn 2004
- employees were honored when President Bush and then Energy Secretary Spencer Abraham visited Oak Ridge in 2004 to view Libyan material and equipment brought to Y-12 for safe, secure storage
- completed construction of a new \$50 million Purification Facility
- began construction on the new storage facility for highly enriched uranium
- began work with Oak Ridge High School to create a manufacturing academy for training students in 21st century job skills
- leads the DOE complex in mentor-protégé agreements, with both colleges and universities and small businesses
- working with the City of Knoxville to support Project Grad, a national program geared to improve disadvantaged inner-city schools

### **Summary**

The presence of DOE and its contractors in Tennessee provides many benefits, both quantitative and qualitative. The facilities discussed in this document provide employment and income for residents of the state. The jobs are often high-skilled, high-paying jobs resulting in a high quality workforce who are the top researchers in their field. The work in Oak Ridge would not be possible without the leadership of the DOE contractors and our strong partnership with the state of Tennessee.

DOE's presence in Tennessee also provides the state with national recognition as a leader in manufacturing, advanced materials, neutron sciences, computational sciences, biological sciences, and transportation technologies. With its research and development capacity and technology sharing programs, DOE plays a significant role in enhancing Tennessee's competitive position in attracting private firms to locate here. In addition, DOE is active in bringing federal research grant money to the state and its colleges and universities.

For several years, the Department of Energy has contracted with The University of Tennessee to perform an analysis of the economic contribution of DOE operations in the State of Tennessee. This report includes a reprint of the Executive Summary of the latest analysis prepared by the Center for Business and Economic Research at The University of Tennessee.

The Department of Energy operations in Oak Ridge continue to be a significant contributor to the State of Tennessee economy. In the future, as new facilities are completed and as we attract new programs and new missions to the Oak Ridge Complex, this economic impact is expected to continue to grow.

## THE ECONOMIC BENEFITS OF THE U.S. DEPARTMENT OF ENERGY FOR THE STATE OF TENNESSEE FISCAL YEAR 2004

Prepared by Center for Business and Economic Research, College of Business Administration  
The University of Tennessee Knoxville, Tennessee for U.S. Department of Energy, Oak Ridge Office

### Executive Summary\*

The operations of the U.S. Department of Energy (DOE) provide a major source of economic benefits for the state of Tennessee and its residents through the creation of jobs and income as well as expansions in state and local tax bases. DOE has a unique opportunity to help influence the economic success of the region. In order to detail and verify the benefits attributed to DOE operations, the Center for Business and Economic Research at the University of Tennessee began conducting in-depth analyses of the economic impacts of DOE payroll and non-payroll spending on the state of Tennessee in 1998. Subsequent analyses were conducted for fiscal years 1999, 2000, 2001 and 2003. The current study provides an analysis of the economic benefits for fiscal year 2004. The results of the current study provide evidence of DOE's role as a major contributor to the Tennessee economy.

Key findings for FY 2004 include the following (FY 2003 results shown in parentheses):

- Spending by DOE and its contractors led to an increase of nearly \$3.7 (\$3.2) billion in the state of Tennessee's gross state product in 2004.
- Total personal income generated in the state of Tennessee by DOE-related activities was roughly \$1.9 (\$1.7) billion in 2004. Each dollar of income directly paid by DOE in the state translates into a total of \$2.26 (\$2.26) in personal income for Tennessee residents.
- DOE spending supported 62,032 (54,555) full-time jobs in the state in 2004, meaning that for every one DOE job, 4.2 (3.8) additional jobs were supported in other sectors of the state economy.
- DOE-related spending generated \$74.7 (\$66.7) million in state and local sales tax revenue in Tennessee in 2004.
- DOE operations continue to rely on a highly trained and educated workforce. In 2004, 956 (956) employees held Ph.D. degrees, 1,704 (1,668) held Masters degrees and 2,896 (3,461) held a Bachelors degree.
- Other DOE activities serve to improve the quality of life for Tennesseans. While some enhance the productivity of Tennessee industries and workers, others contribute to the well-being of residents in a more personal manner. For example, DOE, its contractors and their employees donated over \$11.6 (\$15.6) million in 2004.

\* The full report is available at <http://www.utk.edu>

<sup>1</sup> BWXT-Y12, LLC; UT-Battelle, LLC; Oak Ridge Associated Universities; Bechtel Jacobs Company, LLC; Wackenhut Services Inc.; DOE Office of Scientific and Technical Information; DOE Oak Ridge Office; DOE/NNSA Site Office; and the Office of Secure Transportation.

# 4 *Economic Benefits, Executive Summary*

*excerpt*

## I. DIRECT BENEFITS OF DOE

DOE spending yields significant direct benefits for the state economy.

- DOE and its major contractors<sup>1</sup> provided 11,951 (11,287) full-time jobs in Tennessee in 2004 with annual wages and salaries totaling \$655.8 (\$564.4) million.

During 2004, DOE and its major contractors employed 11,951 full-time equivalent employees living in the state of Tennessee and spent more than \$655.8 million in payroll expenditures. The jobs are relatively high wage jobs with an average annual salary of \$54,873.

- Total non-payroll spending (or direct procurement spending) by DOE and its contractors totaled more than \$1,135 (\$995) million in 2004.

Acquisition of goods and services from Tennessee businesses led to non-payroll spending of more than \$1,135 million by DOE and its contractors. Non-payroll spending generates millions of dollars in new income and supports thousands of jobs in a wide array of sectors in Tennessee's economy.

- DOE and its contractors paid nearly \$18.3 (\$17.7) million in state and local sales taxes in 2003.

As a result of DOE and contractor purchases of goods and services in Tennessee, \$13.6 million and \$4.7 million were directly contributed to the public coffers of state and local governments, respectively. However, this number understates the total direct benefits to tax revenues resulting from DOE operations because it excludes other forms of tax payments such as payments-in-lieu-of-taxes, and business and property taxes.

**Table A: Summary of Economic Benefits of DOE in Tennessee, 2004 (dollars in millions)**

<b>Impact</b>	<b>Direct</b>	<b>Total</b>
Output	\$1,999.6	\$3,671
Income	\$863.8	\$1,953
Sales Tax	\$18.3	\$74.7
Employment	11,951	62,032

## II. TOTAL ECONOMIC BENEFITS OF DOE'S DIRECT SPENDING IN TENNESSEE

DOE spending ripples through the state's economy, yielding additional benefits.

