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Sandia National Laboratories

Engineer Steve Yearout marks 25th anniversary sending sensors into space

Fifty nuke-detecting sensor sets on US Air Force GPS satellites developed by Sandia/LANL team

By Neal Singer

Imagine you're a collection of sensors, flying in formation in one of 31 US Air Force satellites in medium earth orbit above the Earth.

The satellite itself is part of the Air Force's global positioning system (GPS) that lets truckers, hunters, and lost city drivers know exactly where they are.

But from your point of view, as a collection of sensors, the satellites are perfect platforms to detect and triangulate in on airborne or space-based nuclear explosions anywhere they may occur.

On the one hand, of course, detection has been no problem: There haven't been any air-based explosions for decades.

On the other hand, there could be one anytime. And the country that did it might deny doing it if its leaders didn't believe the US could track it.

So sensors have to be ready to detect a real explosion and do so through a jungle of potential false positives: Lightning bolts that occur more frequently than one per second (as well as unpredictably occurring super-lightning bolts), energetic particles from the Van Allen radiation belt that collide with electronics on the satellite, the welter of cell phone communication "noise," and bolides entering Earth's atmosphere at terrific speeds, flaring and sometimes exploding.

"What was tricky," says project chief engineer Steve Yearout (5733) of the early

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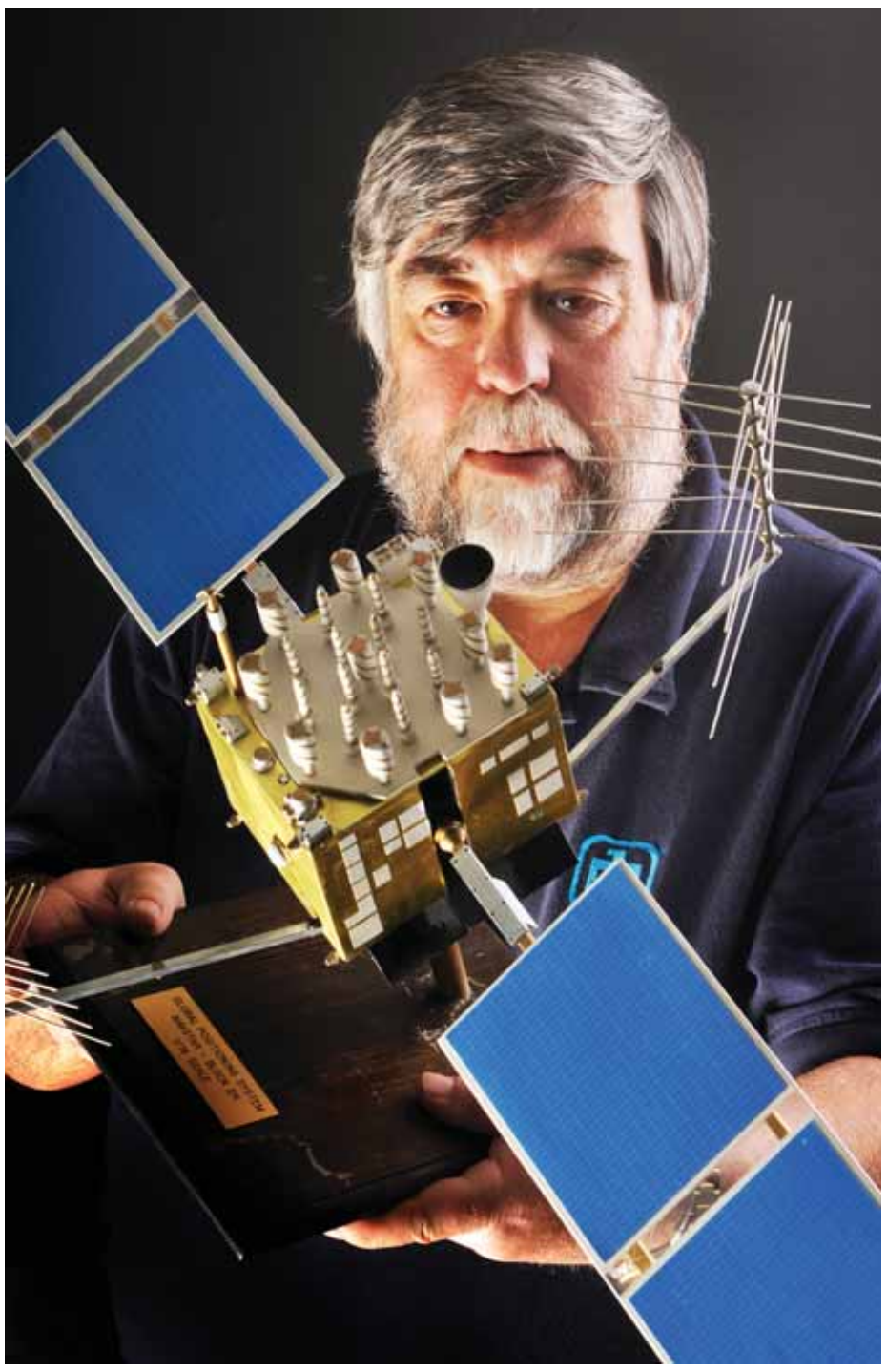

SANDIA ENGINEER STEVE YEAROUT displays a 1/15 scale model of a NAVSTAR Block IIR GPS satellite. Over the past 25 years, Steve has activated and tested the responses of sensor packages on 50 similar satellites launched by the US Air Force. (Photo by Randy Montoya)

Inside . . .

Wind farm may be on the way for Sandia, Kirtland Air Force Base

Department seeks industry interest in a 30-MW farm on base

By Chris Burroughs

Sandia and Kirtland Air Force Base may soon share a wind farm that will provide as much as one-third of the electricity used by the two entities.

The Labs' Wind Energy Technology Dept. 6333 and the DOE Wind and Hydropower Technologies Program have embarked on a project to determine if such a plant is viable and to build a roughly 30-megawatt (MW) farm on the air base. A private company would design, build, and operate the farm, and DOE/NNSA, Sandia, and Kirtland would buy the electricity.

