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NNSA Labs Win 21 “Nobel Prizes of Technology”

Scientists at NNSA’s three weapons laboratories have won 21 of *R&D Magazine*’s 2003 R&D 100 awards for technological innovations.

The R&D 100 Awards, sometimes called “the Nobel Prizes of technology,” were first awarded in 1963 by the Chicago-based trade publication. It uses technical experts to help determine the world’s top 100 scientific and technological advances that show the most significant commercial potential. The winners are chosen from an international pool of contestants from universities, private corporations, and government labs.

Los Alamos National Laboratory in New Mexico won eight of the

awards. Sandia National Laboratories in New Mexico and California won seven and Lawrence Livermore National Laboratory in California won six. Many of the awards were won in partnership with private companies, other labs, or universities. Recent emphasis on technology transfer has boosted the number of joint submissions.

Administrator Linton Brooks said, “The fact that our labs routinely win so many of the R&D 100 awards is confirmation that they engage in some of the best scientific work and have staffs composed of some of the brightest scientific minds in the world. While we pursue our mission of national security, we are also producing technologies that can serve society in

many ways.”

The winning technologies include a biothreat detection and characterization technology for protecting civilian populations against terrorist aerosol releases of microorganisms that could induce lethal infection; a semiconductor device that can help mitigate electrical network problems by rapidly converting stored DC energy into AC power; and a process that has helped to solve one of the greatest technical challenges for producing faster computer chips with more memory using extreme ultraviolet lithography.

A complete list of the winning technologies is available from Al Stotts (astotts@doel.gov).



NNSA Administrator Linton Brooks joined members of the New Mexico congressional delegation and senior management from Sandia National Laboratories at the official groundbreaking ceremony for Sandia’s Microsystems and Engineering Science Application (MESA) complex. (Left to right Senator Pete Domenici, Senator Jeff Bingaman, Representative Heather Wilson and Administrator Brooks.)

NNSA Adds New Tool to Stockpile Stewardship Program

The NNSA Nevada Site Office and Lawrence Livermore National Laboratory achieved a major

Scientists fired a projectile, at a speed of five kilometers per second, at a plutonium target. Upon impact, it produced a high-pressure shock

in the absence of underground nuclear testing,” NNSA Administrator Linton Brooks said after the landmark experiment.



The JASPER gun is an approximately 90 foot long, two stage gun.

wave. The shock wave passed through the target within a fraction of a microsecond. Diagnostic equipment measured the properties of the shocked material inside the target during this extremely brief period.

A vital experimental technique for determining the properties of materials at high pressures, temperatures, and strain rates is to shock the material and measure the material response. JASPER experiments support these goals, which are key elements of the NNSA Stockpile Stewardship Program. Additionally the experiments complement the on-going Subcritical Experimental Program currently in place at the Nevada Test Site. A series of 20 shots were conducted with the gun to qualify it for use with nuclear materials.

milestone with the successful firing of the Joint Actinide Shock Physics Experimental Research (JASPER) gas gun at the Nevada Test Site.

“Our national laboratories now have at their disposal a valuable asset that enhances our due diligence to certify the nuclear weapons stockpile

While operated by Lawrence Livermore National Laboratory, the JASPER gas gun will see multi-laboratory use. The gun is capable of about 24 experiments per year over it’s ten-year life.

Secretary of Homeland Security Tom Ridge (center) is joined by Assistant Secretary Robert Liscouski (left) and Michael R. Anastasio (right), director, Lawrence Livermore National Laboratory at an LLNL briefing on counterterrorism technologies.



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From Saigon to Sandia - A Refugee Family's Story

Tan Thai's life could be a novel or a movie. A Distinguished Member of the Technical Staff at Sandia National Laboratories in Albuquerque, Tan was a middle school teacher in Vietnam twenty-five years ago when Saigon fell to the communists.

The life Tan enjoyed while growing up in Vietnam changed drastically after that. His father, a businessman, lost everything. His younger brother, Loc, was drafted by the communists to carry ammunition. Tan could not see past a bleak future.

He says the strength and love of his mother motivated him and his older sister, Mai, to escape Vietnam. "Don't cry," she said, as they left. They were captured on their first attempt but were successful on their next attempt.

"Successful" meant they arrived in a crowded boat at Pulau Bidong, a small island off the east coast of Malaysia, after three days and nights at sea. Their journey included being robbed on three separate occasions by Thai sea pirates. The pirates threatened their lives and terrorized them. "Only by God's grace did they let us go," says Tan.

