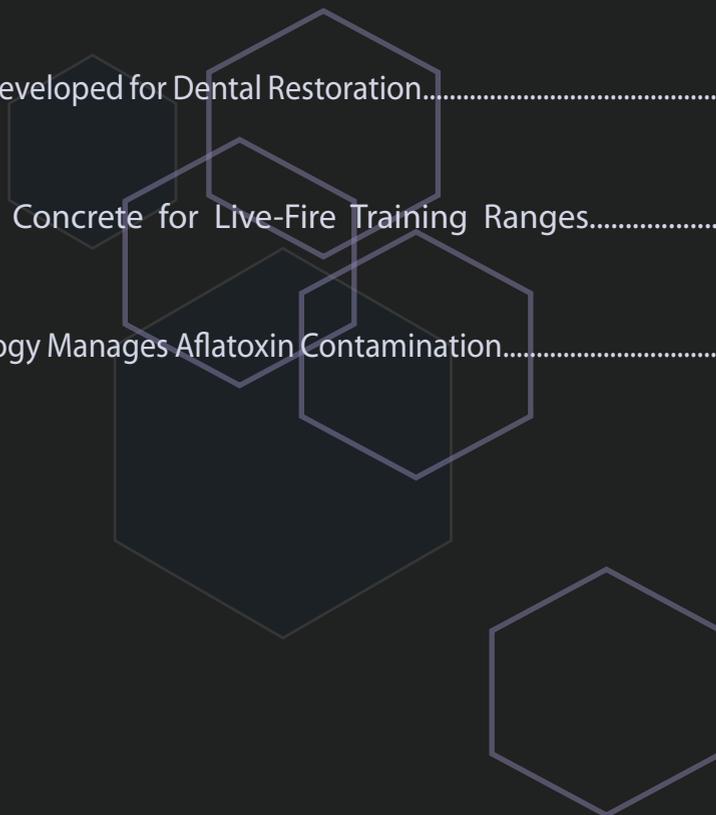


FEDERAL LABORATORIES & STATE AND LOCAL GOVERNMENTS  
*PARTNERS FOR TECHNOLOGY TRANSFER SUCCESS*



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# LETTER FROM THE FLC STATE AND LOCAL GOVERNMENT COMMITTEE CHAIR

It has long been the policy of the federal government to ensure the full use of the nation's investment in research and development (R&D) by actively supporting and encouraging the transfer of technology developed in federal laboratories to state and local governments and the private sector. To this end, the Federal Laboratory Consortium for Technology Transfer (FLC) was established and tasked by federal legislation to assist and encourage state and local governments and regional organizations, such as small business development centers and Chambers of Commerce, to participate in—and benefit from—the technology transfer process with federal laboratories.

The FLC's State and Local Government (S&LG) Committee is responsible for ensuring that state and local government organizations are aware of the benefits that are available to them and their regions through technology transfer partnerships with federal laboratories. These partnerships have resulted in successful collaborations in such areas as education, the environment, health, crime, economic development, and many others—and economic benefits, improved quality of life, and a safer future for the citizens in these geographic regions as well as the entire nation. A cross-section of just a few of these collaborations is highlighted in this brochure, demonstrating the accomplishments that are possible when federal laboratories team with state and local governments to work for the greater good of all.

We of the S&LG Committee hope that the technology transfer accomplishments described in this brochure will make state and local government organizations aware of the availability of the technology, resources, and technical assistance available to them through technology transfer partnerships with federal laboratories—not only in their own region, but anywhere in the country.

*Jennelle Derrickson*

FLC State and Local Government  
Committee Chair



*The successful development of the intelligent Aquatic Biomonitoring System included a CRADA between the U.S. Army Center for Environmental Health Research and the Metropolitan Washington Council of Governments.*

## INNOVATIVE AQUATIC BIOMONITORING SYSTEM USES FISH TO ENSURE PURE WATER SUPPLIES

To protect soldiers from exposure to drinking water supplies contaminated with toxic industrial and agricultural chemicals, the U.S. Army Center for Environmental Health Research (USACEHR) developed an aquatic biomonitor that continuously monitors water and rapidly identifies toxic conditions caused by a wide range of chemicals or chemical mixtures. The device uses live bluegill fish to detect biohazards.