Maximizing renewables

Dept. 6333 Manager Jose Zayas says the project — called Sandia Wind Farm Feasibility Project — is part of the DOE Transformational Energy Action Management (TEAM) initiative. According to Energy Secretary Samuel Bodman, the TEAM initiative goal is to "maximize installation of secure, on-site renewable energy projects at all DOE sites." In addition to installing renewable energy, other DOE goals are to reduce energy use by 30 percent and use third parties to finance the projects. The project would also be a way to reduce energy intensity and greenhouse gas emissions, increase use and efficiency of renewable energy technologies, and adopt sustainable design practices as called for in President Bush's January 2007

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PRESIDENT GEORGE W. BUSH examines a Sandia-designed wind turbine blade cross section during his August 2005 visit to the Labs. With the president are, from left, Sen. Pete Domenici, Labs Director Tom Hunter, DOE Secretary Samuel Bodman, and Sen. Jeff Bingaman. Sandia and Kirtland Air Force Base are exploring the possibility of installing a wind farm in a remote area of the base to provide roughly 30 megawatts of wind energy. (Photo by Randy Montoya)

LSS tools make a difference

Can Lean Six Sigma tools make a difference in your group? The folks in Center 5400 found out what organizations around the Labs are learning: Yes it can! Read the story and see the before-and-after photos on **page 4.**

Labs' 9/80 timekeeping requirements to change

By May 23, some nonexempt employees on the 9/80 schedule will need to meet with their managers to agree on a consistent work schedule. A form (SF 4890-DEV) is available at the Corporate Forms homepage for documenting fixed 9/80 schedules for nonexempt employees whose schedules differ from Sandia's standard 9/80 work hours.

Nonexempt status includes anyone eligible for overtime pay: Technologists, Administrative Staff Associates, Senior Management Assistants, Office Manage-

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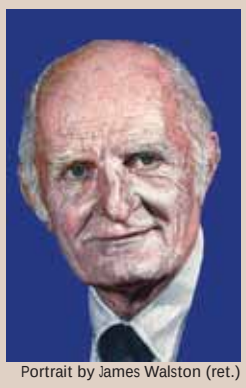
Morgan Sparks dies at age 91



Portrait by James Walston (ret.)

Led Labs from 1972-1981

Morgan Sparks, who led Sandia during the demanding decade of the 1970s and whose role in the development of the first practical transistor while at Bell Labs secured his reputation in the annals of American science and technology, has died at his daughter's home in California.

What's what

As a movie buff, I can hardly not take note of the passing away of Charlton Heston. Everybody knows his work and seems to have an opinion about it. And everyone knows about his controversial later career as president of the National Rifle Association – and seems to have an opinion about *that*, too. Regarding the former, I really like it – a lot. Regarding the latter, well, I do have an opinion. But did you know there's a Sandia connection to Heston? Yep. Back in 1998, the famous actor agreed to appear as the on-screen narrator of a video about Sandia's micromachine work, which at that time was still novel and very exciting. Then-Sandians Paul McWhorter (a leader in our micromachine work) and Dave Sparks (a videographer) traveled to Heston's home in California to make the video. McWhorter said at the time: "Mr. Heston was the most gracious man I ever met. He was genuinely excited about the technology, and did a fantastic job for us. It was a privilege to be able to spend the day with him."

As I recall, it was a terrific video, and got a good bit of play for a while. Anyhow, I wrote a story for the *Lab News* about the whole episode, which stills seems pretty interesting to me. If you're interested, it's in the *Lab News* archive at www.sandia.gov/LabNews/LN02-27-98/heston_story.html.

* * *

I offer for your consideration (remember how Rod Serling used to say that on *Twilight Zone*?) this item from *Sandia Daily News* a few weeks back: "Use caution and be on the lookout for an aggressive badger in the area of MO272. It is in the process of being trapped." One of our office wags wondered out loud if this over-eager "badger" was dashing around trying to get Sandians to hurry up and get their new federal badges. By the way, a follow-up report stated that the badger was being escorted out of the area. He, she, or it must not have had a badge.

* * *

Oops, I did it again. I can't believe this. In my last column, I had an item about how in a previous story I had misused the word "discreet," which I had mistakenly spelled "discrete." Well, wouldn't you know it? In the very issue where I'm eating very public crow, we published a transcript of Tom Hunter's testimony before a Senate subcommittee. In that text, Tom refers to the fact that we had eliminated all our "discreet" category two and category three special nuclear material. It was a transcription error (since corrected) based on what the transcriber heard.

I bet we could go months without even using the word "discrete" or "discreet" in these pages, and here I get burned on the words two issues in a row. What are the odds on that? (Now that I think about it, we've now used the words three issues in a row. What are the odds on *that*?)

* * *

Boy do we have a lot of grammarians around here! Last time in this space, I tossed out a question about the correct usage for "between" and "among." I don't think I've ever gotten so many emails in response. (Quickest on the draw was Lucie Mayeux over in 4113, who cited the venerable and indispensible *Elements of Style* in her reply.) For the record, every correspondent offered some version of the right answer. If you're interested in getting in on this game, here's another one for you: How do you decide when to use "that" and when to use "which?"

See you next time.

– Bill Murphy (505-845-0845, MS0165, wtmurph@sandia.gov)

It was time for Sandian Anthony 'Tony' Montoya to go home

"Tony had an effect on my life from the start of the workday — 6 a.m." says Kenny Gutierrez (2434-1). "I would be at my computer and he would walk in, set his first foot through the door, and not a second later say, 'Is it time to go home yet?'"

TONY MONTOYA (left) with his friend Michael Garcia out for a round of golf, a game Tony loved to play.

Tony died suddenly April 25 at age 55. He had been at Sandia 23 years. He was a member of Electronic Fabrication Dept. 2434. "Tony was respected by his peers and customers not only for his technical skills but for his positive outlook on life," says his manager, Phillip Gallegos. "Tony enjoyed playing golf and baseball with his friends and family. He mentored our young employees and made worker easier and enjoyable for all of us."

"Tony was like my brother," says Rosie Vargas (2434-1). "He was my friend, always willing to help. I will always remember him joking and laughing."

Says Kevin Santistevan (2434), "Tony's schedule enabled him to go home at 3:30 p.m. Many days he would come to see me a little after 3 p.m. and say, 'Well, it's too late to leave early.' He was in our hearts. I feel it was too late for him to leave us so early."

