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Stockpile Stewardship Effort Is Ten Years Old

More than a decade has passed since underground tests at the Nevada Test Site shook the earth and rattled windows in suburban Las Vegas. Since then, the safety, security and reliability of the nation's stockpile has been surveiled and certified annually through a host of high-tech experiments and facilities—many of which did not exist a decade ago.

Many experts have compared the challenges of stockpile stewardship to the Manhattan project of World War II or the Apollo program that landed Americans on the moon. For the first time in history, a major scientific program has relied entirely on experience, surrogate experiments and three-dimensional computer simulations.

“This is a shining example of successful DOE strategic planning, which produced an



Congressman Dave Hobson, chairman of the House Energy and Water Development Appropriations Subcommittee, and Congressman Mike Simpson, subcommittee member, tour the target chamber in the National Ignition Facility at Lawrence Livermore National Laboratory.

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NNSA Resumes Tritium Production For First Time in 15 Years

When the Tennessee Valley Authority's (TVA) Watts Bar reactor near Knoxville, TN, attained criticality on Oct. 20, the event marked the restoration of the nation's capability to produce tritium for nuclear weapons. Tritium was last produced at the Savannah River Site's reactors in Aiken, SC, that were shut down in 1988 due to age and safety concerns.

Tritium is an isotope of hydrogen that contains two neutrons and is a necessary component in all nuclear

weapons. Tritium also decays at a rate of about 5 percent per year, requiring warheads to be replenished periodically with fresh tritium. NNSA has been able to meet this need by recycling tritium from retired units. However, it has long been recognized that a new source of tritium would be needed.

With the shutdown of the Savannah River reactors, the Department considered various options for restoring tritium production, ranging from the construction of an updated

version of the Savannah River heavy water reactors to construction of a new large proton reactor. After a three-year competitive development, the Department announced in May 1999 that the Tennessee Valley Authority's (TVA) commercial light water reactors at Watts Bar and Sequoyah, located near Chattanooga, TN, would be used.

Congress authorized the use

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Stockpile Stewardship

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accurate 10-year projection that was fulfilled through cutting-edge advances in Computer Science, Laser Fusion, Physics, Materials Science and diagnostics,” Dr. Everet Beckner, NNSA Deputy Administrator for Defense Programs explained.

Traditional underground nuclear testing permitted a top-down assessment of a nuclear weapon. Like an automobile, scientists took it for an underground “test drive” in the Nevada desert to find out if a weapon worked.

“Now they must understand weapons and how they function from the bottom up,” Beckner said. “Weapons must be broken down into individual components. Then the characteristics of each piece must be examined to predict how components will perform under different

conditions—as well as over time. This requires understanding the physics and engineering of a weapon in unprecedented detail.”

Compounding the challenge for scientists and engineers, in older weapons systems, original parts are no longer manufactured. Regulations governing their manufacture have changed. And most of the facilities that produced them have been closed or downsized.

To achieve a detailed understanding, researchers had to develop new scientific tools and experimental facilities for conducting surrogate experiments and computer simulations. Among the tools developed were the National Ignition Facility at Lawrence Livermore, the Dual-Axis Radiography for Hydrotesting at Los Alamos, and the Z-Machine at Sandia.

An essential and integrating element of Stockpile Stewardship has been the use of supercomputers to simulate the aging and operation of a nuclear weapon. The Accelerated Strategic Computing Initiative, or ASCI, became a race against the clock—and against Moore’s Law, which forecasts the rate of increases in processor speed.

As the delivery of the fifth ASCI system becomes imminent, the 100-teraOps goals will become a reality. ASCI Purple will cap a development curve where Moore’s Law proved to be a foundation rather than a ceiling.

“But should the need ever arise to return to full-scale nuclear testing, the Stockpile Stewardship Program would remain a vital, cost-effective compliment to full-up underground tests,” Beckner assured.

NNSA Tritium Production

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of the TVA reactors and the Nuclear Regulatory Commission granted amendments to the operating licenses to permit tritium production. For now, only the Watts Bar reactor will be used for tritium production. Two Sequoyah reactors will remain in standby for the foreseeable future.

Tritium will be produced in the reactors by irradiating hollow rods containing the isotope Lithium-6 with neutrons. At the end of the normal 18-month commercial reactor operating cycle, the rods will be removed and transported in certified casks to a new Tritium Extraction Facility currently under construction at the Savannah River Site.