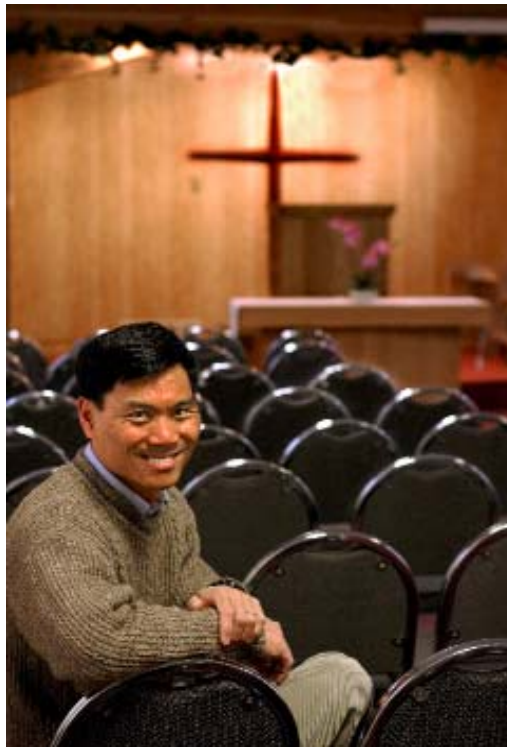
The small wooden fishing boat was overcrowded with about 50 people of all ages. "People vomited all around me, the odor was horrific," says Tan. "My sister and I had some water but no food."

Their arrival in Pulau Bidong was also traumatic, but a happy surprise awaited them. As Tan and Mai sat on the dock, their brother Loc appeared. They had not heard from Loc in a very long time, but he also had escaped. Loc told them he had gone every day to the only dock on the

island in hope of seeing family members.

There were 6,000 refugees in Pulau Bidong when they arrived. They built their own houses from abandoned materials like plastic sugar bags and wood from trees harvested from the island's hills. Beds were constructed out of tree bark, later "upgraded" with wooden planks.

"Our stay at Pulau Bidong lasted about six months," Tan says. "Some refugees had to wait for five or six



Tan Thai of Sandia Labs, photographed at a Vietnamese church in Albuquerque where he is a volunteer pastor.

years if they didn't have relatives or friends in any sponsoring countries. We were fortunate. My sister's husband had escaped in 1975 and lived in Dallas, so it took us only half a year of waiting in Bidong."

However, because of Loc's health

problem, Tan and Mai ended up waiting another three months in a transit camp. As for Loc, it took him another six months to reach the U.S.

Initially, they all lived together in Texas. About a year and a half after arriving in Dallas, Tan moved to Arkansas where an aunt and uncle offered him a place to stay while attending the University of Arkansas.

Tan's degrees in electrical engineering brought him to Sandia Labs in 1987 by way of AT&T.

Today at Sandia, Tan does research and development for computer security applications. He was promoted to Distinguished Member of Technical Staff in 2001.

Tan and his wife Lan, a Vietnamese interpreter at the University of New Mexico, have three children, Hannah, Nathan, and Stephen. Tan also serves as a biovocational pastor at a Vietnamese church. His nights and most of the weekend are filled with church work and family activities.

His brother Loc works for Boeing and sister Mai works for an electronics firm. They both live in Texas. Their mother died before her paperwork to enter the U.S. was completed. Tan became a U.S. citizen in 1986 in Arkansas.

Although he is glad that his children did not have to experience his quest for freedom, he hopes that they value what they have in the U.S. "To me, mine is a typical American story," says Tan. "It is a story my mother would embrace with humility."

Paul Longworth Sworn in as NNSA Deputy Administrator for Defense Nuclear Nonproliferation

Paul M. Longworth, who previously served as the senior policy advisory for national security and the former Soviet Union for Secretary of Energy Spencer Abraham, is the new deputy administrator for defense nuclear nonproliferation for NNSA.



The President nominated him to be deputy administrator in April and he was confirmed by the Senate in July. His swearing in ceremony took place in August.

After the ceremony, Abraham said, "Paul Longworth has done an excellent job as a senior advisory in the critical areas of national security

and nonproliferation. He brings leadership and experience to a vital position that has many nonproliferation initiatives worldwide which are important to the security of our nation."

Longworth has over seventeen years of experience in national security, nuclear, and environmental issues. He has served in the Executive and Legislative branches of the federal government and in the private sector.

Longworth said his main concerns will be to continue

promoting the administration's nonproliferation priorities, which include preventing the proliferation of weapons of mass destruction through securing and reducing nuclear materials worldwide, and improving trans-border security to keep dangerous weapons and materials from reaching the hands of our adversaries or ending up on U.S. soil.