A fierce competitor

"Tony was the type of man you would meet in the morning and by the end of the day he was your friend," says Michael Garcia (2434-1), his best friend at Sandia.

"He was a fierce competitor on any field," says Michael. "Winning or losing, Tony was always the same. Helping people was his nature. He made everyone feel special as he addressed everyone in his own special way — 'Hey, Rosie Posy,' or 'Hey, Juan-two-three,' 'Hey, Isaac Hayes,' 'Hey, Jake the Snake,' or 'Yo, Adrian.'

"Tony had what we have called Tony-isms, funny little sayings, for different situations. They were his insightful ways of communicating," adds Michael. "You knew exactly what he was trying to tell you as he would say 'Another day, another 15 cents', 'We went to different schools together,' 'Don't choke on the blue pill you might get a stiff neck,' 'Like I know where that scene leads to,' 'I plead insanity,' and the one Tony used often — 'Is it time to go home?' For Tony it was — time to go home."

— Iris Aboytes

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'Power to save the world' *is subject of next Tech Symposium*

Power to Save the World: The Truth About Nuclear Energy. That's the audacious title of the next Technology Symposium session, scheduled for May 20, 11 a.m., in the Steve Schiff Auditorium.

It's also the title of a book by Gwyneth Cravens, who, along with retired Sandia scientist Rip Anderson, will discuss the book's main theme: The promise that nuclear energy holds to break the nation's reliance on fossil fuels and reduce greenhouse gasses.

Cravens began as a skeptic about nuclear energy but, thanks to a chance conversation with Rip Anderson about a decade ago, she was sufficiently taken aback by the information he imparted that she embarked on a project to learn everything she could about nuclear energy. Anderson enjoyed a formidable career at Sandia in the fields of probabilistic risk assessment and nuclear and environmental health and safety. Under his tutelage, Cravens became convinced over time that nuclear energy's benefits outweigh its risks and that it does indeed hold the "power to save the world." She wrote a book describing her journey.

In Cravens' book, Anderson plays a central role as he guides her around the nation's nuclear energy infrastructure. At each stop of "the Nuclear America Tour," Cravens learns things that surprise her, that don't conform to her preconceived ideas about nuclear power and its dangers.

Power to Save the World: The Truth About Nuclear Energy is now in its third printing and is currently the top-selling book at Amazon.com in its particular subject category (nuclear energy).

Biofuels work gets another adrenaline shot

By Mike Janes

Another seed was planted in support of Sandia's blossoming biofuels program recently when the Labs snagged $600,000 in funding ($300,000 a year for two years) for "Development of Saccharifying Enzymes for Commercial Use." The award, in response to a call from DOE's Office of Energy Efficiency and Renewable Energy, is part of a joint proposal led by industry partner DSM. Other partners are Abengoa Bioenergy Technologies and Los Alamos National Laboratory.

Rajat Sapra (8321) will serve as principal investigator; other team members are Ken Sale (8321) and Seema Singh (8755). The work, says Rajat, will focus on the use of enzymes from fungi (organisms that grow on plant biomass in communities like rainforest environments) that can break down cellulose for conversion to ethanol. It's a natural extension of Sandia's current work with "extreme" enzymes that break down cellulose in plant biomass to sugars for fermentation or biofuels production (*Lab News*, June 22, 2007), Rajat says.

"DSM already has a well-established understanding of enzymes from fungi and how to produce these enzymes for commercial purposes," says Rajat, who adds that the company possesses a successful industrial fermentation process for non-biofuel applications that involve fungi.

"We intend to take our expertise in structural and biophysical analysis, apply it to this particular type of fungal enzymes, and help improve the enzyme engineering process," he says. Sandia will use various spectroscopic and molecular modeling techniques to help scientists better understand how these enzymes break down biomass. "Ultimately, what we're trying to do is make better, more effective enzymes," says Rajat.

Grant Heffelfinger (8330) notes that the project is unrelated to the high-profile Joint Bio-Energy Institute (JBEI) endeavor (*Lab News*, July 6, 2007). "It's an important step in further establishing our growing presence in the biofuels arena," says Grant.

The project is one of four DOE-funded initiatives announced recently. Covering a four-year period, nearly $34 million has been committed by DOE for the projects, each of which will focus on developing improved enzyme systems to convert cellulosic ethanol into sugars suitable for production of biofuels.

Sandia CaliforniaNews

New VP 4000 Chief Protection Officer Mike Hazen heads organization with expanded responsibilities

He says a personal bumper sticker would read 'Mission support first, people always'

By Chris Burroughs

If Div. 4000 VP Mike Hazen had a bumper sticker made to represent his philosophy at Sandia, it would read "Mission support first, people always."

He says his decisions and the way he works with people are always based on that frame of reference.

MIKE HAZEN

"The people I'm blessed to work with are the best," he says. "It's really about people. They are the most precious resource and crown jewels of this organization. My personal goal is to be recognized as a servant and principled leader."

Mike was promoted to VP of Infrastructure Operations & Protection Div. 4000 eight months ago after serving as director of Safeguards & Security Center 4200 for three and a half years. Before joining Sandia, he was a colonel in the US Air Force with a career that spanned 31 years, culminating with his assignment as the director of security forces, Air Force Space Command.

The division that he was tapped to head is nothing like the organization that his predecessor, Ron Detry, led. As the result of a strategic management decision, two new areas of work — Facilities and ES&H — were added to the division, which previously consisted only of Safeguards & Security. The rationale to make the change, Mike says, was to "put key mission support activities together so they could, together, effectively and efficiently support Sandia's national security mission."

When he assumed the new position, Mike, with management approval, changed his title from Chief Security Officer to Chief Protection Officer, a reflection of the division's broadened duties.

"My areas of responsibility now include protecting people, environment, information, and resources" he says. "I wanted the title to show that Division 4000 was an integrated force dedicated to the health and welfare of all the people at this great national security laboratory."

He says the goal of the new division is "to mature as an organization and transform into one team all working to make Sandia and our nation better."

The challenges are many for the new vice president. Among them are sustaining gains of Safeguards & Security, ES&H, and Facilities over the past few years, creating an environment where everyone can excel, opening lines of communication with every level at Sandia, and preparing for a future that "certainly will be full of change and uncertainty."

He adds, "We need to ensure that we become a more powerful organization by partnering, supporting, and encouraging a diverse [work] force. This means a focus on 'people first,' and that's how we get better.