Fish respond to a wide range of unsuspected toxic chemicals or chemical mixtures in water. If they are stressed as the result of inhaling toxins in the water, one of the first symptoms is a change in their breathing patterns. The USACEHR team developed and prototyped a portable, web-enabled, real-time, aquatic

early-warning system that uses the ventilatory and body movement patterns of the fish as a biosensor to provide continuous real-time detection of developing toxic conditions in water. The system enables toxic conditions to be identified within 15-30 minutes.

In 2004, USACEHR executed an exclusive patent license agreement with a small engineering and design company, Intelligent Automation Corporation, for the commercial development of an aquatic biomonitor—the intelligent Aquatic Biomonitoring System<sup>®</sup>, or iABR.

Because a significant threat to homeland security involves the potential for terrorists to release hazardous chemicals into local water supplies, the Aquatic Biomonitoring System was evaluated through partnerships with local governments, such as the City of New York, which used the system to monitor several of the city's reservoirs. The successful field tests resulted in a Cooperative Research and Development Agreement (CRADA) with the Metropolitan Washington Council of Governments for the purchase of a number of biomonitoring systems, which will be installed at various locations in the Potomac River in Maryland to monitor the river's source water and distribution systems.

The aquatic biomonitor, developed in a federal laboratory and tested and proven through partnerships with city governments, is an innovative system that not only can protect soldiers in the field from exposure to contaminated water, but is also available for use by cities and local governments to ensure the purity of their local water supplies.

U.S. Army Center for Environmental Health Research  
[www.usacehr.org/](http://www.usacehr.org/)

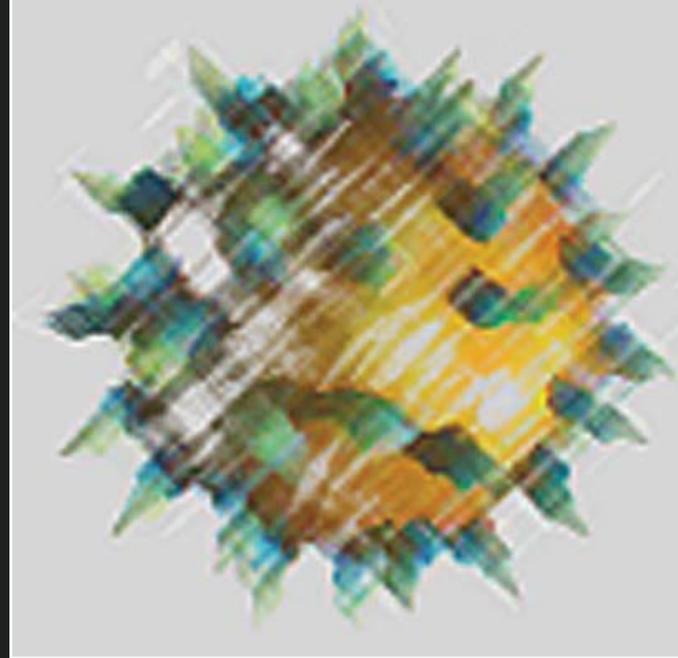
Located at Fort Detrick, Maryland, the U.S. Army Center for Environmental Health Research operates state-of-the-art aquaculture facilities and laboratories specifically designed for aquatic toxicology and molecular biology. The Center's interdisciplinary staff is dedicated to improving risk assessment methods and to developing biomonitoring technologies for military environmental health hazards.

# HIV DATABASE CATALOG PROVIDES NEW TOOL TO COMBAT AIDS

Los Alamos National Laboratory's (LANL) HIV (human immunodeficiency virus) Genetic Sequence Database team created and maintained a mammoth database that catalogs and curates all known nucleotide sequences of the HIV virus. The database is unique and serves as a valuable tool for HIV researchers, clinicians, epidemiologists, and private companies developing treatments and vaccines for AIDS.

In 2004 LANL partnered with Massachusetts General Hospital, which has the largest hospital-based research program in the U.S., through a National Institutes of Health (NIH)-funded study to examine patient response to infection and the mechanisms of HIV drug resistance.

The LANL-Massachusetts General team is also working toward development of a vaccine that will be effective in preventing HIV infection. As part of this project, LANL is using the HIV Genetic Sequence Database to track the virus and determine how it mutates in patients, while Mas-



*Simulation of an HIV cell*

sachusetts General continues to treat the patients and study their responses to the disease.