Using remote control methods, the rods will then be cut and the tritium

gas removed using a vacuum-thermal process. After partial purification, the gas will be sent to the nearby Tritium Loading Facility where it will be available to replenish the stockpile. The Tritium Extraction Facility will be operational in late FY 2007.



The arrival of tritium producing rods at the Tennessee Valley Authority’s Watts Bar reactor site is greeted by, left to right, Dana Krupa, NNSA Commercial Light Water Reactor Program Manager; Dr. Everet Beckner, Deputy Administrator for Defense Programs; and Jim Chardos, TVA’s Tritium Program Manager.

NNSA Signs New Model Contract for Sandia Labs

NNSA Administrator Linton Brooks has signed an agreement with Lockheed Martin for a new model contract to manage Sandia National Laboratories for the next five years. Lockheed Martin Technology Services Executive Vice President Michael Camardo signed the contract on behalf of Lockheed Martin.

Brooks said, "I hope this contract will serve as a model for other future contracts. It provides a model for increasing contractor accountability for daily operations and is thus an important step toward reengineering federal oversight that is part of the NNSA of the future. Patty Wagner and her team at the Sandia Site Office did a great job in negotiating this innovative effort."

Under the new model, federal oversight will be conducted at a systems level once the contractor has an acceptable site assurance system. Federal oversight for nuclear operations and safeguards and security will remain the same. The contract also requires the contractor

to capitalize on private sector expertise and it provides a more disciplined work authorization process.

It also includes new performance



NNSA Administrator Linton Brooks, left, reviews the Lockheed Martin model contract for managing Sandia National Laboratories. Sandia Site Office Manager Karen Boardman (center) and Sandia Executive Vice President Joan Woodard also participated in the contract signing ceremony.

incentives and an "award term" whereby outstanding evaluations combined with meeting several award term incentives can earn a year-by-year extension of the contract.

The new model for the contract took effect Oct. 1, 2003, and will be in place until Sept. 30, 2008. The five-year contract extension was announced in December 2002.

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News Briefs

Los Alamos, Sandia and New Mexico School Form Explosives Research Center

To reinvigorate U.S. research and development in explosives - including applications aimed at the terrorist threat - Los Alamos and Sandia national laboratories and the New Mexico Institute of Mining and Technology are establishing the Center for Energetic Materials and Energetic Devices, or CEMED.

Officials from the three organizations have signed a memorandum of understanding spelling out the scope of the new research Center.

There is a growing need for advanced capabilities to identify, evaluate, test and disarm so-called energetic, or explosive devices. Customers for CEMED will include the U.S. Departments of Energy, Defense, Justice, Homeland Security and Agriculture, as well as other federal and state agencies with an interest in energetic materials and devices.

Los Alamos Announces Newest Lab Fellows

Los Alamos National Laboratory Director G. Peter Nanos has selected seven Los Alamos staff members as Laboratory Fellows, the Laboratory's highest scientific honor. The honor is given yearly to technical staff members who have sustained a high level of excellence in programs important to the Laboratory's mission, made important scientific discoveries that lead to widespread

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Camille Yuan-Soo Hoo Enjoys Challenges of Livermore Office

As the Livermore Site Office Manager, Camille Yuan-Soo Hoo is responsible for contract management and field implementation of NNSA and Department of Energy programs at the Lawrence Livermore National Laboratory (LLNL). “I am fortunate to work with many talented men and women at the Livermore Site Office (LSO) and the Laboratory on their important contributions to national security and science programs,” she said.

After the NNSA realignment in December 2002, Camille became Manager of the Livermore Site Office. She had served as the Oakland Operations Office Manager since May 7, 2000. “The transformation of the Livermore Site Office, since the NNSA realignment, is progressing well,” she said. “Federal oversight of Livermore Laboratory is becoming stronger as roles and responsibilities of Site Managers and HQ are clarified.”

Camille is particularly focused on the Laboratory’s technology innovations to support Homeland Security. “The attacks of September 11, 2001, followed by the anthrax mailings, revealed the vulnerability of the U.S. to terrorism. The Laboratory was able to respond effectively and broadly to those attacks because it had been actively addressing the threat of weapons of mass destruction terrorism

for many years.”

Another important role for Camille as Site Manager is to ensure development and maintenance of LLNL’s facilities and infrastructure to meet operational and mission



Camille Yuan-Soo, manager of the Livermore Site Office.

requirements. She says she is excited about several new state-of-the-art program facilities under construction, including the National Ignition Facility for developing and validating computer for the Stockpile Stewardship program; the Terascale Simulation Facility that will house the next-generation of supercomputers; and the Sensitive Compartmented Information Facility that will be used by Laboratory scientists to conduct state-of-the-art analysis on national security threats.