"Sandia has a perfect set of core values and we'll be guided by them. I'd add one more value 'caring' [for each other] — along with a recognition that providing mission support is not only honorable, it's something we can be proud of in Division 4000."

Mike says his division is being impacted by budget reductions "same as everyone else and it should be."

"Our challenge here is that there will be some things we just can't do," he says. "But what we *will* do is to continue to prioritize and support to the best of our ability the mission and become more efficient by using Lean Six Sigma, simplifying processes, and doing away with redundancies, bureaucracy, and work that doesn't add value."

Another challenge Mike cites is to reduce both the security and building footprint at Sandia in an initiative that is spawned by an NNSA mandate and the Labs' desire. Older high-maintenance and costly buildings are being removed and better use of Sandia's new efficient ones is key, says Mike. In addition, some buildings, such as benefits and badging, have been moved off of Kirtland Air Force Base to make access to them easier. The most secure areas remain on base.

Besides reducing the building footprint, over recent months the security footprint has also been dramatically reduced. Sandia completed a highly successful phase one special nuclear material inventory, as well as an ongoing vault and vault-type room reduction. This, Mike says, has saved a "lot of security dollars."

Mike is particularly proud of gains in environmental protection, which has won numerous awards. "We're going green and it is something we all should be very proud of," he says. (See "Sandia environmental management programs earn recognition" below).

His goal is for Division 4000 to successfully meet all the challenges head on and become the "standard by which everyone else is compared."

Sandia environmental management programs earn recognition

Falling under Div. 4000 VP Mike Hazen's stewardship are Sandia's environmental management programs. Several of these recently received recognition and awards, including three of the eight Pollution Prevention Star awards given across the entire DOE complex. The honors include:

• **Environmental management system (EMS)** implementation, outreach, program and facilities integration received the 2008 White House Closing the Circle Award honorable mention. This award recognized numerous EMS activities, including facilities operations (energy management, water conservation, sustainable buildings), outreach and communication (*Sandia Daily News* weekly environmental tips and energy savings tips, Earth Day activities and lectures, quarterly newsletter, annual one-day conference for high school students). The EMS also won an NNSA-Best-in-Class award and the DOE Pollution Prevention (P2) Star award.

• **Sandia's Green Building program** won the NNSA Best in Class award and the P2 Star award. During the past year, three Sandia buildings — Weapons Evaluation Test Laboratory (WETL), Center for Integrated Nanotechnologies (CINT), and MESA Microsystems Fabrication (MFAB) — were awarded Leadership in Energy and Environmental Design (LEED) building certification given by the US Green Building Council (USGBC). LEED is a standard that recognizes the environmental and energy performance of buildings and rates them in the categories of site development, water efficiency, energy, performance, use of materials and resources, and indoor environmental quality.

• **The Sandia/New Mexico Electronics Stewardship** team won the NNSA Best in Class and the DOE (P2) Star awards for another year of progress in reducing the environmental impact of office electronics lifecycle ownership. The team agreed to follow the Electronic Product Environmental Assessment Tool (EPEAT), a set of criteria in eight different categories to determine the environmental attributes of a particular electronic office product. Last fiscal year Sandia/New Mexico purchased 11,101 computer units, 96 percent of which were EPEAT-compliant, and recycled 136.3 metric tons of electronic scrap.

• **Sandia was presented six Gold Pretreatment Awards** by the Albuquerque/Bernalillo County Water Utility Authority. The gold awards are given to permit holders who have an active pretreatment management system that has demonstrated 100 percent compliance with reporting requirements and 100 percent compliance with their permit discharge limits.

• Sandia received an NNSA Best in Class and an honorable mention for the **DOE P2 Star for green chemistry**, which is the use of a set of principles that reduces or eliminates the use or generation of hazardous substances in the design, manufacture, and application of chemical products. Ceramics and Glass Dept. 2454 applied this principle in redesigning a process to produce powder used for a hydrogen generation application. The results were reduced overall process volume to accommodate bench scale equipment, reduced chemical usage, and reduced hazardous waste volume.

• **Sandia/California was accepted into an Environmental Protection Agency Performance Track** for committing to complete Arroyo Seco improvements, reduce transportation fuels by 10 percent, increase recycled content of paper products by 16 percent, and reduce water use by 6 percent, all by 2010.

• Sandia/California received the **Livermore Chamber of Commerce Environmental Spirit Award** for its environmental programs and ongoing commitment to protecting the environment and wildlife on the laboratory's 400-acre site.

— Chris Burroughs

Satellite

(Continued from page 1)

sensor placements, "is that we did not have a good idea what our observations of the environment would look like from the standpoint of space. Looking at Earth with sensors was new and not well understood — the background noise, the clutter."

Sandia involved since 1983

Steve should know. No matter which GPS satellite the sensors fly on, Steve has been there to turn them on and test their responses in the sky.

"We started launching our part of the payloads in 1983," he says. "We've done 50 payloads so far. I've been involved in turning on all 50."

That would be an average of two payload launches a year for the past 25 years, the most recent in March. His team packages them in what resemble several small suitcases.

The sensors include X-ray and particle detectors from Los Alamos National Laboratory. Sandia provides optical and electromagnetic pulse (EMP) sensors, radio frequency equipment, and the main processors that coordinate all commands from the ground, as well as return sensor output back to ground.

THE ONE THAT GOT AWAY — Steve Yearout captured this photo of a Delta rocket booster that was carrying a GPS satellite just seconds after launch. Steve explains that there are nine solid booster rockets around the bottom of the Delta, which is liquid-fueled. In this incident, it is believed that one of these solids split and started an uncontrolled burn, initiating the self-destruct mechanism that destroyed the rocket at just about the time the range safety officer pushed the destruct button. Steve has been involved with 51 launches of GPS satellites carrying Sandia sensors. This is the only one that failed.

"We also have a state-of-health telemetry system that allows us to see how our system is functioning," says Steve.

The sensors are delivered to an Air Force contractor (in the past, either Boeing or Lockheed Martin), which integrates the boxes into the satellite package. The satellite is launched from Cape Canaveral (the Air Force side of Kennedy Space Center), and then, once in orbit, switched on remotely by Steve and his teammates from Sandia, LANL, and the USAF.