- **Tennessee's gross state product increased almost \$3.7 (\$3.2) billion in 2004 as a result of direct, indirect and multiplier effects of DOE spending.** The total output benefit, measured by changes in gross state product from payroll and non-payroll spending by DOE and its major contractors, was \$3.67 billion in the state of Tennessee in 2004. The output multiplier was 1.84, meaning that for \$1.00 directly spent by DOE in Tennessee, an additional \$0.84 of output was produced in other sectors of the economy.
- **DOE activities in Tennessee gave rise to a total income benefit of \$1.95 (\$1.4) billion in 2004.** DOE's impact on personal income across the state of Tennessee totaled roughly \$1.95 billion in 2004. The income multiplier was 2.26 indicating that for every \$1.00 DOE and its contractors spent on wages and salaries, an additional \$1.26 in personal income was created for the residents of the state.
- **DOE operations supported 62,032 (54,555) full-time jobs in the state of Tennessee in 2004.** The new income generated in Tennessee as a result of DOE operations supported a total of 62,032 jobs in the state. The employment multiplier was 5.19, meaning that for every direct job provided by DOE, an additional 4.19 jobs were supported in other sectors of the state's economy. This relatively high employment multiplier reflects in part the high average annual salary of DOE-related employees in the state.
- **The total state and local sales taxes attributed to DOE operations totaled more than \$74.7 (\$66.7) million in 2004.** DOE operations give rise to significant increases in sales tax revenue for state and local governments in Tennessee. In 2004, the total state sales tax attributed to DOE was \$55.6 million, while local tax coffers benefitted by an additional \$19.1 million in local sales tax revenue.

## III. OTHER BENEFITS AND INITIATIVES

Many of the benefits arising from DOE activities are not easily quantified. At the same time, these broader activities perhaps have an even more important positive impact on the state and its future well-being than the quantifiable economic benefits.

- DOE, its contractors and their employees donated over \$11.6 (\$15.6) million in charitable contributions, community grants, and equipment bequests to organizations across Tennessee in 2004.
- In 2004, around 2,000 (1,983) guest researchers generated 12,000 (11,000) overnight stays in the Knoxville-Oak Ridge area.
- The American Museum of Science and Energy drew 90,000 (78,302) visitors during Fiscal Year 2004.

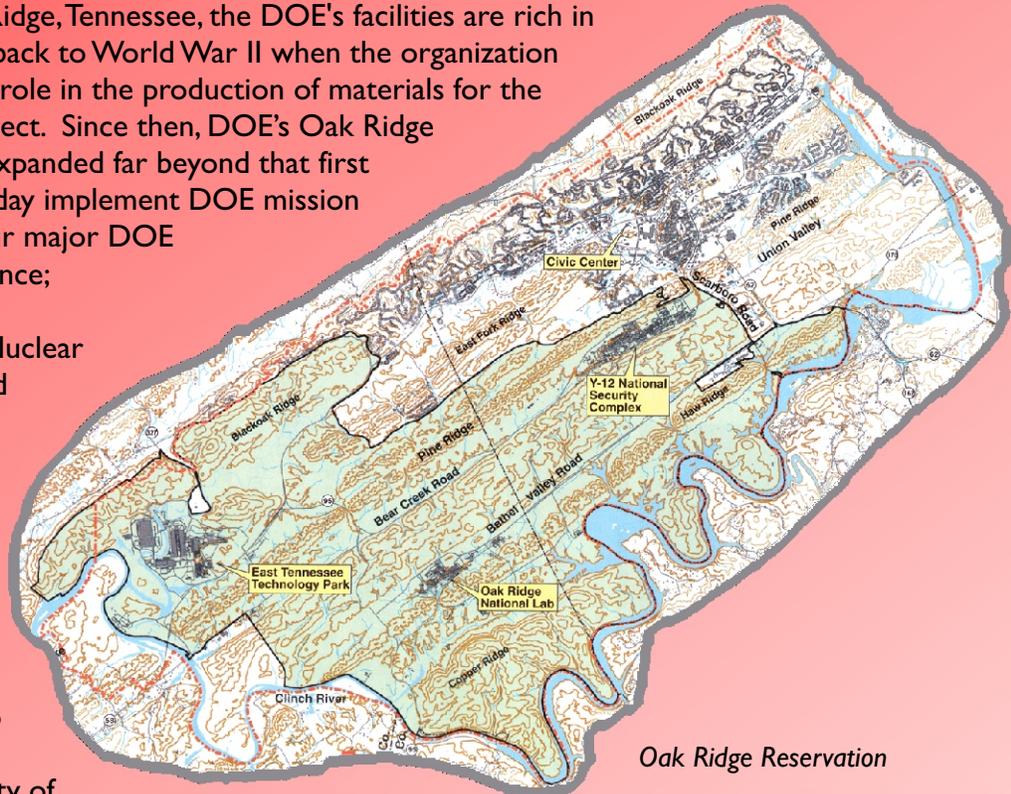
# Department of Energy

The DOE is present in Oak Ridge in three distinct capacities: 1) the DOE Oak Ridge Office (ORO); 2) the Y-12 Site Office of the National Nuclear Security Administration (NNSA), an independent agency of the DOE; and 3) the Office of Scientific and Technical Information (OSTI). ORO and the NNSA use several contractors in the management and operation of their facilities in Oak Ridge.

Based in Oak Ridge, Tennessee, the DOE's facilities are rich in history, dating back to World War II when the organization played a major role in the production of materials for the Manhattan Project. Since then, DOE's Oak Ridge facilities have expanded far beyond that first mission and today implement DOE mission elements in four major DOE programs: Science; Environmental Management; Nuclear Fuel Supply; and National Security.