LANL is creating new tools in the database and is expanding the database to include information on sequence, resistance, immunology, and vaccine trials. Ultimately, the HIV database is expected to help researchers understand the genetic drift of the virus—how the virus's mutation allows it to evade the body's immune response as well as antiviral drugs.

Los Alamos National Laboratory  
[www.lanl.gov](http://www.lanl.gov)

From its origins as a secret Manhattan Project laboratory during World War II, Los Alamos National Laboratory, the largest institution in northern New Mexico, has attracted world-class scientists and applied their energy and creativity to solving the nation's most challenging problems. LANL's priorities are its national security mission, strategic science in support of the mission, safety and security, and development of community partnerships.





*The BritePrint™ Fingerprint Detection Device, developed through a partnership between Savannah River National Laboratory and the Georgia Bureau of Investigation, was the solution to the need for a new light source for fingerprint detection.*

## NEW LIGHT SOURCE FOR DETECTION OF FINGERPRINTS SOLVES PROBLEM FOR CSIs

A problem that faced the Georgia Bureau of Investigation (GBI)—the need for a new, lightweight, self-powered, easily portable, and affordable light source for the detection of fingerprints—also faced most small law-enforcement agencies across the nation. Existing high-intensity light sources were cumbersome, required external electrical power and, at \$10,000-\$15,000 apiece were too expensive for any but the largest investigative departments.

In an effort to solve the problem, the GBI contacted Savannah River National Laboratory (SRNL). With development funding provided by GBI, SRNL developed the BritePrint™ Fingerprint Detection Device, a lightweight, inexpensive, battery-powered, high-intensity light source that enables the immediate detection and analysis of fingerprints, footprints, and other latent markings.

The BritePrint device is comprised of an array of wavelength-specific light emitting diodes (LEDs) that provide sufficient blue-light intensity to compete with the more cumbersome and expensive light sources on the market. The BritePrint Fingerprint Detection Device has been exclusively licensed to Fingerprint Detection Technologies for manufacture and commercialization for the law enforcement community.

Savannah River National Laboratory  
[www.srs.gov](http://www.srs.gov)

Savannah River National Laboratory (SNRL) is recognized as a world-class center of excellence for the development and application of unique and innovative science and technology solutions. SNRL provides technical support and innovation in the areas of national security, nuclear materials management, and environmental technology.

## EDUCATIONAL PARTNERSHIPS AT AIR FORCE STARBASE, LA LUZ

The Air Force Research Laboratory (AFRL) at Kirtland Air Force Base, NM, is well-known for its educational partnership activities. The laboratory's fame extends beyond New Mexico, and it has been cited as a national model for educational outreach. The laboratory's educational partnerships are performed jointly with the state of New Mexico and are based on long-range goals of the state and participating school districts. The programs emphasize various areas of study relating to the advancement of technology.

Among these programs is the Air Force STARBASE® La Luz Academy, supported by the AFRL at Kirtland, which is working to get students interested in math, science, engineering, and technology through an innovative educational outreach program. The Academy, which opened in 2004, was implemented to expand the laboratory's existing educational outreach program and raise the interest of "at-risk" elementary through high school students in math, science, engineering, and technology. The program recruits these students from participating New Mexico public schools and has three main components: Mars Mission Flight for fifth graders, Providing Engi-



*Congresswoman Heather Wilson (R-NM) joins students in cutting the opening day ribbon at STARBASE.*

neering and Technology Experiences for Students (PETES) Flight for middle school students, and Students Planning and Conducting Engineering (SPACE) Flight for high school students.

The Mars Mission Flight is based on the Challenger Center for Space Science Education's Marsville, the Cosmic Village® program, modified to include Air Force core values, terminology, and missions.

The PETES flights, which are designed for middle school students, are based on classroom teaching and projects conducted at the Academy's building at Kirtland. The flights are designed to teach math, science, and engineering through hands-on projects, presentations, and courses developed and conducted by volunteer AFRL scientists and engineers. The PETES flights serve as a bridge to the high school SPACE Flight, in which students receive mentorship and guidance from volunteer scientists and engineers from the laboratory. Each student team in the program works on a three-year real-world research and development project. Seniors also complete a college-level introduction to systems engineering course to complete the SPACE Flight program.