Perfectly synchronized atomic clocks on all satellites mean that telemetry, geometry, and computer programs working together can accurately define the position of any point of interest.

Difficult as it is to test equipment in advance of the environment in which it will be used, the Sandia group's sensor packages have performed exceptionally well over the years.

'We build pretty good stuff'

This includes surviving one faulty rocket that exploded on takeoff in the 1980s. A number of the boxed Sandia boards survived and were still operable. "We build pretty good stuff," says Steve. He doesn't count this launch as one of his 50.

Steve, ready for new career challenges, envisions "way down the road" moving into an arena just slightly downstream: analyzing data produced by the sensors he helped design, oversaw in production, watched launch, and keyed into action.

But for now, Steve is looking forward to turning on many more space-based sensor systems.

9/80 timekeeping

(Continued from page 1)

ment Assistants, and all represented employees.

The new requirement — a stopgap measure until permanent changes can be made to Sandia's electronic timecard system and policies — is a necessary step toward adding rigor to timekeeping practices for nonexempt employees. The need for this additional rigor was identified as part of a US Department of Labor audit of Sandia's timekeeping practices that is nearing completion.

Permanent changes to Sandia's timekeeping systems will take about seven months.

The audit and the need for employees and managers to document deviations from Sandia's standard 9/80 schedule were discussed in a Nov. 16 memo to managers from now-retired Executive VP John Stichman.

Near- and long-term changes

Permanent changes to Sandia's timekeeping systems will take about seven months, says Julian Sanchez, senior manager for Human Resources Operations 3510.

Until then, anyone approving timecards for nonexempt employees must document deviations from Sandia's standard 9/80 schedule. (A separate letter has gone out to managers with details about this requirement.)

The standard work hours for employees on a 9/80 schedule are 7:30 a.m. to 5 p.m. Monday through Thursday, and 7:30 a.m. to 4 p.m. on alternate worked Fridays. If a nonexempt employee adheres to this schedule, no written documentation is required.

If, however, the nonexempt employee wants to work a 9/80 schedule that differs from these standard 9/80 hours for their Friday worked, the employee and manager must document the employee's fixed 9/80 schedule using the form.

Once a schedule is documented, deviations from that schedule on the employee's Friday worked must be recorded appropriately on the employee's timecard. Careful time recording on the Friday worked is of particular importance because of the way in which Sandia's timekeeping system splits the workweek on Friday.

To allow for the most flexibility possible, the form permits, with manager approval, start times every half hour from 5 a.m. to 9:30 a.m.

For more information, contact your manager or your Division Human Resources Consultant (HRC): www-irn.sandia.gov/hr/Division_HR_Consultants/.

On the broader issue of 9/80 as it applies to all employees, says Julian, Sandia's management recognizes and values 9/80 as an important work/life benefit and it is Sandia's intent that it be continued. It is, however, important that Sandians recognize the need to carefully document and appropriately monitor the work schedules of nonexempt employees.

Space: Enough? Too much? Let this team help you sort it out

BEFORE AND AFTER — Integrated Military Systems Development Center 5400 recently conducted a Lean Six Sigma 6S Event on its two primary design, assembly, and test labs. The major accomplishments were as follows: First, the team removed three flatbeds worth of unused and obsolete equipment, tools, raw materials, and property items for reapplication. Second, the team removed obsolete furniture, safety hazards, and chemicals that were no longer needed, thereby increasing safety and reducing potential hazards. Third, the team created increased capacity and efficiencies for new and emerging projects.

By John Zavadil and Camille Reyes

Sandia is faced with a constant challenge: how to make sure there is enough space to meet mission needs while using that space as efficiently and effectively as possible.

Just a few years ago, line organizations were desperate for office space to house new mission work. Thanks to a flat budget and an aggressive construction program that has added a lot of new space since 2003, Sandia now has more office space than is required by mission. Sandia's management is looking at ways to eliminate or reuse this excess space, and Lean Six Sigma (LSS) tools are helping to lead the way.

The Facilities organization has initiated a series of "structured improvement activities" (SIAs) using LSS methodology to increase awareness of the space situation and discover opportunities.

LSS black belts from Lockheed Martin facilitated the first SIA with the Defense Systems and Assessments SMU in October 2007. Sandia black belts have since hosted a second SIA for divisions 4000 and 10000, and a third SIA is being planned for Div. 6000. The goal is to conduct an SIA for each division or SMU at Sandia by the end of the year.

SIAs follow an LSS methodology, but one tool in particular has had a significant impact — the 6S scorecard. 6S stands for sort, straighten, shine, standardize, safety, and sustain. SIA attendees use the scorecard when they tour their space during an event; it allows them to view their space in a different way. The attendees find that materials tend to accumulate, leading to clutter and the appearance of needing more space. The 6S scorecard allows occupants to clean up and improve the efficiency and safety of their space so they can accomplish the same work in less square footage.

This increased awareness about excess space is already paying off. Sandia will vacate the Research Park lease by the end of May, saving about $1.1 million in annual lease costs. Low-utilization buildings are also being targeted to identify additional space that could be vacated and removed.

To date, much of this effort has focused on offices, because data on office use is more readily available and offices are easier to consolidate than laboratories. However, offices account for only about one-third of Sandia's total square footage, so future SIAs will explore the significant opportunities available for improving laboratory usage.

If you have questions, contact Lynne Schluter (4856), the manager leading the structured improvement activities program, at 505-284-5206 or lhschlu@sandia.gov.
Questions about LSS? Contact Laura Guedelhoefer, corporate black belt, at 505-284-3469 or laguede@sandia.gov .

THE ANSWER, MY FRIEND — A wind farm like this one in the desert near Palm Springs, Calif., could be in Sandia's future if a proposal to build a wind farm on Kirtland Air Force Base comes to fruition. Sandia and Kirtland, with the support of DOE's Wind and Hydropower Technologies Program, are exploring the possibility of installing a roughly 30 MW wind farm on the base. Power generated by the facility would be shared by the Air Force, NNSA, and Sandia. The facility would be built, owned, and operated by a private company. (Photo by Randy Montoya)

Wind farm

(Continued from page 1)

Executive Order 13423.

