



From Labs Director Tom Hunter

A letter to all Sandians

Fellow Sandians,

This is my final message to you as your president. It is simply to say that it has been my distinct privilege to be a member of the finest science-based engineering institution any-

where. No doubt, the last few years have given me the unique opportunity to represent you in our service to the nation. Even the last few weeks, in which we have been dealing with a national crisis, have demonstrated to me once again how proud I am to serve side by side with Sandians who work tirelessly and unselfishly to resolve an issue so important to the



nation. Our highest goal is to be the laboratory the nation turns to first in times of urgent need, and when called, to serve with intensity and commitment.

There was a special reason we were created just over 60 years ago. The nation wanted to make a statement that no adversary or threat could ever find our country without science and engineering superiority. Our fellow citizens deserve to rest confidently knowing that we are hard at work. Likewise, our country's adversaries must never rest easy — recognizing that Sandia and places like it will always keep us one

step ahead. As the nation continues to call on us in such a myriad of ways, it is my greatest hope that we will never forget who we are. We are simply an institution committed to serve the nation by delivering excellent results. We do this through our technical competence and our commitment to our values. We have no other reason to exist. We must never exist for financial return nor follow a corporate creed to deliver a return for shareholders. We simply serve to make the nation a better place. The nation and its leaders rely on us to deliver unquestioned objective advice without concern for any other incentives — always and never with any doubt.

I did not seek, plan for, or expect my current position. Yet, when offered, I could not say no to the opportunity to represent and support each of you. We have done much together and our laboratory is now positioned to do even more as the nation continues to seek us out. We chose a deliberate course, aspiring to be even greater, stronger, and with clearer intent. I hope I have met some of your expectations and that some of our dreams for the future of the laboratory have been realized. While there is always more that can be achieved, I am proud of what we have accomplished. I'm proud, too, that our work has reflected our clear priorities. I hope you feel that we gave our heart, our all, to ensure that the nation came first, the vitality of our laboratory second, and ourselves after that.

I owe much to so many. Our customers in DOE have become true partners in seeking a better future. Across the wide spectrum of other customers, I have felt profound mutual respect. It's been a special pleasure to work with our partners in industry and universities. The leadership team and all of our managers have been a true inspiration for me. Yet my greatest gratitude goes to each of you, my fellow Sandians, for allowing me to be with you through the years, to learn from you, and find ways to make this a better place. It is my greatest debt and the most profound experience in my life. Since titles have always seemed odd to me, it is my fond hope that I will be remembered as simply another Sandian who tried his best to live up to the expectations placed on a great institution by a great nation.

As you go forward, go confidently, think boldly, achieve much, and go with my most heartfelt desire for your even greater success.

Tom Hunter

Inside . . .



A Sandia story

Tom Hunter was born at home in 1945 in rural northern Florida, a remote and isolated part of the nation in 1945. Read about Tom's life and career on pages 8-9.

MESA: The house that Tom built

Three years ago this summer, MESA — the Microsystems and Engineering Sciences Applications complex — was declared open for business, ahead of schedule and under budget. How has MESA fared so far? Read the story on pages 6-7.



Remembering Sandia Pioneer Glenn Fowler



Glenn Fowler passed away last month at the age of 92. Friends and colleagues reflect on Glenn's huge contributions to Sandia and its enduring culture. See pages 10-11.

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Tom Hunter passes torch to Paul Himmert at 2010 State of the Labs presentation

By Heather Clark

Outgoing President and Labs Director Tom Hunter shared the stage for his final State of the Labs presentation with his successor, President and Labs Director-designee Paul Himmert, who said he looks forward to an "exciting" future at Sandia.

Tom will retire July 9, ending a 43-year career at the Labs and five years at the helm. Paul, currently executive VP and deputy Laboratories director for the nuclear weapons program, has been at Sandia 34 years. They spoke June 15 to community members at the National Hispanic Cultural Center in Albuquerque.

"What I've come to understand is it's very nice in a life lived to have a convergence in what you come to believe and what you do," Tom said, explaining that he learned over time the importance of service to the nation, working with other people, and finding ways to help others. "As I pass the baton to Paul, I do so with the fond remembrance of all my time at Sandia, but also I just want to thank the institution for allowing me to reach that convergence in my own life."

During Tom's tenure, Sandia's mission expanded from mainly nuclear weapons work to a diverse range of national security challenges, including global

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— Labs Director Tom Hunter

nuclear threats, terrorism, cyber security, energy, and US economic competitiveness.

Though today's nuclear weapons stockpile is smaller than it has been in the past, Tom said the Labs' role has become increasingly important.

(Continued on page 4)



That's that

Our telephone outage here at the New Mexico site the other day got me thinking about how much we rely on our communications tools and how those tools are changing right before our eyes.

Saw the other day in the Albuquerque Journal where Qwest New Mexico, the state's dominant land line telephone service provider, has been losing customers at a rate of 6,000 per month. And this is no new trend; the Journal quotes the Qwest New Mexico president as saying that the company in 2004 had some 800,000 subscribers and is now down to fewer than 600,000. That's an astonishing, breathtaking decline for a business that, in the not so distant past, owned a virtual monopoly on voice communication.