Air Force Research Laboratory--Kirtland  
[www.de.afrl.af.mil/](http://www.de.afrl.af.mil/)

The Air Force Research Laboratory at Kirtland Air Force Base is the Department of Defense's center of expertise for lasers, high-power microwaves, and other directed energy technologies. The laboratory conducts research into a variety of energies that might be used for national defense.



*The development of an innovative composite dental restorative material involved a unique partnership consisting of NIST, NIH, the American Dental Association Foundation, and a private company.*

## NEW COMPOSITE MATERIAL DEVELOPED FOR DENTAL RESTORATION

Composite dental material that stimulates regenerative repair of defective teeth has been developed, transferred, and commercialized through a unique collaboration involving the National Institute of Standards and Technology (NIST), the National Institutes of Health (NIH), the American Dental Association Foundation (ADAF), and the H.J. Bosworth Company. The composite material, made of amorphous calcium phosphate embedded in polymers, can efficiently promote the regrowth of tooth structures.

In the presence of saliva, the composite material releases calcium and phosphate ions, forming a crystalline calcium phosphate similar to the material found naturally in teeth and bone. This is the first calcium phosphate remineralizing technology to be marketed for dental prevention and restoration.

Building on research by the ADAF, researchers at NIST and the National Institute of Dental and Cranial Facial Research of the NIH, developed the polymeric amorphous calcium phosphate technology, which was patented by NIST. NIST issued an exclusive license to ADAF, which entered into a commercialization sublicense with Bosworth in 2003.

The first products, a pit and fissure sealant, orthodontic adhesive, and crown and bridge cement, were launched in 2004. Both NIST and ADAF scientists assisted Bosworth with the formulation, testing, and quality control of these unique products, which have stimulated considerable media interest.

National Institute of Standards and Technology  
[www.nist.gov](http://www.nist.gov)

An agency within the Department of Commerce, the National Institute of Standards and Technology (NIST) promotes U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhance economic security and improve the quality of life. The research conducted at NIST is designed to advance the nation's technology infrastructure; NIST also supports the development of innovative technologies for broad national benefit by co-funding R&D partnerships with the private sector.

National Institutes of Health  
[www.nih.gov](http://www.nih.gov)

The National Institutes of Health (NIH), a part of the Department of Health and Human Services, is the primary federal agency for conducting and supporting medical research. Composed of 27 institutes and centers, the NIH provides leadership and financial support to researchers investigating ways to prevent disease, as well as the causes, treatments, and cures for common and rare diseases in every state and throughout the world.

## BULLET-TRAPPING FOAMED CONCRETE FOR LIVE-FIRE TRAINING RANGES FOR LOCAL LAW ENFORCEMENT

Researchers at the U.S. Army Engineer Research and Development Center's (ERDC) Geotechnical and Structures Laboratory developed, patented and introduced into the commercial sector a foamed fiber-reinforced concrete that can be cast in blocks and panels that capture impacting bullets without producing dangerous ricochets. The concrete formulation was originally developed for use in Army live-fire training mazes and enclosures for grenade training, and was modified to minimize the leaching of lead and other potential pollutants from the foamed concrete. The result is a unique nonhazardous material—SACON®.

Working with industry partners through CRADAs, licenses for the new technology were issued to the lab's CRADA partners, and the first civilian firing range using SACON was constructed in 2003. In 2004, in a ground-breaking agreement, the Geotechnical and Structures Laboratory issued a license to Mississippi Prison Industries Corporation. This license was unique because it provided federally developed technology to a state-owned, not-for-profit corporation, thus making SACON economically available to law enforcement groups throughout the country.



*A ground-breaking agreement with a state-owned not-for-profit corporation enabled the U.S. Army Engineer Research and Development Center to make SACON economically available to law enforcement organizations.*

U.S. Army Engineer Research and Development Center Geotechnical and Structures Laboratory  
[www.erd.c.usace.army.mil/](http://www.erd.c.usace.army.mil/)

The U.S. Army Engineer Research and Development Center (ERDC) is one of the most diverse engineering and scientific research organizations in the world. It consists of seven laboratories, including the Geotechnical and Structures Laboratory in Vicksburg, MS. ERDC research and development projects include facilities and structures; environmental quality, restoration, compliance, conservation and regulation; geosciences; and climatology.