A Request For Information (RFI) was recently placed on a Sandia procurement website in an effort to make commercial, utility-scale wind farm developers, owners, operators, energy service companies, and financiers aware of the potential opportunity to build a wind farm on the base. Deadline to respond to the RFI and be eligible to compete for the partnership is July 3.

In addition, Sandia is holding an "Industry Day" on June 10 in Albuquerque where interested developers can obtain information and ask questions. At the meeting Brian Connor of DOE's Wind and Hydropower Technologies Program will address the federal goals and objectives of the TEAM initiative and how they will apply to other DOE sites, including Sandia.

Project engineer Roger Hill (6333) says this project is highly unusual for a variety of reasons.

"Usually, private companies build wind farms to sell power to utilities or utilities install wind turbines for their own system use," Roger says. "Here we are looking for a private company to build a wind plant on federal land for federal [Sandia and Kirtland] consumption."

The initial stage of the project will involve investigating the feasibility of building the farm on federal lands and/or the adjacent Isleta Pueblo. In the next couple of months Sandia will install a meteorological station on a ridgeline in the Manzano mountains near Albuquerque to measure wind speed and direction. A second will follow.

Roger says that the Manzano mountain site is believed to be one of the best locations of all DOE facilities for a wind farm. Its wind yield is in an indicated wind power class 5 or 6 on a scale of 1 to 7, falling just short of superb.

As part of the feasibility effort, the study team will spend a year assessing the wind characteristics, as well as looking at accessibility to transmission lines, base substations, and PNM's Sandia switching station. Roger anticipates that as the feasibility study moves along, issues will be identified that will need to be addressed. For instance, the wind turbine installation or operation might conflict with current or planned base operations. Also, an environmental assessment must be performed to ascertain and perhaps mitigate impacts on wildlife.

Together Sandia and KAFB use 72 MW during peak loads and about 40-50 MW at any given time. Sandia's share of the electricity usage is about 60 percent and Kirtland's is 40 percent. If a wind farm is built, the two may split the electricity produced in the same 60-40 equation. Construction time from inception to finish could be as little as two years.

Wind farms in New Mexico are located in Guadalupe County (Aragonne Mesa), Quay County (Caprock Wind Ranch, Phases I and II), Roosevelt County (San Juan Mesa), and Quay and DeBaca counties (New Mexico Wind Energy Center).

Jose says the idea of a Sandia/Kirtland wind farm "is as exciting as it gets" because it provides the opportunity to showcase Sandia and be one of the first DOE sites to have a utility-scale wind farm where power is being consumed.

"This is a pioneering effort that meets the national initiative for renewable energy deployment," he says. "Plus it contributes to our self-sufficiency and sustainability. We are using a natural indigenous resource to meet our own needs. And it can be replicated elsewhere. It's a big deal."

Wind energy facts

- At the end of 2007 New Mexico was producing 496 MW from wind, ranking the state 10th in the nation in the amount of energy produced by wind power.
- In 2007 wind accounted for 30 percent of new power-producing capacity added to the national grid, more than 5,200 MW of wind capacity was installed in the US, bringing the total capacity to 16,819 MW, making it second only to Germany.

Bringing quality tools to school

NEW MEXICO LT. GOV. DIANE DENISH joins students at Painted Sky Elementary School in Albuquerque as part of a Strengthening Quality in Schools (SQS) initiative. SQS is sponsored by the Governor's Business Executives for Education, of which Sandia Div. 3000 VP John Slipke is a member. The initiative helps schools embrace continuous improvement and other quality strategies. The lieutenant governor and other SQS visitors were able to see firsthand how students at Painted Sky are using quality tools and techniques to improve their math, science, reading, writing, and overall academic results.

(Photo by Randy Montoya)

Tom Hunter addresses community leaders at 2008 State of the Labs event

Sandia President and Labs Director Tom Hunter addresses an audience of community leaders at the annual Sandia State of the Labs event. The function, held this year at the National Hispanic Cultural Center, provides an opportunity for Sandia's leadership to talk about the Labs' accomplishments and capabilities and share insights about the challenges facing the nation. Tom emphasized in his remarks that Sandia, Albuquerque, and the state of New Mexico today are uniquely positioned to play a central role in addressing a broad range of issues America will grapple with at the beginning of the 21st century.

(Photo by Bill Doty)

Morgan Sparks led Labs from 1972-1981

Was noted for his role in development of the junction transistor at Bell Labs

Morgan Sparks came to Albuquerque from Bell Labs in 1972 to serve as director of Sandia National Labs. In addition to a new job, he found a new home, becoming a deeply involved civic leader. He lived in Albuquerque for the rest of his years.

MORGAN SPARKS

Morgan, who served as Labs director from 1972 until his retirement in 1981, died May 3 at his daughter's home in Fullerton, Calif. He was 91.

Sandia President and Labs Director Tom Hunter recalls the Morgan Sparks era as a pivotal one for Sandia. Says Tom, "Morgan was president when I was a young staff member at Sandia. He set the framework for Sandia to become a multiprogram Lab. He was widely recognized for his ability to engage the Lab in many new areas that proved to be important for our future.

"Morgan was a great American and a respected leader in our community, especially in his extraordinary support for the University of New Mexico.

"He made a tremendous impression on all of us. I spent some time with him at the Nevada Test Site in the early '70s and will always remember how this renowned researcher from Bell Labs so quickly and thoroughly immersed himself in every aspect of our weapons work."

Fashioned the first practical transistor

Before coming to Sandia, Morgan enjoyed a distinguished 30-year career with Bell Laboratories in New Jersey and is best remembered as the person who fashioned the first practical transistor, the semiconductor device that has revolutionized almost every aspect of modern life (see "Morgan Sparks and the junction transistor" at right).

Although his consequential career at Bell Labs assured his place in the history of American science and technology, it was at Sandia that Morgan left his mark on the hearts and minds of a generation of Labs researchers. Morgan became the quintessential Sandian, a fact that was appreciated by Sen. Pete Domenici, R-N.M., who was elected to the US Senate the same year that Morgan became Labs director. Upon learning of his passing, Domenici said, "Morgan Sparks set a high standard for the professional, efficient management of Sandia National Labs. He recognized the future need to channel lab science into technology transfer, and he laid the groundwork to link defense-based research to applications that now impact our lives every day.

"I credit Dr. Sparks for working to make Sandia one of the best run labs in the nation. He was my friend. Nancy and I send our thoughts and prayers to his family, friends, and colleagues who mourn his passing."