But it's hardly surprising, is it? People want to stay connected – and stay connected in the most convenient way they can. AT&T got it right in its advertising campaign from the late 1970s and early 1980s. If you're of an age, you probably remember their advertising jingle: "Reach out and touch someone/Reach out and just say hi." That's exactly what people are doing, except they've concluded that wireless lets you "reach and just say hi" no matter where you are and what you're doing. Sailing off the coast of Nantucket and want to call your nephew who's biking across the country and is somewhere in the middle of Nebraska? No big deal.

I remember when it was a big deal – a big deal, for example, for a household to add a second telephone line. That was something the families of rich kids did. Regular, middle-income, middle-class families had a telephone and maybe, just maybe, an extension phone in the master bedroom. But a second line? A line that allowed more than one person at a time in the family to make a phone call? That was an indulgence beyond the reach of most of us. Not that I cared, but my sisters sure did. How they would have loved that second line. And a third and a fourth for that matter. A phone for everyone! Wouldn't that be . . . nah, never happen.

Except it did happen. Wireless penetration in the US has grown from 97 million phones a decade ago to some 277 million phones today. That's a phone for practically everyone above the age of reason. Have we reached that point, written about by 1960s songwriter Harry Nilsson: Everybody's talkin' at me/I don't hear a word they're sayin'/Only the echoes of my mind." There's a whole school of social scolds who wring their hands and wonder if, for all our talk, we're really communicating. Well, with all due respect to the worrywarts, yes.

* * *

On the same subject, my colleague Rod Geer just stopped by my office and coincidentally mentioned that his daughter was over at the local Apple store the other day and found people literally camped out on the sidewalk, in tents, lining up to get the latest iPhone. A bit extreme? Of course. But the point is, it's probably been a century since landlines inspired that kind of (mindless?) devotion. Can you imagine this scene in front of the local Bell Telephone headquarters: "Man, I just gotta get my new Princess phone?" I didn't think so. If you're in the landline business, how do you compete with that? I sure wouldn't want to.

One more thing about telephones: The late comedian George Carlin once observed that it's a good thing the inventor wasn't named Alexander Graham Siren. "If it was," Carlin said, "your phone wouldn't ring, it'd go off . . . *Martha, the phone's going off again!*"

* * *

Here's another thing families used to have just one of: cameras. Remember when there was the family camera and Dad usually controlled it? Now, everybody's taking photos – all the time. Usually with the cameras built into their cell phones. Not with their Princess phones, mind you. I suppose there are worrywarts out there – there always are – wondering whether, for all the pictures we're taking, we really see anything. Gee, I don't know, but I do know that I took a whole lot of photos on our camping/sailing trip to Heron Lake State Park last summer and I'm glad I have every single one of them.

See you next time.

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

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WEAPON INTERN PROGRAM 2011 NOMINATIONS

Nominations for 2011 are now being accepted through July 9th, 2010



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Family Day 2009 earns top public relations society award

The New Mexico chapter of the Public Relations Society of America (NMPRSA) has presented Sandia's Albuquerque-based Family Day 2009 with one of its top prizes, a Gold Cumbre Award.

The award was for an outstanding example of an integrated communications campaign. Public relations campaign entries for Cumbre Awards, which are presented annually, are evaluated using the prime tenets of public relations: research, target audience, analysis, planning, communication, budget, implementation, and post-event analysis.

The award nomination was prepared by Pam Catanach and Rod Geer, Family Day 2009 deputy coordinator and coordinator, respectively.



A portion of their nomination read: "All core objectives were met. Post-event polling and informal feedback confirm Sandia Family Day 2009 was a resounding success. Records show that 12,523 hosts and guests attended, right within the predicted range based on earlier employee input. Children had a chance to learn about science through hands-on activities provided to them and all went home safe (no injuries, slips, trips, falls, etc.) fulfilling the Sandia Executive Office's key objective."

2010 Retiree Social

The 2010 Retiree Social will be held August 20, from 12:30 – 3:30 p.m. at the Embassy Suites Hotel – Conference Center. There will be plenty of room for gathering of friends, good food, reminiscing, and catching up on each others' lives. Sandia will also provide a park-and-ride service from Hoffmantown Church. An invitation with event details will be sent to retirees via mail in late July.

From Legal . . . Using copyrighted materials in Sandia works?

Q: A Sandia training presentation I attended included popular images, music, and videos. Is Sandia allowed to use third parties' copyrighted materials in our presentations?

A: Sandia, like every other corporation, is prohibited from using copyrighted materials without the owner's permission. Media companies that own popular images, music, cartoons, videos, etc. have a prosperous permissions market for use of copyrighted materials. Use of the materials without permission is a violation of the owner's copyright and subject to damages not less than \$750 for each act of infringement. That means the use of a single third-party-owned image in a presentation handed to 100 participants is subject to no less than \$75,000 in damages. The use of materials in Sandia presentations, documents, publications, or any other manner requires permission of the owner. Consult with the Sandia Legal Technology Transfer Center (Org 11500) for a determination that use of copyrighted materials is permitted. To stay compliant, Sandia has contracted with specific publishers for use of their materials. Such materials can be found at www.istockphoto.com and CSandia.gov. Materials from these sites do not require legal division review.