Camille says she enjoys her new role as the Livermore Site Office Manager and the opportunity to learn more about science, environmental safety and health and security.

Infrastructure Update Special Materials Facility at Y-12 Under Construction

A new special materials facility at the Y-12 National Security Complex at Oak Ridge, TN, is now under construction.

The Purification Facility will provide a purification process for manufacturing non-nuclear special materials needed to support the Stockpile Life Extension Program. Processes in the new facility will be housed in gloveboxes. It will also contain state-of-the-art instrumentation and equipment.

“This is a big step forward in Y-12’s efforts to become a more able, agile and affordable facility,” said Dennis Ruddy, president and general manager of BWXT Y-12. “It is a key milestone of Y-12’s modernization program and will play a vital role in its ability to meet its national security mission well into the twenty-first century.”

Bill Brumley, the NNSA’s Y-12 site manager, said the new facility “is an important upgrade of infrastructure and technology to allow Y-12 to meet its future mission requirements within the Nuclear Weapons Complex.”

The 10,000 square foot concrete and steel building with brick veneer was designed by Pro2Serve of Oak Ridge and will be built by Foley Construction of Kansas City, MO. The \$50 million project is part of the Special Materials Capabilities program of the Y-12 modernization effort.

News Briefs

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use, or been recognized as leaders in their fields both within and outside of the Laboratory.

The seven newest Fellows are Carol J. Burns of the Chemistry Division, R. Brian Dyer of the Bioscience Division, Robert S. Hixson of the Dynamic Experimentation Division, Quanxi Jia of the Materials Science and Technology Division - Superconductivity Technology Center, Nicholas S. P. King of the Physics Division, and Michael M. Nieto and Arthur F. Voter, both from the Theoretical Division.

Backhaus Named Top Young Innovator By Technology Review Magazine

The Massachusetts Institute of Technology's Technology Review magazine has named Los Alamos National Laboratory staff member Scott Backhaus one of the world's 100 Top Young Innovators for 2003.

The TR100, chosen by the editors of Technology Review and an elite panel of judges, consists of 100 individuals under age 35 whose innovative work in technology has a profound impact on today's world.

Backhaus was chosen for his work in thermoacoustics, and specifically his role in the development of the acoustic Stirling heat engine. Backhaus came to Los Alamos as a postdoctoral fellow in 1998, and became a technical staff member this year.

NNSA Initiates Cooperative Monitoring Center In Jordan

The new Cooperative Monitoring Center (CMC) in Amman, Jordan, was inaugurated in an October ceremony attended by Jordan's Prince Rashid Bin Hassan, U.S. Ambassador to Jordan Edward Gnehm, and other Jordanian and American dignitaries. The Center was created by NNSA, Sandia National Laboratories, and the Jordanian Royal Scientific Society.

CMC@ Amman is modeled after Sandia's Cooperative Monitoring Center in

Albuquerque, NM. Its mission is to bring together policymakers and scientists - largely from the Middle East - to explore how technology can be used to strengthen security in the region, such as through arms control agreements, resource management, and cooperative border monitoring.

Amman was chosen as the site for Sandia's "sister" CMC because of Jordan's strategic location in the region, its close relationships with neighboring countries, and the academic depth of the RSS. The center's Director is retired General Mohammed Shiyyab, who has been deeply involved in regional security and arms control issues, and in the negotiations that led to the Israeli-

Jordanian peace treaty.

The center is now the cornerstone of NNSA's regional security program in the Middle East, which fosters science and technology cooperation,



CMC@Amman Director General Mohammed Shiyyab (center) explains cooperative monitoring technology to U.S. Ambassador to Jordan Edward Gnehm (left) and Prince Rashid bin Hassan of Jordan (right).

strengthens regional security, and reduces incentives for proliferation. The center will provide training to Jordanian and other scientists and policymakers from the region, conduct research and analysis on technical solutions to regional problems, and facilitate workshops on key regional security issues.

Sandia staff introduced 16 Jordanian military, security, and intelligence officials to the concepts of cooperative monitoring at the center's first training workshop in July. Over the next year the center will initiate new regional projects in the areas of radiation monitoring, border security, disease surveillance, sustainable land use, and water management.