In an interview after his retirement for *Recollections for Tomorrow*, a special 40th-anniversary Sandia publication, Morgan reflected on what it means to be a Sandian:

"For some time here [at Sandia] the vice president for research was brought out from Bell Labs. The dominant reason was to keep those bonds [between Bell Labs and Sandia; AT&T managed Sandia for the Atomic Energy Commission at that time]. There is a kind of corporate culture that evolves. It encourages researchers to thoroughly understand their subject, write papers, publish, become known, get to know other fundamental workers in the field. There is an aura of how the work is done that gets established, primarily by the attitude of those in charge: The standards they demand, the freedoms that are available, the limits on those freedoms. The feeling was that if you're going to do research in a field, you have to do it in a thorough, fundamental way. Those things were enormously influenced by Bell Labs.

"Sandia has its own culture. I think one of the things Sandia did was emphasize integrity. Sandia has always been very careful not to promise something it couldn't deliver or to make claims it couldn't support. It wanted to do things in a very first-class way, with absolute integrity. Sandia is a very high-quality organization. Every organization has some history and background, and Bell Labs in particular and the Bell System in general played an important role in the evolution of Sandia. But Sandia is a first-rate, world-class laboratory in its own right. I think the people who work here do, and should, think of Sandia in that way."

Born in 1916 in Pagosa Springs, Colo., and raised in Texas, Morgan received his bachelor's and master's degrees in chemistry at Rice University before earning his PhD in physical chemistry from the University of Illinois in 1943. That same year, he began his long tenure at Bell Telephone Laboratories in Murray Hill, N.J., working on batteries for naval torpedoes in its Electrochemical Research Department. In 1948 he joined the new Semiconductor Research Group just as it was about to announce the invention of the first transistor. It was as part of that group that Morgan made his signal contributions to the development of the transistor.

Good at almost everything he tried

Jack Howard, who served as Morgan's executive VP from 1973 to 1981, recalled the many dimensions of the man: "Morgan Sparks was good at most anything he tried," Jack wrote in an email to the *Lab News*. "The transistor won Nobel prizes for three physicists at Bell Labs but it wouldn't have worked without the epitaxial layer Morgan cooked up for them.

"At Sandia he quickly became abreast of the weapons business; Sandians know the great job he did while he was here.

"After he retired he saved the Albuquerque Police Department from a work-stoppage by acting as arbitrator between the City and the Police Union. The Anderson School of Management at UNM needed a short-duration boss while they made a nationwide search for a new one. Morgan stepped in and served as dean [until a permanent replacement was hired]."

During the 1950s, 1960s, and early 1970s, Morgan rose through several management positions at Bell Labs and the Western Electric Company, the manufacturing arm of the parent company AT&T. After his retirement from Sandia, Morgan accepted an appointment to the Robert O. Anderson School of Management at the University of New Mexico where he served as dean from 1981 to 1984.

Morgan was active in Albuquerque civic life, serving as chair of the United Way, the Police Commission Task Force, and he helped lead the effort to keep and enhance the activities sited at Kirtland Air Force Base. He served on the boards of Presbyterian and Lovelace Hospitals, the New Mexico Symphony Orchestra, and Albuquerque Academy. Until 2007 he was president of High Desert Investment Corporation, the developers of the High Desert and Mariposa communities.

In 2006 he was preceded in death by his wife of 57 years, Elizabeth MacEvoy Sparks. They have four children, Margaret Potter of Waitsfield, Vt.; Gordon Sparks, also of Waitsfield; Patricia Fusting of Fullerton, Calif.; and Morgan Sparks Jr., of Burlington, Vt. A memorial service will be held in Albuquerque later this month (additional information will be published in *Sandia Daily News*).

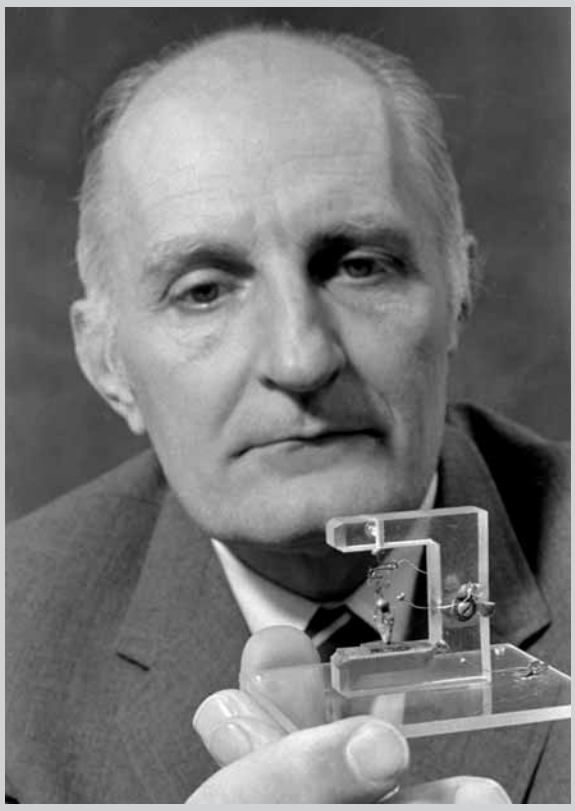
Morgan Sparks and the junction transistor

The first transistor was a rickety contraption that was almost impossible to mass-produce. Bell Labs researcher William Shockley conceived of the "junction transistor" — a three-layer sandwich of semiconductor materials such as silicon and germanium — that would be much more reliable and a lot easier to manufacture than the first transistors developed at the Labs. It would take three years of research advances in materials science by Morgan Sparks, Gordon Teal, and other Bell Labs researchers before the conception could finally be actualized.

Morgan fabricated a crude prototype of this junction transistor in 1949, proving that Shockley's ideas were indeed correct. Working closely with Teal in early 1951, Sparks figured out how to inject impurities into the molten material from which the crystals were being made, establishing the interfaces or "junctions" between adjacent semiconductor layers required in Shockley's design.

Bell Labs announced the resulting device, the "microwatt junction transistor" to great fanfare on July 4, 1951. Several months later Morgan wrote an article on the new device, "The Junction Transistor," which appeared in *Scientific American*. Junction transistors soon began displacing vacuum tubes in such electronic devices as hearing aids and portable radios — the transistor radios that a postwar generation grew to love.