The DOE's 33,749-acre Oak Ridge Reservation is located within and adjacent to the corporate limits of the City of Oak Ridge, Tennessee, in

Anderson and Roane counties. There are three major plant complexes on the Oak Ridge Reservation: the Oak Ridge National Laboratory (ORNL); the East Tennessee Technology Park (ETTP); and the NNSA's Y-12 National Security Complex. Also located in the City of Oak Ridge are the Office of Scientific and Technical Information (OSTI); the Oak Ridge Institute for Science and Education (ORISE); and the American Museum of Science and Energy (AMSE). Together, these facilities and their capabilities represent a unique technological and educational resource and a major component of the growing East Tennessee Technology Corridor.



# Oak Ridge Office

WWW.OAKRIDGE.DOE.GOV

**O**RO is responsible for major programs that are performed at the Oak Ridge National Laboratory (ORNL), the East Tennessee Technology Park (ETTP), and the Oak Ridge Institute for Science and Education (ORISE). ORO also supports and provides services to 10 Office of Science laboratories throughout the nation.

ORO's four major programs are Science, Environmental Management, Nuclear Fuel Supply, and National Security:

- The **Science** Program includes basic and applied research to advance the nation's energy resources, environmental quality, scientific knowledge, and contribute to science education.
- **Environmental Management** is an accelerated cleanup program underway to correct the legacies remaining from more than 50 years of energy research and weapons production with the majority of work to be completed by 2008.
- **Nuclear Fuel Supply** ensures that domestic uranium capabilities are maintained and transitions Department's assets to the private sector to accelerate environmental cleanup while enhancing economic growth.
- **National Security** work includes the development of technologies to detect, prevent and reverse the proliferation of weapons of mass destruction in support of our nation's homeland security.



*Gerald Boyd, Oak Ridge Office Manager*



*Federal Building*

In addition to these programs, ORO provides support to the Pacific Northwest Laboratory Site Office; and manages and operates the Payments Processing Center for the entire DOE complex. ORO also provides business, technical and administrative support to the complex as a partner in the Office of Science Integrated Support Center.

## National Nuclear Security Administration, Y-12 Site Office

[WWW.ORO.DOE.GOV/NNSA](http://WWW.ORO.DOE.GOV/NNSA)

The NNSA carries out the national nuclear security responsibilities of the DOE. These responsibilities include maintaining a safe, secure, and reliable stockpile of nuclear weapons and associated materials, capabilities and technologies; promotion of international nuclear safety and nonproliferation; and administration and management of the naval nuclear propulsion program. As required by the National Defense Authorization Act for Fiscal Year 2000, the national security functions and activities performed by certain elements of the DOE were transferred to the NNSA. Management responsibility for operations at the Y-12 National Security Complex (formerly known as the Y-12 Plant) transferred to the Y-12 Site Office (YSO) under the NNSA.



Y-12 National Security Complex

## Office of Scientific and Technical Information

[WWW.OSTI.GOV](http://WWW.OSTI.GOV)

Research and development (R&D) can only be successful if the knowledge gained through the R&D process is shared. DOE's Office of Scientific and Technical Information (OSTI), as part of DOE Headquarters Office of Science, collects, organizes, preserves, and disseminates information resulting from DOE's \$8.3 billion R&D program. OSTI is responsible for sharing the agency's R&D knowledge and fulfills this responsibility through leading-edge e-government information systems. Among other systems, OSTI's DOE Information Bridge ([www.osti.gov/bridge](http://www.osti.gov/bridge)), Energy Citations Database ([www.osti.gov/energycitations](http://www.osti.gov/energycitations)), and E-Print Network ([www.osti.gov/eprints](http://www.osti.gov/eprints)) provide unique access to all forms of R&D information of interest to DOE and the U.S. scientific community. Patrons of OSTI's vast, electronic R&D information collections include DOE and other federal and contractor researchers, academic institutions, science-attentive citizens, and U.S. industry.



Office of Scientific and Technical Information dedicates Science.gov Way

OSTI coordinates an agency-wide program for the corporate management of R&D information involving over 60 DOE Headquarters Offices, Field Offices, National Laboratories, and over 4,000 other contractor facilities. OSTI also partners with 11 federal agency counterparts to provide *Science.gov*, a premier "one-stop" Web system for citizens and researchers to access the government's R&D collections. *Science.gov* is an OSTI-hosted gateway to over 1,700 sites and databases of federal R&D information, over 360 of which are DOE's.

# Oak Ridge National Laboratory

WWW.ORNL.GOV

**O**RNL is a multi-program science and technology laboratory managed for DOE by UT-Battelle, LLC, since 2000. Scientists and engineers at ORNL conduct basic and applied research and development to create scientific knowledge and technological solutions that strengthen the nation's leadership in key areas of science; increase the availability of clean abundant energy; restore and protect the environment; and contribute to the security of the nation. ORNL also performs other work, including isotope production, and provides research and technical assistance to other organizations. ORNL was established in 1943 to carry out a single, well-defined mission: the pilot-scale production and separation of plutonium for the World War II Manhattan Project. From this foundation, the Laboratory has evolved into a unique resource for addressing important national and global energy and environmental issues.

Today, ORNL pioneers the development of new energy sources, technologies, and materials and the advancement of knowledge in biological, chemical, computational, physical, engineering, environmental and social sciences. ORNL's six major scientific competencies include neutron science, energy, high performance computing, complex biological systems, advanced materials, and national security. ORNL is assembling world class tools for nanoscale research and development, including the \$1.4 billion Spallation Neutron Source and the Center for Nanophase Materials Sciences. ORNL is home to the world's fastest unclassified computing facility (100 teraflops by 2006).

ORNL also hosts the Laboratory for Comparative and Functional Genomics, the National Transportation Research Center, and the National Transmission Technology Research center among its unique research capabilities. And, ORNL is in the final stages of a \$30 million project to provide a modern campus for the next generation of science. A combination of federal, state, and private funds is building 13 new facilities; including the institutes for Computational Science, Biological Science, and Neutron Science.



*Oak Ridge National Laboratory*

## Oak Ridge Institute for Science and Education

[WWW.ORAU.GOV/ORISE.HTM](http://WWW.ORAU.GOV/ORISE.HTM)

The Oak Ridge Institute for Science and Education (ORISE) was established by the U.S. Department of Energy to undertake national and international programs in education, training, health, and the environment. ORISE and its programs are operated by Oak Ridge Associated Universities (ORAU) through a contract with the U.S. Department of Energy. Established in 1946, ORAU is a consortium of 91 doctoral-granting colleges and universities serving the government, academia, and the private sector in important areas of science and technology.