"I am honored to be nominated for this position by President Bush. I am also honored to be given the chance to work with the men and women of the NNSA's nonproliferation program. I can think of no organization that is better prepared to address the threats posed by the proliferation of weapons of mass destruction than the Office of Defense Nuclear Nonproliferation," Longworth said.

Nuclear Engineer Brumley Manages Y-12 Office

When asked if he has any plans for retirement, Bill Brumley replies, "I'm having too much fun to stop now." The Y-12 Site Area Office manager has been overseeing the numerous programs and projects that allow the Y-12 National Security Complex to remain a vital component of the Nuclear Weapons Complex since October 2000, and he has no plans of stopping any time soon.

"We have torn down more than 100 structures at Y-12 that were sending a message to employees that the site was falling into disrepair," he said. "The skyline of Y-12 is changing rapidly, and I'm excited about that. We recently broke ground for our new

purification facility, and plans are moving forward for the highly enriched uranium storage facility, as well.

"Not only are we tearing down old facilities and building new ones, but we have more than 50 ongoing plant projects. Everything we are doing right



Bill Brumley, manager of the Y-12 Site Area Office, speaks with the media at a recent groundbreaking ceremony for Y-12's new Purification Facility.

now is leading us to the safest, best Y-12 possible."

While he cites executing construction plans as one of his biggest challenges, Brumley said one of the biggest satisfactions during his tenure in Oak Ridge is seeing the full resumption of Y12's enriched uranium operations, which have been idle since Y-12's 1994 stand down.

"We have worked hard to get to where we are, and we know there are many more

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Computer-Carrying Moths Help Research

If you thought your laptop afforded you the ultimate in computer portability, look at what the NNSA's Kansas City Plant is working on for the lowly moth.

Engineers at the plant are designing a computer chip so small and lightweight that it can be mounted on a moth without restricting its flight. Computer-carrying moths? Isn't that taking technology a bit too far?

Not to neurobiologists at the University of Washington (UW). The Seattle-based researchers, among others, are extremely interested in equipping moths with portable computers, and they have enlisted the technical expertise of the Kansas City Plant to help make it possible.

In a study partially underwritten by the U.S. Naval Research Laboratory, UW scientists are using computer electronics to probe the neural basis of behavior. Other research participants include the California Institute of Technology, Pasadena, and Case Western Reserve University in Cleveland, Ohio.

The key to the research is designing and building an implantable computer to interface with the moth while in flight. That's the role of the Kansas City Plant, according to the plant's managing contractor, Honeywell.

As for the star of the show - the insect that will tote this miniature computer in flight - it isn't the typical moth you might see circling your neighborhood streetlight. It's the *Manduca hawk moth*, a relatively large species whose size and characteristics make it an invaluable tool for scientific research ranging

from behavioral studies to biochemical and genetic processes.

The Kansas City Plant got involved in the project about two years ago after UW's research team ran into

obstacles. UW had a chip but it used surface-mount technology which made it too large for the moth to be able to fly - what UW needed is a neurochip that weighs less than a gram.

The Kansas City Plant is an ideal partner for the project because it can deliver the small number of units needed. Unlike other commercial miniaturization companies, the plant can work with small quantities and hence keep costs down. Also, the



The Manduca Hawk moth is used by researchers at the Kansas City Plant to explore the possibility of implanting a computer on a moth. This particular moth is valuable because of its large size and unique behavior.

plant is flexible in terms of applying new technologies - some may not be commercially available - to fabricate this product well within the specifications.

The research goal is broader than just studying insect flight. The moth research could be applied to studies of the human neuromuscular system and perhaps even be used in the making of advanced bio-inspired machines.

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Kansas City Plant Shares Safety Strategies With Other Companies

Bill Brumley

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Since 1996, the NNSA's Kansas City Plant has enjoyed Star status in the Voluntary Protection Program (VPP), an honor bestowed by the DOE on companies that take extra steps to ensure a safe and healthful workplace.

Recently, plant associates have become increasingly involved with VPP's mentoring program, helping other companies to achieve their own certification.

The plant recently led a VPP 101 Workshop where organizations from Missouri, Kansas, and Nebraska learned about the program's significance. Attendees included the City of Lee's Summit, Mo., Hallmark Cards, Williams Foods, and Sherwin-Williams. The workshop highlighted the importance of VPP in the workplace and illustrated how

successful the program has been.