Peter Davies takes lead of Center 8100

By Patti Koning

Last month, Peter Davies was named the new director of Homeland Security and Defense Systems Center 8100. Having spent the last three years as the director of Institutional Development, Peter is looking forward to again being immersed in mission work.

"In my role for the past three years, I've had the opportunity to get to know all of Sandia's missions. Working with a center that is engaged across all four mission SMUs is very exciting," he says. "I like that diversity."

Peter's new role was effective on June 25 and he expects to move to California in mid-July. Initially, he plans to do a lot of listening to develop an understanding of the capabilities of the center. He is already thinking of how 8100 will engage with the two new strategic management units (SMUs): International Homeland and Nuclear Security (IHNS) and Energy Climate & Infrastructure Security (ECIS).

The ties to both SMUs already exist — Peter's Department of Homeland Security program director role will create significant interactions with Div. 6000 VP Jill Hruby, who heads IHNS, and that SMU's set of program directors. Being located in California with Div. 8000 VP Rick Stulen, who heads up ECIS, and having energy-related work within 8100 will tie the center to the ECIS SMU as well.

Making connections is a theme that comes up often when Peter talks about his new position. "As part of the



PETER DAVIES

director's council for the Nuclear Security Thrust, I have been engaged in thinking about our mission across the entire nuclear arena. Those different areas — nuclear weapons, arms control, nonproliferation, and nuclear WMD — have interconnections that aren't reflected in how our customers view these problems," he says. "As a result, we tend to think of these problems in terms of slices. There is an important opportunity to consider what happens when you look at the intersections among them and the connections we aren't making right now."

Prior to being named director of 8100, Peter was director of Institutional Development with responsibilities for Government Relations, Laboratory Strategic Planning and Strategic Studies, and the chief of staff functions for Labs Director Tom Hunter and Chief Operating Officer Al Romig. For a guy who wasn't sure he wanted to get into management, he's held a number of leadership roles across Sandia, including serving as program director for the Sandia Water Initiative and director of the Nuclear Energy and Global Security Center, Geoscience and Environment Center, and Global Engagement Strategy.

Incoming Labs Director Paul Hommert first pointed Peter on the management path. As Peter tells it, he'd been working at Sandia for about four years on the Waste Isolation Plant Pilot (WIPP) project when he got a call out of the blue from Paul asking if he would con-

sider becoming a department manager.

"I didn't quite hang up on him, but I really wasn't interested," explains Peter. "Being a manager was the farthest thing from my mind because I really enjoyed technical work. After a few days of thinking, I concluded there might be a path through which I could have more impact over the long run."

For Peter, the new position also marks a homecoming of sorts to the San Francisco Bay Area. In the early 1980s, both he and his wife, Tarin, attended Stanford University's graduate school. "We are very excited about getting to experience more of California after such a long time," he says.

The return to California also provides Peter with a new venue for pursuing his two passions outside of work: spending time in the wilderness and photography.

"I've always needed access to real mountains or a real ocean," he says. "In California, I have both."

He spends much of his free time hiking, backpacking, and cross-country skiing. "When I am in the wilderness, I'm usually carrying a camera," he says. "When I carry a camera, I see the world differently."

Naturally, Peter's photography centers on landscapes, wilderness, and wildlife. He has exhibited his work in juried exhibitions in New Mexico and has entered competitions, with some success. At last year's New Mexico State Fair, he was awarded Best of Show and People's Choice in the professional division for a photograph taken in the cypress grove at the Fitzgerald Marine Reserve, just north of Half Moon Bay. He's been very active in the New Mexico photography community and is looking forward to engaging with photographers in the Bay Area.

"Working with a center that is engaged across all four mission SMUs is very exciting. I like that diversity."

— Peter Davies

Sandia California News

NNSA saves \$4 million disposing of contaminated excess machine tools at Sandia/California

By Mike Janes

Sandia/California's Bldg. 979 housed machine tools that had been used to support a wide array of research and development projects since the early 1990s. Ken Buck (8236) and Jerry Fordham (8236-2) were the owners of the operation and equipment and initiated the clean-up project in 2007.

Toff Garcia (8517) negotiated all aspects of the clean-up activities, while others such as Wendy Dolstra (8516), Kelly Wendell (8236-2), and Pam Williams (8525) also played critical roles. "It was a real team effort, one that we had to have in order to pull this off," Toff says.

The R&D work supported by the machine tools was completed in recent years, resulting in a determination that the tools were no longer needed by DOE and NNSA and could be disposed of as excess.

"It was important that we execute a disposition plan for a number of reasons, such as potential regulatory concerns and the loss of revenue-generating space," explains Ken.