Calendar Will Help Promote Diversity Awareness

The Los Alamos National Laboratory Diversity Office has developed a state-of-the-art online tool to help promote diversity awareness in the workplace. It is also useful for scheduling meetings while avoiding conflicts with cultural and religious observances.

The Weaving Our Worlds (WOW) Diversity Calendar is an expansive and engaging educational resource for Lab leaders and workers. It contains more than 800 observances, including cultural, religious, and historical events.

The calendar includes the birthdays of heroes and famous people from diverse backgrounds that demonstrate invisible diversity (thinking style, personality traits, age, educational background). There are poets, filmmakers,

scientists (Robert Oppenheimer, Glenn Seaborg, and Luis Alvarez included), artists, writers, musicians, political



Lisa Gutierrez, LANL's Diversity Director, points to one of her favorite features in the diversity calendar developed by Laurie Quon. The calendar has received rave reviews from diversity calendar professionals.

leaders, and activists, to name a few categories.

It is a one-of-a-kind calendar

employing multimedia (images, sound, video) to help employees learn about the cultures, practices, heroes, historical events, and foods important to those they work with. Multimedia is from fun sources such as the Smithsonian Institute, PBS, Discovery Channel, and National Geographic.

“Understanding each other fosters cooperation, teamwork, and better working relationships. The WOW calendar addresses a number of areas but specifically focuses on providing diversity education and awareness. This tool should be on every manager’s desktop to help them promote diversity in the workplace,” says Lisa Gutierrez, Diversity Director.

Check out this unique calendar at <http://lanldb1.lanl.gov/lanl/lanlevents.nsf/networkredirectForWOWCalendar?OpenAgent>. For additional details about the calendar, how it was developed, and its many uses, go online to <http://www.lanl.gov/orgs/dvo/WOWCalendar/CalendarFAQs.pdf>.

NNSA, WAPA Sign Money Saving Electricity Deal

Electricity for Sandia National Laboratories (SNL) and Kirtland Air Force Base in Albuquerque, NM, is now being supplied by the Western Area Power Administration (WAPA) under an inter-agency agreement between NNSA and WAPA.

Savings of more than \$18 million in power costs is anticipated over the next six years as a result of the agreement. Other beneficiaries of the anticipated savings will include the NNSA Albuquerque Service Center and other KAFB federal tenants.

The arrangement was made

possible by a Federal Regulatory Commission ruling and subsequent settlement negotiations reached with Public Service Company of New Mexico (PNM), the electric utility that previously provided power to KAFB. Some provisions of the settlement with PNM included WAPA entering into a six-year wholesale purchase power contract with PNM. In return, PNM agreed to provide transmission service to KAFB.

The new arrangement was developed through the joint efforts of DOE, NNSA, the Air Force and

WAPA personnel with technical support provided by Lundberg, Marshall and Associates.

NNSA Administrator Linton Brooks said, “I congratulate the hard work of everyone involved in this lengthy and complicated process, which will save the American taxpayers millions of dollars as we keep electricity flowing to an important NNSA laboratory, the Service Center, and other national defense functions at Kirtland Air Force Base.”

Awan, Monette Recognized for Service to America

When National Nuclear Security Administration (NNSA) employee Riaz Awan was sent to the Ukraine to oversee a Department of Energy (DOE)/NNSA funded Chernobyl replacement heat plant as part of the safe and secure permanent closure of the Chernobyl Nuclear Power Plant, he knew it was a big responsibility.

Now, five years later, he is the DOE attaché at the U.S. embassy in Kiev, helping coordinate national security, nuclear safety and nonproliferation projects in Ukraine. For his efforts, Awan recently received a Service to America Medal, awarded by the Partnership for Public Service to honor outstanding achievements of America's public servants. The awardees were chosen by a selection

committee of prominent public figures including the *Washington Post's* David Broder; Arthur Sulzberger, chairman and publisher of the *New York Times*; and the Honorable Kay Coles James, director of the U.S. Office of Personnel Management.

"I feel strongly about the importance of the career federal work force and Riaz Awan is a good example of an outstanding public servant. I was very proud of him as I watched him receive the International Security Award for in his work in our nonproliferation and nuclear safety programs," NNSA Administrator Linton F. Brooks said. "Riaz is on the front lines of the Bush administration's efforts to secure sensitive material worldwide."

Awan said he felt humbled by the

award. "I feel honored and privileged that our government has put trust and faith in me to do this important work thousands of miles away. I appreciate being acknowledged like this, and will continue doing my best."