The Kansas City Plant also mentors the Oak Ridge Institute for Science and Education located in Oak Ridge, Tenn. According to Scott White, manager of environmental safety and health, there are benefits to a mentor participating in the program, just as there are to the company receiving the mentoring. "By being a mentor, we are given the opportunity to see what other sites are doing and compare those activities to our own program. It's an excellent way to network and share information. We can share what we've done, as well as our ideas, and get an outside party's feedback. In that sense, it gives you an opportunity to review your own program as well."

challenges ahead of us," he said. "But the satisfaction gained from each success is so rewarding—I'm really having a good time right now."

When he's not burning the midnight oil at Y-12, Brumley is clicking the lens of a camera, a hobby he began with a small 35-mm camera and has since branched into the digital format. His office is lined with shots of a trip to Japan, wildlife, fireworks displays and a full panorama of a 300-foot-tall Alaskan glacier. He's contemplating a retirement project of photographing barns in the East Tennessee area—"kind of like the Bridges of Madison County." Sounds as if he plans on working hard even after the day that he does decide to retire, but then again, that's fun for Bill Brumley.



Connecticut Congressman Christopher Shays, center, holds a plutonium ball used in criticality safety training at Los Alamos National Laboratory during a visit to the High Bay at Technical Area 18. Standing next to Shays (at left in photo) is Ohio Congressman Michael Turner. Shays is chairman of the national security subcommittee of the House Committee on Government Reform. Turner is vice chairman. The congressmen were at Los Alamos with NNSA Administrator Linton Brooks to receive overviews on laboratory safeguards and security programs. They also visited the Pantex Plant in Amarillo, TX and the Y-12 National Security Complex in Oak Ridge, TN.

NNSA Assists Russian Scientists, American Business

Through a project funded by the National Nuclear Security Administration's (NNSA) Initiatives for Proliferation Prevention (IPP) program, an American small business, Argonide Nanomaterials, has made an important breakthrough in filtering technology based on nano-alumina fibers. This new Argonide technology has important national security and counterterrorism implications.

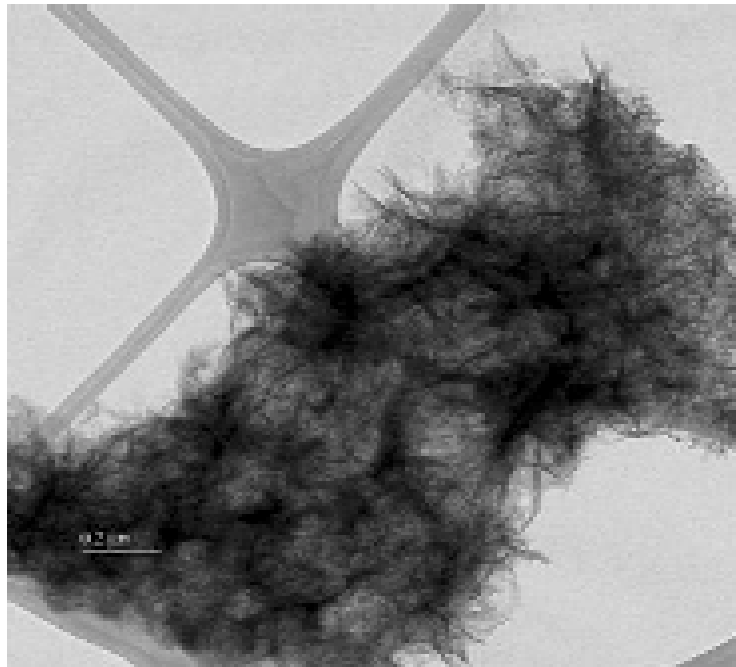
Argonide Nanomaterials developed nano-alumina fibers through a joint effort involving the Department of Energy's National Renewable Energy Laboratory and two research institutes in Russia — the Design Technology Center in Tomsk and VECTOR State Research Center of Virology and Biotechnology in Novosibirsk. The project is an example of the success NNSA has had in implementing its nonproliferation programs with support from the U.S. small business community.

Marketed under Argonide's brand-name, NanoCeram®, nano-alumina fibers remove impurities from water at flow rates over 200 times faster than current technologies. NanoCeram® filters can remove 99.9999% of biological contaminants as well as dissolved heavy metals such as lead, mercury, and uranium from water solutions.

Applications of nano-alumina filter technology are broad, ranging from laboratory use to residential use by consumers. Potential applications include removing biological and chemical agents from water, testing for biological and chemical

contaminants, and filtering water for home consumption.

With annual market value



Nano-alumina fibers as viewed through an electron microscope.

estimates for NanoCeram® placed at \$10 million per year, this IPP project provides a significant boost for a small business such as Argonide, which currently has annual gross revenues of less than \$12 million.