"But first and foremost, the contaminated equipment represented unnecessary health and safety risks to Sandia personnel."

NNSA selected Toxco Inc. of Oak Ridge, Tenn. — a Nuclear Regulatory Commission-licensed vendor — for its ability to receive the equipment for processing and release from regulatory control. One of the world's leading battery recyclers, Toxco and its facilities are approved and permitted, operating under strict guidelines from state and federal environmental protection agencies.

Potential reuse of the tools was complicated because of contamination, but the cost for disposing the tools at the Nevada Test Site was estimated at more than \$4

"First and foremost, the contaminated equipment represented unnecessary health and safety risks to Sandia personnel."

— Ken Buck

million. Looking to most efficiently use taxpayer dollars, Sandia contacted NNSA's Office of Infrastructure and Environment to determine if there was a lower-cost method to dispose of the tools.

Toxco agreed to take title to the equipment "as-is, where-is" at Sandia and transport the items to its licensed facility in Tennessee for reclamation. The total cost of this plan is roughly \$70,000, and the vendor provided all transportation, processing, and waste disposal services necessary to disposition the equipment either as waste or reusable equipment.



ON THE ROAD — Machine tools from the California site head down the road toward Tennessee. (NNSA photo)



IN A PARTNERSHIP among Sandia, NNSA, and Oak Ridge-based Toxco Inc., a suite of machine tools contaminated during their period of mission-related work has been safely removed from the California site, saving taxpayers some \$4 million in recycling and disposition costs. Here, the crated tools are loaded onto a truck for transport to Toxco's facility in Tennessee. (NNSA photo)

NNSA announced in June that it has removed contaminated excess machine tools at Sandia's California site by forging an innovative partnership with an outside vendor that saved taxpayers millions.

"After overcoming several disposition challenges, we successfully executed a strategy that resulted in significant savings to NNSA and American taxpayers," says Randal Scott, NNSA's deputy associate administrator for Infrastructure and Environment. "The removal of the contaminated tools at Sandia/California is another example of NNSA's commitment to turning a Cold War-era nuclear weapons complex into a 21st century nuclear security enterprise."

State of the Labs

(Continued from page 1)



OUTGOING LABS DIRECTOR Tom Hunter meets artist Frederico Vigil preceding the 2010 State of the Labs presentation at the National Hispanic Cultural Center. Vigil is painting a giant fresco in the Center's torreon that celebrates thousands of years of Hispanic cultural development. Looking on is incoming Labs Director Paul Hommert. (Photo by Lloyd Wilson)

"While the numbers are smaller, the intensity and the demands of high-precision technology are still the same," he said.

Fundamental importance of nuclear deterrent

Paul said the US is taking its first look at what the nuclear deterrent means after the Cold War and 9/11 — a review that has reaffirmed the fundamental impor-

tance of the nuclear deterrent for US security.

"What that means for Sandia is quite a bit of work that we'll have to do . . . over the next 10 to 20 years to put this reduced stockpile at the highest level of technological strength with respect to safety, security, and reliability," he said.

Tom said he is probably the last person at Sandia who ever managed a nuclear test, but he said experienced employees are teaching younger employees about the Labs' nuclear responsibilities so that the institutional knowledge is not lost. Nuclear testing stopped in 1992.

"There will come a time when no one at Sandia has ever played a role in a nuclear test," Tom said. "If we can keep the value system right, if we can keep the awesomeness and the responsibility right, and the technology right, I think we can maintain a strong nuclear deterrent."

Paul said Sandia would continue its work on cyber security, which is "probably the most significant emerging threat of the next decade or two. It's one you almost can't get your head around because it's so pervasive to us every day."

Key role of industrial partners

To help boost US economic competitiveness, Paul mentioned Sandia's work with industrial partners, including helping Goodyear improve its tire design, aiding General Motors Corp. with alternative fuels and combustion research, and helping Boeing Co. improve manufacturing processes.

"On any given day, there are a thousand-plus different things we're doing for [our fellow citizens] at the laboratory," Paul said.

Tom and Paul also outlined how Sandia and its workforce give back to the community. Tom said Sandia plans to hire more than 600 new employees in fiscal year 2010, in part to replace an anticipated wave of employees retiring this year. Sandia's payroll is more than \$900 million each year and the Labs spent \$311 million for goods and services from New Mexico small businesses in fiscal year 2009.

Paul says Sandians volunteered 123,000 hours in 2009 and donated more than \$4 million to the United Way the same year.

Sandia also supports education in the community, but Tom said he worries about whether American children want to become scientists and engineers.

"We've got to get society to value the role that scien-



SIGNING ON — Incoming Labs Director Paul Hommert puts his signature on a pot at the National Hispanic Cultural Center that has been signed by many VIP visitors to the center over the years. (Photo by Lloyd Wilson)

tists and engineers play," he said.

Standing before a photograph of a younger Tom, Paul said predecessor's career has demonstrated the importance of people and values through the years.

Paul said those who briefed Tom on topics typically found he knew more about subjects than they did.