*Aflatoxin—here shown sporulating on wheat—is being controlled as the result of a partnership between the Agricultural Research Service and a group of cotton-growing organizations in Arizona.*

## BIOLOGICAL CONTROL TECHNOLOGY MANAGES AFLATOXIN CONTAMINATION

The problem of aflatoxin contamination has been a concern to the agricultural industry and agricultural communities throughout the world for many years. Despite extensive research in the U.S. and throughout the world, no practical preventive measures had been developed for any crop or region until a scientist with the U.S. Department of Agriculture's Agricultural Research Service (ARS) invented a biological control technology that reduces this potent naturally occurring environmental carcinogen. Using naturally occurring "atoxigenic" strains of fungi that do not produce aflatoxins to competitively exclude aflatoxin-producing strains, this innovative technology effectively reduces the incidence of aflatoxin in crops and the environment.

Aflatoxin contamination has been a concern to the Arizona cotton industry for over three decades and, through partnerships with the Arizona Cotton Research and Protection Council (ACRPC), the National Cotton Council, Arizona Cotton Growers Association, and Cotton, Incorporated, biological control technologies using atoxigenic strains of fungi were transferred to the commercial sector for practical application. The ARS also assisted with the design and development of a commercial-scale atoxigenic production facility, which is operated by ACRPC.

This innovative technology will result in reduced incidence of aflatoxin-producing fungi and potentially carcinogenic aflatoxins in the environment. The technology is currently being adapted to other regions throughout the world, including Africa, Australia, and Asia.

U.S. Department of Agriculture  
Agricultural Research Service  
<http://ars.usda.gov>

ARS is the chief scientific research agency of the U.S. Department of Agriculture. ARS conducts research to develop and transfer solutions to agricultural problems of high national priority, and provide information access and dissemination to ensure high-quality, safe food, and other agricultural products.

# THE ONLY GOVERNMENT-WIDE FORUM FOR TECHNOLOGY TRANSFER

# FLC

The Federal Laboratory Consortium for Technology Transfer (FLC), a nationwide network of over 700 federal laboratories, is the only government-wide forum for technology transfer (T<sup>2</sup>). Organized in 1974 and formally chartered by the Federal Technology Transfer Act of 1986, the FLC provides the framework for developing T<sup>2</sup> strategies and opportunities by promoting and facilitating technical cooperation among federal laboratories, industry, academia, and state and local governments. As the recognized leader in maximizing collaborative research for the transfer of technologies, the FLC enhances the socioeconomic well-being of the nation in the global marketplace.



## [www.federallabs.org](http://www.federallabs.org)

The FLC website makes it easy to find people, capabilities, and applications within the FLC's network of federal labs and centers. The site publicizes T<sup>2</sup> news and technology trends, and provides a gateway to FLC products and services.



## Technology Locator

The Technology Locator is a free service that provides 1:1 personalized assistance locating federal laboratories ready to transfer their technologies to the marketplace and bringing these laboratories together for collaborative R&D. Call toll-free at 1-888-388-5227.



## Exhibits

The FLC travels to government, industry, and technology trade shows throughout the year and throughout the country promoting government technology transfer and the FLC's full range of services.



## Education and Training

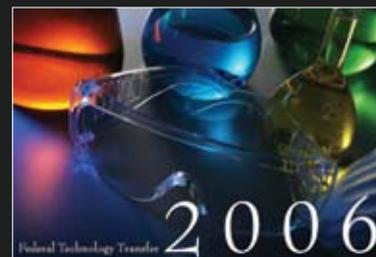
The FLC provides education and training on all aspects of T<sup>2</sup> to laboratory personnel. This service includes fundamentals, intermediate, and advanced training courses offering continuing education units (CEUs); a wide range of publications and resources; a training resources database; and an online T<sup>2</sup> curriculum.



## FLC Awards Program

The FLC honors technology transfer excellence through its awards program. Each year, the FLC recognizes those who advance federal technology and expertise to the marketplace.

## FLC Publications



*Federal Technology Transfer*



*FLC 2007 Calendar*



*FLC NewsLink*



*FLC Technology Transfer  
Desk Reference*

FEDERAL LABORATORY CONSORTIUM

**FLC**

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