ORISE supports the mission of the Department of Energy through seven primary program areas:

- In Science and Engineering Education, ORISE prepares tomorrow's scientific workforce by administering research participation, fellowship, scholarship, and internship programs.
- Through its Worldwide Emergency Response and Training activities, ORISE responds and prepares others to respond to unique emergencies such as terrorist attacks or radiation accidents.
- ORISE conducts Workforce Health and Safety Research and Training that helps organizations protect the health and safety of their employees.
- The ORISE Environmental Monitoring programs help DOE preserve the environment and protect the public through radiological hazardous site characterization and cleanup verification.
- ORISE utilizes Specialized Training to develop and implement comprehensive technical training and continuing education programs that enhance employee performance.
- ORISE builds Research and Training Networks to bring together resources to eliminate redundant efforts and reduce costs.
- ORISE assembles Collaborative Research Partnerships to foster mutually beneficial relationships among researchers nationwide.



*Oak Ridge Associated Universities*

# East Tennessee Technology Park

WWW.ETTPREUSE.COM



*East Tennessee Technology Park*

Decades of activities on the Oak Ridge Reservation in support of the government's research and national security missions have left a legacy of contamination, which requires management and/or cleanup and disposal. Approximately 10 percent of the Reservation's lands require cleanup. The East Tennessee Technology Park (ETTP), also known as the Heritage Center, is the

home of the former gaseous diffusion plant and is a primary focus for DOE's Environmental Management Program. Most of the cleanup work that is required at ETTP is the decontamination and demolition of buildings.

Cleanup of ETTP is an important component of DOE's accelerated cleanup and closure plan. Under DOE's Accelerated Cleanup approach, the Department has established a milestone for cleanup of ETTP by the end of 2008. The cleanup is managed for DOE by Bechtel Jacobs Company LLC, which both performs and subcontracts work.

Reindustrialization is integral to DOE's strategy to accelerate cleanup at ETTP. The current focus of the Reindustrialization Program is to transfer facilities and land to the Community Reuse Organization of East Tennessee (CROET). Twenty-six facilities are slated for transfer to CROET; the remaining buildings will be demolished and the land will be cleaned up by DOE. If all 26 facilities are transferred, DOE will save nearly \$70 million. These savings will be realized because the new property owner will be responsible for ultimate demolition of the buildings; therefore, DOE will not fund these actions. Once cleanup of ETTP is complete, CROET plans to establish a Brownfield industrial complex on the property. Prior to the transfers, CROET will continue to lease facilities from DOE and sublease them to private-sector tenants, as it has been doing since 1996.

## Y-12 National Security Complex

[WWW.Y12.DOE.GOV](http://WWW.Y12.DOE.GOV)

The DOE's National Security mission in Oak Ridge is carried out at the Y-12 National Security Complex. Operated by BWXTY-12, LLC, for DOE's NNSA, the Y-12 National Security Complex is a manufacturing facility that plays an integral role in NNSA's Nuclear Weapons Complex. Programs at Y-12 include manufacturing and reworking nuclear weapon components, dismantling nuclear weapon components returned from the national arsenal, serving as the nation's storehouse of special nuclear materials, preventing the spread of weapons of mass destruction, and providing special production support to other programs.

The Y-12 National Security Complex was part of the Manhattan Project. Its job was to process uranium for the first atomic bomb. Construction of Y-12 started in February 1943; enriched uranium production started in November of the same year. For almost 60 years, Y-12 has been one of the DOE's premier manufacturing facilities. Every weapon in the stockpile has some components manufactured at the Y-12 National Security Complex. Today, NNSA's Y-12 National Security Complex manufacturing facility stretches over approximately 800 acres with more than 575 structures that contain more than 7.0 million square feet of floor space.



Y-12 National Security Complex

## Wackenhut Services Incorporated

[WWW.WACKENHUT-OAKRIDGE.COM](http://WWW.WACKENHUT-OAKRIDGE.COM)



Protective Services supporting Oak Ridge facilities

In January 2000, DOE/ORO contracted with Wackenhut Services Incorporated (WSI) to provide protective services for the Oak Ridge Complex. WSI brought to this contract a team comprised of three small businesses: PAI Corporation; Critique Inc.; and NCI. Under this contract, the WSI-OR team provides physical, information and personal protective services for Y-12 National Security Complex, ORNL, ETTP, and the Federal Building Complex. The WSI-OR team employs 735 people who protect the DOE's Oak Ridge resources.

## Science

*The Science Program work is performed at the Spallation Neutron Source, Oak Ridge National Laboratory, and Oak Ridge Institute for Science and Education.*



*Spallation Neutron Source*

### Spallation Neutron Source

The U.S. Department of Energy Office of Science is building the world's best accelerator-based, pulsed-neutron system, called the Spallation Neutron Source (SNS), in Oak Ridge, Tennessee. Six DOE national laboratories are involved in designing this powerful scientific tool. Like a flashing strobe light providing high-speed illumination of an object, the SNS will fire pulses 60 times a second at a target. Those pulses will contain up to 10 times more neutrons than are produced at the most powerful pulsed neutron sources in the world. Just as we prefer a bright light to a dim one to read the fine print in a book, researchers will prefer this source of "brighter" neutrons. SNS will give more detailed snapshots of the structure of even the smallest samples of physical and biological materials, from plastics to proteins, making "movies" of molecules in motion.

The Spallation Neutron Source (SNS) is nearing completion. The SNS is scheduled to begin research operations during the summer of 2006, opening a new chapter in ORNL's storied history of scientific achievement. The SNS will feature a linear accelerator and a bounty of other scientific equipment. The \$1.4 billion project has already been successful on several fronts.

### Oak Ridge National Laboratory

In 2004, ORNL continued its modernization program to the campus. In May 2004, ORNL began the latest chapter in its rich history of genetics research with the dedication of the William L. and Liane B. Russell Laboratory for Comparative and Functional Genomics. With 36,000 square feet of space, accommodations for 60,000 mice, cryogenic storage and other state-of-the-art features, the \$14 million lab is an impressive showcase of modern genetic research capability. The Tennessee Mouse Genome Consortium, an ORNL collaboration with several universities and medical centers across Tennessee, already has brought \$12 million in research dollars to the state based upon the resources living in this new facility.