"He's set such a tremendously high bar for understanding what the laboratory does in a deep way," Paul says. "He is an extraordinary leader. He's been an extraordinary asset to this community."

Tom is not going quietly into retirement. Paul noted that Tom has not had a day off in recent months due to his work with Energy Secretary Steven Chu on the oil spill in the Gulf of Mexico.

Tom not only brought the strength of the laboratory to that job, Paul said, but he also brought his own personal abilities and a deep technical understanding.

Asked about the spill by an audience member, Tom said the difficulty of the problem is striking.

"We're working a mile below the ocean. Everything's done by robots with cameras. It's all about containing this extremely high-pressure flow," Tom said. Still, he thinks a solution will be found.

"The laboratories are helping, the secretary of energy has personally spent hours and hours, and we have a team from all over the country trying to help sort out the path forward and the solutions. All those give me confidence that a solution will be arrived at," Tom said. "When you have a problem to solve, you just work at it until you solve it."

Nick Pattengale's doctoral dissertation wins Qforma award from UNM School of Engineering

Nick Pattengale (5633), a Sandia University Part-Time Program participant, who just completed his doctorate in computer science at the University of New Mexico, has been awarded the UNM School of Engineering (SOE) "Best Computational Thesis written in Academic Year 2009-2010" for his PhD dissertation titled "Efficient Algorithms for Phylogenetic Post-Analysis."

Chosen by SOE faculty and sponsored by the Santa Fe-based medical analytics company Qforma, the award was accompanied by a \$5,000 prize. Students from any SOE department, master's or PhD, were allowed to compete for the prize, as long as computation played a significant role in their thesis/dissertation.

Nick's dissertation is relevant in a sub-field of computational (molecular) biology called phylogenetic inference. Phylogenetic inference is the act of reconstructing evolutionary histories of related organisms (or languages, proteins, art forms, or indeed anything undergoing an evolutionary process). Nick's dissertation addresses fundamental algorithmic problems in phylogenetic inference, including efficiency considerations in computing distances between phylogenies, assessing the stability (or confidence) of a reconstructed phylogeny, and identifying misleading sources of noise in the underlying data.

At Sandia, Nick has spent the past eight years as a software engineer in Information Systems Analysis Center 5600 doing research and development in information assurance technologies. He is interested in whether distributed and (semi-) autonomous situated soft-

ware systems have a valid role in next-generation security technologies. Nick says he is also actively exploring paths to more directly leverage his dissertation work at Sandia.

In a letter nominating Nick's work for the Qforma prize, his dissertation adviser wrote that an anonymous referee, making a determination to publish part of Nick's work in an important conference proceeding, wrote "This work may revolutionize how phylogenies are computed and validated."

"Thus," Nick's adviser wrote in his nomination letter to Qforma, "while it is naturally too early to judge the impact of his work, there is no doubt that the scientific community shares the opinion of his dissertation committee: this is work of distinction and high potential impact. . . ."

Noting that Nick's dissertation focuses on three areas of phylogenetic analysis, his adviser wrote that, "[E]ach of these approaches has been subjected to very extensive computational testing and validation, using both simulated and biological datasets. This combination of deep results and sophisticated testing is rare in algorithm design and nearly unheard of in bioinformatics and computational biology, but has been a fundamental characteristic of Nick's work. . . ."

"[Nick's] dissertation work not only contributed fundamental advances in phylogenetic reconstruction, but also entirely novel foundational work upon which new research projects can be built. Nick has the makings of a highly creative and productive researcher and his dissertation amply demonstrates these traits."



UNM COMPUTER SCIENCE doctoral graduate Nicholas Pattengale, left, receives the QForma award from Roger Jones, QForma chief scientific officer.

Sandian Tom Friedmann awarded NASA Exceptional Engineering Achievement Medal

Diamond-like thin film offers hard data for solar models

By Neal Singer

Tom Friedmann (01112) was one of six researchers awarded NASA's Exceptional Engineering Achievement Medal (EEAM) at a ceremony June 15 at the Jet Propulsion Laboratory in Pasadena, Calif. He received the award for the quality of the diamond-like carbon thin films he contributed to the Genesis science mission. The other five winners were all members of JPL.

The purpose of the Genesis mission was to collect the solar wind that is ejected from the outer portion of the sun, itself thought a kind of fossil of the original nebula that transformed into our solar system 4.5 billion years ago. The captured materials could test the validity of solar-formation models. The EEAM award acknowledges Tom's contributions as critical for mission success.