The development of the nano-alumina fiber technology marks another success for the NNSA's IPP program. Established in 1994, the IPP program engages former Soviet weapons scientists in peaceful, commercially sustainable pursuits by matching U.S. companies with former Soviet weapons institutes to develop new commercial technologies. U.S. industry partners benefit through access to new technologies, while former Soviet weapons scientists gain new employment opportunities in commercial research and development. By providing alternative peaceful activities for

weapon scientists, IPP projects prevent the spread of weapons expertise to countries of proliferation

concern. U.S. companies participate in IPP through the U.S. Industry Coalition (USIC), a non-profit industry association with over 150 members, two thirds of which are small businesses.

To further promote technology commercialization under the IPP program, USIC is producing a technology tradeshow,

“Partnerships for Prosperity & Security: Accessing Innovative Technologies from Russia, Ukraine and Kazakhstan.” This exhibit-conference, scheduled from November 5-6, 2003 in Philadelphia, is sponsored by NNSA. More than 100 high technology products in the areas of energy (coal, oil, gas, nuclear, and fuel cell), radiopharmaceuticals, nanotechnology, information technologies, and detection technologies for nonproliferation and homeland security will be on display. This event will give the world its first look at many cutting-edge technologies that evolved from the work conducted in the scientific institutes of the former Soviet Union. For more information and to register for the tradeshow, log on to www.partnershipsforprosperity.net.

NNSA Advances “Weapons Into Plowshares” With First LEU Shipment to Tennessee

NNSA and the Savannah River Site (SRS) have begun a new era of converting “weapons into plowshares” with the first shipment of low-enriched uranium (LEU) to Tennessee, where it will be adapted to help supply the nation’s energy needs.

The shipment is a major milestone in the high enriched uranium (HEU) Blend Down Program, which was honored earlier this year by DOE for excellent project management. The HEU Blend Down Program takes HEU, a weapons-usable form of uranium, and blends it with natural uranium to make LEU, which cannot be used in weapons. The LEU is shipped to Nuclear Fuel Services (NFS) in Erwin, TN, where it will be prepared for fabrication into a fuel for use in Tennessee Valley Authority (TVA) reactors.

“This marks a big step in our

nation’s nonproliferation efforts,” Secretary of Energy Spencer Abraham said. “We have taken material that was left over from the Cold War and turned it into something that is unattractive for use in weapons. Not only that, we’ve turned it into a material that has an important peacetime use, producing electricity.”

At the end of the Cold War, when SRS ended production of special nuclear materials, more than 33 metric tons of high enriched uranium were left over in various stages of the nuclear production cycle. That material, which includes irradiated and unirradiated fuel, solutions and other forms, was included in the 174 metric tons of uranium nationwide that, in 1994, the President declared as excess to the nation’s security needs.

In 1997, DOE signed a Memorandum of Understanding with

TVA, which then entered into agreements with two additional companies, NFS and Framatome, to take part in the conversion to commercial nuclear fuel.

Fuel assemblies are taken apart at SRS and the HEU is packaged into bundles in K Area. The HEU is then moved to the site’s H Area, where it is processed to remove impurities that would make it unusable as a fuel. The purified HEU is then blended with natural uranium supplied by TVA and loaded into shipping containers certified by the Nuclear Regulatory Commission. The LEU is then shipped to NFS, where it will be converted to an oxide form before it is fabricated into fuel assemblies, which will be used in TVA’s Browns Ferry nuclear plant. The blending down and shipping of LEU will continue through 2007.



Albuquerque Mayor Marin Chavez, left, and Service Center Director Jim Hirahara.

NNSA to Provide Science Advisor For City

A process for NNSA to provide science advice to the City of Albuquerque, NM, has been established under a statement of cooperation signed by Albuquerque Mayor Martin Chavez, NNSA Service Center Director Jim Hirahara and Sandia Site Office Manager Karen Boardman.

Under the agreement, John-Olav Johnsen, a senior NNSA technical advisor for bioscience at the Service Center, will act as the lead science advisor to the Mayor’s office. Johnsen will coordinate other subject matter experts within NNSA and at Sandia National Laboratories when requests are made by the City for advice. Sandia advisors will be coordinated through

Mike DeWitte, the manager of Sandia’s corporate outreach and partnerships program.

“This project with the City of Albuquerque is consistent with the Statement of Principles signed by Deputy Secretary Kyle McSlarrow with the Energy Communities Alliance,” Hirahara said. “In that statement the Department commits itself to a timely, open and meaningful dialogue with local governments and to consult regularly with each other in areas such as emergency response planning and policies that impact a community’s health, safety, environment or economy.”