*Oak Ridge National Laboratory*

Also in May 2004, ORNL was selected by the DOE to lead the establishment of a National Leadership Computing Facility (NLCF) partnership with a goal of building the world's most powerful supercomputer by 2007. The NLCF is a five-year plan that will pool the partnership's computational resources for a sustained capacity of 50 trillion calculations (teraflops) per second and a peak capacity of more than 250 trillion teraflops per second.

Technology Transfer and Economic Development maintained an exciting pace in 2004. Some highlights are: 12 new companies (six of them national) or product lines were developed through ORNL technologies; 10 client companies of the Center of Entrepreneurial Growth moved to their next stage of business maturation; opportunities for ORNL Energy Efficiency and Renewable Energy Program Technology Transfer in the Western Carolinas were initiated; and assistance was provided to the State of Alabama in its economic development initiatives surrounding 15 counties.

Late in 2004, ORNL played a lead role in convening the 21st Century Manufacturing Technology Initiative where a five-state consortium of industrial/manufacturing extension programs explore ways that these units could work with ORNL and the Y-12 National Security Complex in an effort to infuse technology into existing manufacturers. This effort is focused on strengthening existing manufacturers by helping them improve the technologies they use in their existing products and adding new product lines based on new technologies. The initial five states were: Alabama, Georgia, Kentucky, North Carolina and Tennessee.

In addition, ORNL is working with TVA on a study to assess the likelihood that the automotive industry would build a research and development capability in the south. Two factors make this idea

## **ORNL wins three R&D 100 awards, pushing total to 119**

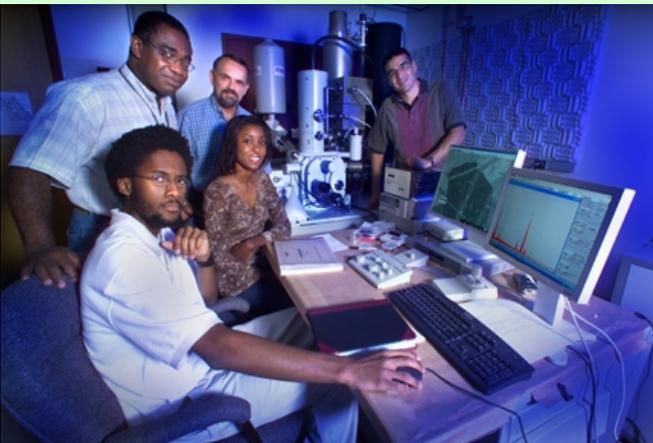
During FY 2004, researchers at the Department of Energy's Oak Ridge National Laboratory won three R&D awards from R&D Magazine, which since 1963 has given the awards for the 100 most significant technological innovations of the year. ORNL's total of 119 awards is second only to General Electric. The following inventions received honors:

- Highly Selective, Regenerable Perchlorate Treatment System, developed by Baohua Gu, Gilbert Brown, Bruce A. Moyer, and Peter V. Bonnesen. The Highly Selective, Regenerable Perchlorate Treatment system uses a unique, highly specific resin to trap the perchlorate, destroy it, and regenerate itself so it can be reused.
- Advanced Heating System for High-Performance Aluminum Forgings, developed by Craig Blue, Puja Kadolkar, Peter Engleman, Charles Howell, Jackie Mayotte, Vinod Sikka and Evan Ohriner of ORNL; Robert Kervick of Komtek of Worcester, Mass.; Howard Mayer of Queen City Forging Company of Cincinnati; George Mochal of Forging Industry Association of Cleveland; Teiichi Ando and Hui Lu of Boston's Northeastern University; and Charles Blue of Infrared Heating Technologies of Oak Ridge. The Advanced Heating System uses an optimized combination of radiant and convection heating for processing materials which reduces heating time and energy consumption and produces high-performance forgings with significantly improved tensile and fatigue properties.
- SniffEx, developed by Thomas Thundat, Lal Pinnaduwege, Tony Gehl, Vassil Boiadjiev and Eric Hawk of ORNL; David Hedden of the University of Tennessee; Eric Houser of the Naval Research Laboratory; Linda Deel of the Bureau of Alcohol, Tobacco, Firearms, and Explosives; and Richard Lareau of the Transportation Security Administration. SniffEx is a compact, low-cost explosive vapor sensor for detecting and locating a variety of explosives, including plastic-based explosives.

seem more realistic. One is the continuing progression of “New American Automobile Manufacturers” locating in Alabama, Kentucky, Mississippi, South Carolina and Tennessee. The other is the continuing evolution of more work to suppliers.

Several projects made great strides in 2004 in partnership with The University of Tennessee. Among them are: the Center for Nanophase Materials Sciences (CNMS); Joint Institute for Computational Sciences (JICS); Joint Institute for Neutron Sciences; Joint Institute for Biological Sciences; and Joint UT-ORNL Center for Homeland Security and Counterproliferation.

- Progress on the CNMS continued. 63 new user proposals were submitted in September 2004 in response to the second Call for User-Initiated Nanoscience Proposals. Based on the results of reviews conducted by the CNMS external Proposal Review Committee, 32 new projects were selected to begin in 2005. With the addition of these new projects, the CNMS interim user program has now started a total of 75 user projects.



*Oak Ridge National Laboratory*

- JICS, which combines the efforts of the state and federal governments and the University of Tennessee, focuses on existing areas of emphasis for development of research programs between ORNL and participating institutions. In 2004, CRAY computers continued being installed in the one acre space of the JICS, as capacity continues to be built toward the goal of 250 teraflops. And, new access to JICS was created through a partnership with TVA, which permits use of

their high performance cable to connect ORNL across the State of Tennessee.

- The Tennessee Governor's budget proposed in 2004 included \$8 million for the Joint Institute for Neutron Sciences. This facility, located adjacent to the Spallation Neutron Source, will house researchers from ORNL and The University of Tennessee who will study ways to improve the structure of materials. Construction continued in 2004.
- Construction of the Joint Institute for Biological Sciences began in spring 2004. This biomedical research facility will research and development and technologies related to DOE's Genomes to Life program, particularly in the fields of functional genomics, structural biology and computational biology. Major joint institute programs include support for the Tennessee Mouse Genome Consortium of eight state research institutions and a graduate studies program of genome science and technology.