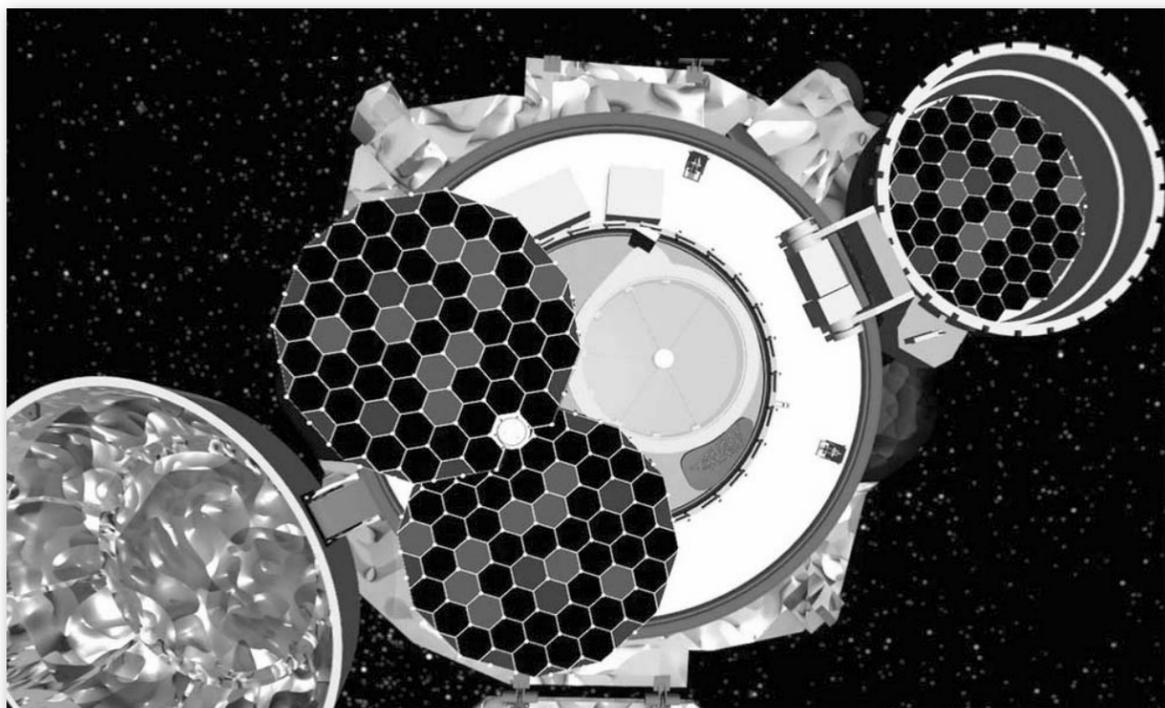


GENESIS MISSION PATCH

"The films were selected due to their purity," says Tom. "They made possible the sensitive determination of the composition of the solar wind that implanted itself in the samples during the mission."

Because the solar wind is diffuse, the Genesis probe exposed the film samples on orbit for more than two years at the Earth-Sun Lagrangian point (the point where earth and sun's gravity cancel) to obtain statistically significant implants. The satellite then folded up its collectors and returned to Earth for sample analysis.

"The reentry was supposed to be managed by deploying a parachute and gently catching the probe with a helicopter," Tom told the *Lab News*. "Unfortunately, the parachute did not deploy due to the misori-



The Genesis collector arrays house the high-purity materials into which solar wind ions are implanted. The total surface area of the collector arrays is more than 1 square meter (11 square feet). (NASA photo)

entation of an accelerometer that was supposed to be activated by the deceleration upon reentry."

Because the sensor was installed backward, the satellite then crashed into the Arizona desert. Although this resulted in contamination of the samples, the Genesis team was able to recover and clean most of the samples and still accomplish much of its ongoing science mission, Tom says.

The Exceptional Engineering Achievement Medal, established in 1991, is awarded to both government and nongovernment individuals for unusually signifi-

cant engineering contributions toward achieving NASA's mission.

According to a NASA handout, "Accomplishments are far above others in quality, scope, and impact. Accomplishments are explicit, demonstrate results, and are perceived as outstanding or significant by peers and impacted target groups."

For information regarding the Genesis mission see: <http://Genesismission.jpl.nasa.gov/>. For information regarding NASA awards see: <http://nasapeople.nasa.gov/awards/nasamedals.htm>.

Groundbreaking Sandia study ties climate uncertainties to economies of US states

California, Pacific NW, and Colorado potentially achieve positive net impacts; other states languish

By Neal Singer

You don't tug on the cape of your insurance company to recompense you for damages unless you bought its product before the accident.

Similarly, a new Sandia climate-change study that models the near-term effects of declining rainfall in each of the 48 continental US states makes clear the toll in agricultural, industrial, financial, and involuntary human population shifts that could occur unless an appropriate amount of initial investment — a kind of upfront insurance payment — is made to forestall much larger economic problems down the road.

Why tie climate change to economics? "In the absence of any idea about costs, the need to address climate change seems remote and has a diluted sense of urgency," study lead George Backus (1433) says.

Downplaying the usual flash-points in climate-change discussion — catastrophic events and legislative interventions — the Sandia study uses probability techniques familiar to insurance companies to place dollar estimates on the effects of climate change in the absence of mitigation or other policy initiatives over the 2010-2050 time period.

The analysis used the results delivered by a variety of computational models reported by the Intergovernmental Panel on Climate Change's 4th Assessment Report. From those, the Sandia report estimates the range of precipitation conditions — from lows to highs — that could occur across the states. The study then presents the consequence of those levels of precipitation on the states' economies.