The Service to America Medals were created in 2002 by the Partnership for Public Service, a non-partisan, non-profit organization committed to recruiting and retaining excellence in the federal workforce, and the Atlantic Media Company.

A second employee, Debbie Monette of the NNSA Nevada Site Office, was a medal finalist in the category of Homeland Security for her work after the terrorist attacks on September 11, 2001.



Federal Agent Frank Tagle tracks his next target during action at the Defender Challenge 2003 security forces competition at the U.S. Army's Camp Bullis Training Camp Oct. 10-16. (Photo courtesy of the U.S. Air Force)

NNSA Special Agents Dominate Air Force Security Force Event

The men in black from NNSA's Office of Secure Transportation (OST) took top honors at Defender Challenge, the Air Force's annual security forces competition held at Lackland Air Force Base in Texas. Their overall victory included winning the Sadler Cup tactical exercise and the team handgun competition. The ten-man OST team placed second in the combat rifle event and two team members placed in the M-4 rifle competition. That won them the Coleman Cup for overall marksmanship.

The winning team is part of an elite corps of federal agents who provide safe and secure transportation for nuclear weapons, weapon components, and special nuclear material. Robert McLaughlin, the team trainer, said putting together a team to compete is difficult considering the requirements of the OST mission. "Getting eleven agents off the road at one time was almost impossible," he said.

Oak Ridge Accelerator Project on Track

A multi-lab effort to build the world's most powerful source of neutrons has taken a giant step forward.

On their first try, researchers at the Spallation Neutron Source in Oak Ridge, TN, successfully ran an ion beam through the first of 10 accelerator tanks from Los Alamos National Laboratory. The achievement clears the way for Los Alamos to continue building five more of the so-called drift-tube linear accelerator tanks, or DTLs, as well as four coupled-cavity linacs that will further accelerate the SNS beam.

The SNS is currently the largest civilian science construction project in the United States. Los Alamos SNS Division Leader Don Rej said ensuring a robust physics design and precision alignment of hardware were the keys to making sure the accelerator worked right the first

time.

"This was a major team effort between Oak Ridge National Laboratory and Los Alamos," Rej said. "Reaching this major milestone for the SNS accelerator program took a lot of combined expertise from more than 100 staff from Los Alamos and our colleagues from the other labs. Los Alamos had complete technical responsibility for the design, engineering and manufacturing of all the components and subsystems."

In addition to the DTLs and coupled-cavity linacs, Los Alamos is responsible for the high-voltage pulsed-power systems, high-power radio frequency systems, control systems and the overall accelerator physics design, including beam dynamics and diagnostics, Rej said.

Six DOE laboratories are participating in the creation of SNS. It consists of an ion source and a

radio frequency quadrupole accelerator built by Lawrence Berkeley National Laboratory, Berkeley, CA; the 10 Los Alamos linacs; unique niobium linac cavities designed by the Thomas Jefferson National Accelerator Facility, Newport News, VA (niobium is a metallic element with special properties for low temperature conductivity); an accumulator ring from Brookhaven National Laboratory, Long Island, NY; a mercury Spallation target designed by Oak Ridge; and a suite of neutron scattering detection instruments from Oak Ridge and Argonne National Laboratory, Chicago, IL.

The overall SNS budget is \$1.4 billion. Oak Ridge National Laboratory is leading the effort, and Los Alamos' share of the work totals about \$200 million.



LLNL firefighters, seen here during a training exercise, recently returned from Southern California, where they were dispatched to help fight the recent wildfires. A crew of Bechtel Nevada firefighters also provided assistance at the Cedar fire outside San Diego.

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Editors: Al Stotts and Bryan Wilkes
Layout: Barbara Courtney

Contributors include: Ellen Boatner, Y-12; Robbin Cresswell, U.S. Air Force; Jim Danneskiold, Los Alamos Lab; Kathy DeLucas, Los Alamos Lab; Gary Emery, U.S. Air Force; Todd Hanson, Los Alamos Lab; Keith Kolb, Bechtel Nevada; Dana Krupa, NA-121; Lauren Martinez, Livermore Site Office; Chris Miller, Sandia Labs; Tami Moore, Sandia Site Office; Kevin Roark, Los Alamos Lab; Kevin Rohrer, Nevada Site Office; David Schwoegler, Lawrence Livermore Lab; Neal Singer, Sandia Labs; Donna Vigil, Los Alamos Site office