- The Joint UT-ORNL Center for Homeland Security and Counterproliferation was formed to: leverage collective capabilities of UT and ORNL; to raise visibility of UT/ORNL as a national/international leader in domestic and national security; establish UT/ORNL as a problem-solver for Homeland Security; provide leadership for the Tennessee Homeland Security Consortium for Tennessee's academic institutions; and provide leadership in bringing Tennessee Valley Corridor assets to Homeland Security. The center has received a \$1.4 million grant for bioterrorism training for medical professional; has received a \$1 million grant for training in anti-terrorism for first responders; and is developing a state plan for agriculture extension agents.

The total ORNL expenditure on construction activity during the year was \$46.7 million. Two major Congressional Line Item projects were completed during the year: the Fire Protection Systems Upgrade (\$5.9 million total cost) and the Laboratory Facilities HVAC Upgrades (\$7.1 million total cost). In addition, work continued on construction of the Research Support Center. This facility provides significant new capability with a new cafeteria, visitor center, and conference center for ORNL. The first of three major investments by the State of Tennessee, the Joint Institute for Computational Sciences (\$10 million total cost), was completed.



*Computational Sciences at Oak Ridge National Laboratory*

Several smaller but important projects were also completed. The Advanced Microscopy Laboratory (AML) Project achieved substantial completion in February 2004 and the unique design of this facility was recognized in an August issue of *Tradelines*, a major industry publication. The 1506 Greenhouse renovation was completed in August 2004 representing the capability for life sciences research at ORNL.

ORNL supports several educational programs aimed at elementary and high school students and teachers in the region. In 2004, ORNL joined the Department of Energy (DOE) in a new commitment to help communities place a greater emphasis on science education. ORNL divides the company's science education efforts into three categories: 1) helping expand the number of accredited science teachers by funding UT's summer science education workshop for middle school science teachers; 2) offering more than 100 summer intern slots at the laboratory, summer camps and environmental classes for elementary students, science scholarships to UT, and funding for science competitions for area high schools; and 3) providing approximately \$230,000 to fund new science laboratories in 23 Tennessee schools.

Also, in 2004, ORNL made a commitment to assist in building a new high school for Oak Ridge. UT-Battelle spearheaded the effort of the early conceptual design and provided \$100,000 to hire an experienced school design firm. During the entire project, UT-Battelle was involved with both the City of Oak Ridge and the Oak Ridge Board of Education. Then in late 2004, the City residents voted overwhelmingly for the new school. The project is now underway for a \$55 million high school. In the community service arena, UT-Battelle employees donated approximately \$770,000 to local charities through the payroll plan in 2004. And, UT-Battelle made corporate donations of approximately \$1.2 million.

## **Oak Ridge Institute for Science and Education**

*operated by Oak Ridge Associated Universities*

A significant accomplishment in 2004 was DOE's selection of ORISE as a Voluntary Protection Program (VPP) Star Site. This designation recognizes the outstanding safety program and associated safety record in ORISE operations. ORISE became the first DOE facility within the DOE Oak Ridge Complex in Tennessee to earn VPP Star status.



*ORAU Campus*

Another key milestone in 2004 was the creation of the Oak Ridge Center for Advanced Studies (ORCAS). The vision for ORCAS is to create a think-tank type of organization to address major policy issues that have substantial science and technology content. ORAU will leverage the intellectual capital inherent in a national laboratory and the academic research community. During the start-up phase of ORCAS, the leadership will come from the founding members, which include ORAU, UT-Battelle/ORNL, Battelle, University of Tennessee, and the seven ORAU/ORNL Core Universities - Duke, Florida State, Georgia Tech, North Carolina State, Virginia Tech, University of Virginia, and Vanderbilt University.

In addition, ORAU completed construction of a new 55,000 square-foot facility on its main campus. This \$8.9 million investment allowed ORAU to move 180 staff into a facility that enhances ORISE mission effectiveness and allows DOE to vacate or reuse three government facilities. And, a \$1.4 million renovation of the Pollard Technology Conference Center was completed at almost the same time.

ORAU leveraged a Small Business Administration grant with a corporate investment to provide a science and technology conference center that will enhance community economic development efforts. This multi-media center is integrated into the ORAU/ORISE infrastructure in a way that will substantially improve education and training activities.

ORAU has also played a leadership role in helping the community embrace an initiative to build a new Oak Ridge High School. The high school is essential to the future of Oak Ridge. ORAU pledged \$1 million to the foundation in support of the new high school.

## Environmental Management

Environmental Management is an accelerated cleanup program underway to correct the legacies remaining from more than 50 years of energy research and weapons production with the majority of work to be completed by 2008.

The program includes an aggressive effort to complete the majority of environmental cleanup by 2008, including the East Tennessee Technology Park (ETTP) site. Already, significant progress has been made in cleaning up large gaseous diffusion plant buildings at this site. Reservation-wide, DOE has accelerated the completion of the EM program by six years and reduced by approximately \$2 billion in total lifecycle costs. ETTP is the location of a unique former governmental research facility which has been leased to USEC Inc. for refurbishment to demonstrate an advanced uranium enrichment centrifuge machine. This demonstration project is the largest Cooperative Research and Development Agreement (CRADA) in the history of ORNL's CRADA program (\$121 million). The project is critical to the development of a continued domestically controlled supply of nuclear fuel for over 20 percent of the nation's electrical power needs.

Because of past practices, portions of land and facilities on the Oak Ridge Reservation (ORR) are contaminated with radioactive elements, mercury, asbestos, PCBs, and industrial wastes. The ORR is on the Environmental Protection Agency's (EPA) national priorities list and is being cleaned up under a federal facilities agreement with EPA and the State of Tennessee.



*Environmental cleanup on the Oak Ridge Reservation*

The Oak Ridge Environmental Management Accelerated Closure Project includes three major subprojects - Melton Valley Closure, ETTP Closure, and Balance of Reservation Closure. Each of these subprojects is driven by specific Records of Decision; the Federal Facility Compliance Act and Site Treatment Plan for the ORR, and supports the EM risk reduction objectives. To accomplish this mission, a cost-plus-incentive fee contract has been awarded that emphasizes results and outcomes.