"On the one hand, there's a lot of uncertainty in quantifying climate change," George says. "Everyone sees that. It's this uncertainty that presents the greatest difficulty for policy makers. If society knew how change would exactly unfold, we could undertake adaptation

and mitigation responses.

"Yet," George and his team write in the introduction to their paper, in other areas, "despite uncertainty about the future, cost-benefit analyses are conducted on a daily basis as aids for policymakers on issues of critical importance to the nation such as health care, social security, and defense."

By summarizing consequences over the range of predicted change — from the smallest to the greatest — the Sandia study is able to present a coherent grouping of results. Then, using well-accepted computer models, the study projects the net effect of climate change on a state's agricultural and industrial base, and the subsequent movement of populations for livable wages.

California, the Pacific Northwest, and Colorado, for example, are the only states in the study that seem to benefit overall from the variation in precipitation that climate change might engender. That is because population would leave those states whose economy is hit hardest by reduced water availability, moving into and stimulating the economies of the less-affected states.

While the uncertainty in climate change predictions because of the wide range of model results are often given as a reason by those skeptical of climate change to ignore the problem, the study's authors take a point of view more common to insurance companies.

In insurance, George says, greater uncertainty means greater risk. In such cases, insurance companies merely

"The real effect of climate-change doubters in emphasizing the limitation of the models is to accentuate risk."

— George Backus

reflect the higher risk in a higher insurance premium. For example, the rates for well-understood risks, such as taking a commercial airline flight, are far lower than those for less-understood risks, such as taking a privately funded rocket flight.

"The real effect of climate-change doubters in emphasizing the limitation of the models is to accentuate risk," George says. "To an insurance company, this would mean this area is more dangerous, not less. The proper action for those skeptics who want to halt government initiatives in climate policies is to reduce the uncertainty and demonstrate, if possible, that the future climatic conditions will remain below dangerous levels."

Thus far, the only existing models say that if nothing is done now, "By the time the negative effects of climate change significantly affect populations," George says, "it will be too late to prevent the escalating damage."

Though the study stops short of applying its techniques to address effective mitigation techniques, its writers mention the early building of sea walls against the expected rise of oceans, planting crops resistant to drought, and removing carbon from the atmosphere through reforestation or geological sequestration.

A further limitation is that the study only considers the impacts of near-term climate change on the US, disregarding worldwide impacts. It also has the imprecisions that result from neglecting a large number of influencing factors. It does not provide a risk analysis or reliability study of amelioration techniques. But the study concludes that "the larger challenge lies not in the technical difficulties of such [analyses] but rather in the communication of the risk and uncertainty in a manner that connects to the vital concerns of the policymakers."

The take-away point: "It is the uncertainty associated with climate change that validates the need to act protectively and proactively." [Emphasis in original text]

MESA, the house that Tom built



SO LONG, TOM — Outgoing Labs Director Tom Hunter greets well-wishers in the Bldg. 858EL atrium during an open house held in his honor. The building is part of the MESA complex, a project that Tom has cited as one of the capstones of his 43-year career at Sandia. (Photo by Randy Montoya)

Story by Neal Singer

Tom Hunter, Sandia's nearly retired president, held his farewell open house not in the administration building (802) but in the Microsystems and Engineering Sciences Applications (MESA) complex, which could be considered (without slighting all the many contributors to that project), the house that Tom built.

There, before an audience of perhaps 200 people from all levels of Sandia, Tom was given a list of 10 new tasks to complete by representatives from DOE's Sandia Site Office confident in his skills. The list began with stopping the Gulf oil spill and continued with bringing peace to the Middle East, reversing global warming, eliminating terrorism, ending world hunger, and a few other "easily" achievable tasks. A senior member from Tom's early bomb field-testing group, about to present Tom with a plaque, mulled the DOE tasks and said mildly, "I'm anxious to see how well you do on those."

Tom seemed comfortable with the assignments and on the flagstones where he stood. The place had been transformed from the Sandia 'used' lot it had been when Tom first came to Sandia to the remarkable research facility that now surrounded his audience.

Without Tom's efforts, that new facility might

THE COMPLEX — The MESA complex in Sandia/New Mexico's Tech Area 1. The view here is looking directly south. (Photo by Randy Montoya)

not be there.

Says senior manager Tom Zipperian (1740), "I'll be celebrating 30 years at Sandia this summer. It's been my experience that a lot of big ideas tend to follow a similar trajectory: they form up, gain momentum, grow to a certain point, and can't go any further until some person in executive management decides that [he or she] personally is going to make it happen.

"MESA followed this path. It first benefitted from [Executive VP] Al Romig's seminal vision and guidance of the idea of a microsystems "center of excellence" in the late 1990s and early 2000s. He invented the acronym MESA.

Principled guidance

"It was Tom Hunter, ultimately, who made MESA real. Tom took personal responsibility for the project. He provided principled guidance of MESA, not just as a construction project, but also as a new way of doing engineering. The intimate mixture of staff and managers from weapons systems engineering, engineering sciences, and microsystems design and fabrication, is central to MESA's operation" Tom says.