By the decade's end, transistors had become a staple element of electronic computers. With the early 1960s emergence of the integrated circuit, or microchip, their populations began to burgeon almost without limit. According to Gordon Moore, a cofounder of Intel Corp. and author of the famed Moore's Law, "We make more transistors every year than the number of printed characters in all the newspapers, magazines, books, photocopies and computer printouts."



MORGAN SPARKS with an early transistor.

A VP VISITS — In this 1978 photo, Vice President Walter Mondale, third from left, visits Sandia to get a firsthand look at the Labs' work in solar energy. Accompanying Mondale on his visit are (in the front row only), from left, Labs Director Morgan Sparks, Mondale, DOE Albuquerque Operations Office Director Herman Roser, New Mexico Gov. Jerry Apodaca, and New Mexico Sen. Pete Domenici.

Sandian Josie Chavez apprehends robbery suspect

By Iris Aboytes

"It was no big deal. It was a team effort," says Josie Chavez (4211) as she talks about helping apprehend a robber recently.

It was about 8:15 on a recent Friday night. Josie, her son John, and his friend Jared were headed home. As they passed a mini mall they frequent, they noticed the front door of the building in a "push-and-shove behavior," says Josie. "It looked like the door was being pushed from both directions at the same time. It just did not look right."

The Little Caesars Pizza down the street, where John had once worked, had been robbed several times so they decided to stop and check. They were concerned for the proprietor, who is their friend.

Josie dropped John and Jared at the front of the building. She cautioned them to stay out of the way in a corner. She parked the car and went around to the back. From her vantage point, she saw suspects running away. One of them, a young woman, was not wearing a mask. The others were wearing hoods, bandanas, and brown utility gloves.

Josie could also see the custodian between two buildings. He was pacing and yelling at the suspects while they were running away. "I approached the building cautiously," she says. "I could see the custodian holding a hatchet. The proprietor had one of the suspects on the ground."

She identified herself and went to help the proprietor, who was bleeding from a wound to the head. "They were both shook up, and rightly so," she said. The proprietor had one of the suspects pinned. "I could see the proprietor had blood on his hands, so I took over," says Josie.

The suspect, who was about 5 feet 7 inches tall and weighed about 180 pounds, was on the ground face-up. She ordered him to turn over and searched him for weapons. She then took his arms and braced them in the small of his back and made him cross his legs. She interlaced his fingers and thumbs to put more pressure in his back. "I did it automatically," says Josie. "I had learned all of this in training. I held him until the police got there."

Police officers and crime prevention officials arrived within 15 minutes after being called by the custodian.

That is when Josie got into trouble. "When the police arrived and took the suspect, I got up to get paper towels for the proprietor, who was now holding his head with his hands," says Josie. "A policeman yelled at me. He said I was compromising his crime scene. I just got up."

The paramedics arrived and took the proprietor to get medical attention.

YOU'RE NOT GOING ANYWHERE — Josie Chavez demonstrates how she kept a robbery suspect from escaping. (Photo by Randy Montoya)

"We gave our statements, I pointed out stolen property in the back, and we left," she says. "We drove down the street to warn the employees at Little Caesars that robbers were in the area."

"I did not feel scared or nervous," says Josie. "We gripe about going to training, but it sure is great when it kicks in."

Sandia employees and retirees receive volunteer awards

By Iris Aboytes

As part of National Volunteer Month, Sandians and Sandia retirees were recently recognized for volunteering more than 114,000 hours to improve our community.

The President's Service Award was presented to 262 Sandians who volunteered more than 100 hours. Seventy-one Sandians received a Community Service Award for volunteering more than 100 hours to one nonprofit agency. Sandian Larissa Velasquez (4018) received the employee Shining Eagle Award, Larry Lane received the retiree Shining Eagle Award, and Timothy Boyle (1815) and Bernadette Hernandez-Sanchez (1815) received the Goodness Award.

Larissa and her husband Jeff became involved with Thunderbird Little League when their oldest son Erik began playing T-ball. Halfway through the season, the manager and team mom quit. That was 11 years ago, and Larissa and Jeff have been manager and team mom ever since. They also serve on the Thunderbird Little League board of directors.

"It's amazing to watch each child grow more and more confident each year and know that fundamental principles are being taught that will help them become good citizens," says Larissa, who volunteered more than 1,300 hours last year. In honor of her volunteer efforts, a check for $500 was given to the president of Thunderbird Little League.

Larry Lane worked 580 hours for Habitat for Humanity, Travel Talk Senior Center, and Friendship Force. Larry says he gets a great deal of satisfaction from doing something that yields tangible results, especially when helping someone. "It is lot better than sitting home watching soap operas," he says. In honor of his volunteer work, a check for $500 was given to the Greater Albuquerque Habitat for Humanity.

Timothy Boyle and Bernadette Hernandez-Sanchez received their award for encouraging students to pursue science and engineering careers. Both have mentored students, from high school through postdoc appointments, by providing meaningful work experiences, advice, and opportunities. Tim mentored Bernie and now she enjoys mentoring others. Together they created successful "CSI-based" science outreach programs that engage K-8 students in discovering the fun and challenge of science.

They incorporated nanotechnology and crime scene investigation experiences into the International Science Fair high school intern program, and developed a partnership with Albuquerque Institute for Mathematics and Science (IMS).

"When I think I've tapped everyone out in giving, Sandians just keep answering the call for more," says Patty Zamora (3652), Sandia's volunteer coordinator.

"Sandians value the importance of giving back to the community. Thanks to the more than 800 registered volunteers. I am overwhelmed by their generosity," she says.

SANDIA VP MATTHEW O'BRIEN gives Larissa Velasquez (4018, right) the 2007 Shining Eagle award. On Larissa's behalf, Valerie Sisneros, president of Thunderbird Little League, receives a check for $500. (Photo by Bill Doty)

Take Our Daughters and Sons to Work

NANOTECHNOLOGY AND CHEMISTRY as demonstrated by Bernadette Hernandez-Sanchez (1815) can be interesting, as witnessed by some of the more than 1,200 guests who attended Sandia's 2008 Take Our Daughters and Sons to Work Day activities. (Photo by Randy Montoya)