Work at ETTP is done by environmental contractor Bechtel Jacobs Company ([www.bechteljacobs.com](http://www.bechteljacobs.com)). In 2004, environmental cleanup contractor Bechtel Jacobs Company LLC made dramatic progress under its Accelerated Cleanup and Closure contract with the U.S. Department of Energy (DOE). Signed in 2003, the contract accelerates cleanup by five years and saves \$1.4 billion over the life of the program.

The company is on course to meet the contract's four major milestones: (1) treatment and disposition of legacy low-level and mixed low-level waste stored on the ORR by the end of FY 2005; (2) decommissioning of surplus facilities and complete hydrologic isolation/capping of major burial grounds and trenches in Melton Valley by the end of FY 2006; (3) decommissioning of surplus facilities, remediation of waste sites, and implementation of groundwater remedies at ETTP, formerly known as the K-25 Site, by the end of FY 2008; and (4) remediation of additional high-priority, high-risk-reduction projects at the Y-12 National Security Complex, Oak Ridge National Laboratory, and off-site by the end of FY 2008.



*Centrifuge development*

Notable accomplishments in FY 2004 included: achieving 85 percent completion of K-25 and 27 hazardous materials abatement, and the start of excess equipment removal; removal of more than 3,400 tons of scrap metal from ETTP; demolition of more than 180 decommissioned facilities at ETTP; shipment of more than 1,800 cylinders of depleted uranium hexafluoride; defueling of the Tower Shielding Reactor; and disposition of 70,000 tons (5,725 truck loads) of waste at DOE's Environmental Management Waste Management Facility.

## Nuclear Fuel Supply

Nuclear Fuel Supply ensures that domestic uranium capabilities are maintained and transitions Department's assets to the private sector to accelerate environmental cleanup while enhancing economic growth.

The Nuclear Fuel Supply Office leads the implementation of the Department of Energy and United States Enrichment Corporation (USEC) cooperative agreement. This includes facilitating the deployment of new, cost-effective advanced enrichment technology in the United States, and ensuring the stability of existing domestic enrichment capabilities, including continued operation of the Paducah Gaseous Diffusion Plant, until the new technology is deployed. USEC plans to build and operate a commercial American Centrifuge Plant in Portsmouth, Ohio, to enrich uranium for nuclear power and fuel technologies. DOE Oak Ridge Office administers the Lease Agreements between USEC and DOE, assures that Memorandums of Agreement exist and are executed between the Nuclear Regulatory Commission (NRC) and DOE to govern USEC activities and executes the DOE Regulatory Oversight Program for USEC activities prior to transition from DOE to NRC.



*Nuclear Fuel Supply work*

The office leads Oak Ridge's Reindustrialization efforts, which focus on accelerating cleanup of the East Tennessee Technology Park (ETTP) by making underutilized facilities and equipment available for productive use by the commercial sector, and developing a private industrial complex at ETTP that is referred to as the Heritage Center. The Reindustrialization approach has been modified to focus on transferring ownership of land and facilities rather than leasing. Property transfers will result in nearly \$70 million savings to DOE because the cost of building demolition will be the responsibility of the new owner. In addition, once facilities are transferred, DOE mortgage costs are reduced, thereby making that money available for other cleanup activities. The mutual goal of the Reindustrialization Program and Environmental Management's Accelerated Cleanup Program is to transition ETTP to be a self-sustaining industrial complex no longer reliant on Federal funding. The Community Reuse Organization of East Tennessee (CROET) is DOE's partner in this endeavor and is responsible for the commercial development of the Heritage Center.

An important initiative which has resulted in the reuse and reindustrialization of a non-used DOE facility is the lease of the Advanced Gas Centrifuge Test Facility (AGCTF) to USEC Inc. The DOE/USEC lease of the AGCTF and the accompanying CRADA agreement have resulted in the creation of over 150 professional highly skilled and highly paid jobs for local Tennessee residents. USEC has a direct payroll of approximately \$12 million. The availability of the AGCTF to USEC has resulted not only in the refurbishment of the leased facility but also in the refurbishment and reuse of other additional support facilities in the local area. Spin off benefits from this effort have included: the lease and refurbishment of an existing non-governmental Oak Ridge site which was developed into a USEC engineering and manufacturing facility and the creation/expansion of local facilities by USEC supporting contractors who manufacture major components for the demonstration facility.

The mission of the Reindustrialization Program is to enable commercial companies to reuse underutilized buildings and land at ETTP in an effort to help diversify the local economy. To accomplish this, ORO has leveraged valuable but unused assets to accelerate cleanup, reduce environmental risk, and create private sector jobs to compensate for the expected loss of jobs as cleanup is completed. Through its varied initiatives, and since the Program's inception, the Reindustrialization Program has achieved approximately \$570 million in cost avoidance and savings. Over time, a total of 6.3 million square feet of plant floor space has been transitioned via innovative contracting and leasing initiatives, with the added benefit of creating nearly 1,600 jobs. The jobs created include those generated by the DOE direct-funded cleanup projects (e.g., the Three Building D&D Project) and those created by tenants leasing space at ETTP through CROET.

### **Community Reuse Organization of East Tennessee (CROET)**

CROET was established in 1995 and is a not-for-profit organization created to engage in activities to stimulate growth in the region's economy and to reindustrialize and reuse the facilities at the East Tennessee Technology Park (ETTP), also referred to as the Heritage Center. CROET has successfully assisted the private sector in creating quality jobs by using the underutilized land, facilities, equipment, personnel and technologies available at the Oak Ridge complex. In addition, CROET provides a voice to DOE on community transition issues.

CROET has been acting as the leasing agent for properties at ETTP since 1996 and, at the end of 2004, has successfully consummated over 75 leases with more than 35 diverse private-sector companies. Businesses locating at ETTP have been known to rehabilitate space in these buildings for reduced lease rates and make use of existing machinery and other assets to reduce their operating costs.

As part of DOE's Accelerated Cleanup Plan for ETTP, the Reindustrialization Program is transitioning from leasing underutilized facilities to transferring them to CROET. Once

transferred, the new property owner is responsible for building demolition. Thus, DOE is not responsible for these costs. The mutual goal of the Reindustrialization Program and Environmental Management's Accelerated Cleanup Program is to transition ETTP to be a self-sustaining industrial complex no longer reliant on Federal funding. Currently, DOE is working on the transfer of 10 facilities at ETTP.

On July 1, 2004, a formal agreement between the CROET New Business Development Loan Fund (managed by Southeast Community Capital) and the Knox County government was reached to create the Knox County Technology and Jobs Fund (KCTJF). The KCTJF is a \$4 million debt fund available to small and early-stage businesses in the CROET service area that do not have access to traditional capital. Each organization making this agreement is providing \$290,000 as loan loss reserve for the KCTJF; these funds allow SCC to obtain \$4 million of private sector funds (generally from banks) to capitalize the KCTJF, a leverage ratio of over 6:1. By supporting the KCTJF, CROET is leveraging their own resources to provide a truly regional small business fund larger than any in existence previously.

The Horizon Center, which is an approximate 1,000-acre parcel of land located a few miles east of the Heritage Center, has been developed by CROET and is targeted for high-end industries. Transfer of the developable portions of the property, which comprises approximately 500 acres, occurred in May 2003. Currently there is one private company at the Horizon Center that has made a \$23 million investment. In addition, negotiations are ongoing with a developer to construct a spec building on a second parcel of land. With the transfer of the developable portions of the site now under CROET's ownership, marketing of the site will be more effective.

## National Security

*National Security work on the Oak Ridge Reservation is done primarily at the Y-12 National Security Complex.*

### **Y-12 National Security Complex**

The Y-12 National Security Complex is undergoing significant changes as its modernization plans take shape. Modernization will ensure the continuation of a vital national security resource for the country and an economic mainstay in East Tennessee. BWXT-Y-12 is the contractor that manages and operates the complex for the National Nuclear Security Administration (NNSA).

BWXTY-12 has completed construction of a new \$50 million Purification facility. The facility, which provides a purification process for the manufacture of non-nuclear materials, was completed in 2004. In addition, construction of a 30,000 square foot state-of-the-art storage facility for historical records was completed in 2004 in the Oak Ridge Summit development on Pine Ridge adjacent to Y-12. This storage facility is the first building in the Oak Ridge Summit development. Scientific and Technical Resources of Oak Ridge built and leased the facility to BWXTY-12 under a long-term lease.

A new storage facility for highly enriched uranium is also being constructed at the Y-12 Complex. A construction contract totaling approximately \$120 million was awarded in August 2004 to Caddell/Blaine, a joint venture of Caddell Construction of Montgomery, Alabama, and Blaine Construction of Knoxville. The total project cost for the facility is estimated at \$313 million. As part of this overall project, a number of small business contract awards also are being made. The project will create an estimated 400 construction jobs for 20 to 24 months.



*Highly Enriched Uranium Storage Facility*

NNSA recently approved the mission need for a new uranium production facility. This facility is in the design stage and would replace facilities built in the 1940s. This facility would result in significant cost savings and cost avoidance by consolidating operations, reducing overall plant footprint, dramatically improving overall security posture, and reducing overall plant operating costs while providing efficient engineered facilities and processes and improving worker health and safety.

In addition, a public funding proposal was made in 2004 to build two major facilities at Y-12: a 450,000 square-foot Production Interface Building and a 100,000-square foot Public Interface Building at the east end of the plant. These two new facilities will house some 1,500 Y-12 employees now residing in 40 separate buildings and will allow for tear down of old and high-maintenance buildings.

BWXTY-12 is also committed to being a good community partner and supports this in a variety of ways. In the area of community outreach, the contractor pledged a minimum of \$1 million dollars to Oak Ridge High School for its renovation project. That amount could increase to \$2.5 million based on BWXTY-12's level of success as the operating contractor for the Y-12 Complex. In addition, the company is working with the high school to create a manufacturing academy for training students in 21st century job skills. During Calendar Year 2004, BWXTY-12 provided \$230,000 for corporate contributions to area non-profit organizations. And, BWXTY-12 is working with the City of Knoxville to support Project Grad, a national program geared to improve disadvantaged inner-city schools. A contribution of \$50,000 per year will be made for five years in support of the Project GRAD educational program. Project GRAD was established to help improve the academic performance and future options for 7,500 students in inner-city schools in Knoxville.

Additional support is provided by BWXTY-12 employees who have volunteered for projects in the Great Smoky Mountains National Park for the past 10 years. These efforts were recently awarded with the 2004 National Park Service Accessibility Achievement Award. Over the past nine years, Y-12 has made an annual grant commitment of \$5,000 to the Great Smoky Mountains National Park and provided a group of volunteers ranging from 35 to 135 people for several project activities each year.

BWXTY-12 is leading the DOE complex in mentor-protégé agreements both with college and universities and small businesses. These agreements are part of the company's economic development activities. BWXTY-12 has signed a mentor-protégé agreement with South Carolina State University (SCSU) and is providing a loaned administrator to serve as technical liaison between Y-12 and the University. SCSU is the only Historically Black College and University in America with a Nuclear Engineering Program.

BWXTY-12 places a high value on encouraging students to study science, math and engineering. This commitment to education resulted in the establishment of two endowment scholarships at area colleges.

The company sponsors many community fundraisers for health and welfare non-profit organizations, such as the Annual Literacy Luncheon. Y-12 employees receive corporate support for participation in team fundraiser walks and bike rides, including the March of Dimes and the American Cancer Society's Relay for Life events.

Employee and corporate United Way contributions total \$651,232.20/year. Contributions are distributed to the United Way organizations in the counties where employees live and designate their contributions. In addition to the annual United Way Campaign, a charitable organization is selected to receive employee contributions, such as school supplies, health and beauty supplies, etc. An annual drive is also held to collect and contribute used coats to an area homeless shelter.

# *Contact Information*

*For additional information, contact:*

U.S. Department of Energy  
Oak Ridge Office

Public Affairs Office  
200 Administration Road  
P.O. Box 2001, M-4  
Oak Ridge, TN 37831

(865) 576-0885 or  
1-800-382-6938, option 1

<http://www.oakridge.doe.gov>