"Tom insisted internal discussions come to consensus and he coordinated the development of external advocacy that achieved the funding that made the project real.

"What he did is the definition of executive leadership." The roughly \$500 million construction project — the largest in Sandia's history — began in 1999 and finished in 2008. Designed and constructed by Sandia's MESA project team, it was originally headed by Kathy Roach

(now a consultant to 8500) in the conceptual design phase, then by Bill Jenkins (1230) throughout the project engineering design and construction phases. Jennifer Plummer (12800) headed the Project Controls team. The project trained an entire generation of Sandians in construction project management, and its success — three years ahead of schedule and \$50 million under budget — brought substantial technical and media recognition to Sandia, NNSA, and DOE.

Strong, unwavering executive management support

"The key factor," says Bill, "was strong, unwavering executive management support."

Among other early achievements, the MESA project provided critical recapitalization to the existing Microelectronics Development Laboratory (since renamed the MESA SiFab). It also replaced an aging Compound Semiconductor Research Laboratory (CSRL) with new offices, light labs, and a new III-V (compound semiconductor) fabrication facility.

MESA also provides a unique facility particularly suited to the development of pluralistic microsystems by conjoining the SiFab and MicroFab under one shell in the MESAFab. There, substances like silicon compounds and gallium arsenide, often thought of as co-contaminants and kept far apart, can be worked together.

The fabs also can be used for individual research pro-

(Continued on next page)



MESA

(Continued from preceding page)

jects rather than the large production runs that many state-of-the-art fabs require. Yet the facilities are also ISO-9000 certified and have the processes and quality systems in place to mass-fabricate radiation-hardened chips and other microsystems components.

For this and other reasons, MESA recently achieved Trusted Foundry accreditation by the DoD, validating the security of MESA-produced microsystems in mitigating tampering and avoiding Trojan horses that could occur in an unsupervised foreign facility.

MESA also features a Weapons Integration Facility (WIF) that combines modeling and microelectronics with the goal of achieving more efficient and creative weapon design.

'Three-legged stool'

The MESA Center's so-called "three-legged stool" integrates microelectronics, modeling and simulation, and weapons system design for the nuclear weapons complex, as well as for sensors invented for defense, outside agencies and industries. It has produced a potpourri of innovations and ongoing projects that, if too early to be considered a rival to the glory days of Bell Labs, has attracted researchers from around the world, achieved publication in top-level journals, and drawn attention from government agencies and private industry.

Tom Hunter and Al Romig (then VP 1000) chose a steady hand to oversee the design and construction of MESA in the person of Don Cook, at that time director of Sandia's Pulsed Power Center and overseer of Sandia's Z machine when it went through a period of startling improvement in X-ray output.

Don, recently confirmed by the US Senate as NNSA deputy administrator for defense programs, emails that his goals for MESA, many of them given directly to him by Tom Hunter (his program boss at the time) and Al Romig (his line boss at the time,) were to:

1. Rebuild 10 percent of the lab in a new way.
2. Provide an engineering science-based integrated microtechnologies capability for weapon applications.
3. Provide a strong attractor for new hires.
4. Improve safety and security of US nuclear weapons systems through appropriate insertion of new microtechnologies.
5. Drive maturation of microtechnologies through multiworkgroup interactions, funding, and targeted weapon-component objectives,
6. Construct multiworkgroup office and laboratory space at various security levels for use in structured "open plan" environments to increase cross-organizational interaction in MESA's Weapons Integration Facility (WIF).
7. Recapitalize the radiation-hardened microelectronics capabilities in a way to develop a "trusted foundry" for US national security applications (MESA MicroFab – silicon side), and
8. Replace the Compound Semiconductor Research Lab (CSRL) with new space and new equipment, along with appropriate light labs and offices (MESA MicroFab and MESA MicroLab).

"In some areas, Sandia went well beyond what was required," Don says. "In other areas, there's more to be done. I have a very good idea as to what should happen there."

'A unique achievement'

While Don ceased work on MESA five years ago, MESA director Gil Herrera has an immediate grasp of what's going on at his center. He's not shy about sharing it.

"The vision of MESA is being achieved," he says. "More than half of Sandia's LDRD Grand Challenges over the last four years have been centered in MESA, reflecting the multidisciplinary, cross-laboratory nature of microsystem R&D. Novel technology demonstration projects are being matured for potential use in nuclear weapons, and dozens of advanced microsystems concepts are being funded and developed for broad national security applications."

Gil says that MESA researchers have already achieved world-record performance in quantum computing by retention of trapped ions; have developed new photovoltaic technologies with the potential to revolutionize solar energy production; and are in a DARPA-supported final phase to build a chip-scale atomic clock that uses VCSEL lasers, developed at Sandia, that could be useful to the military should satellite communications go out.

Researchers also have DARPA and DTRA support for an ultrafast, ultra-accurate, very light chemical sensor to detect noxious gasses in 15 seconds.

Says Joe Simonson (1716), who leads the microgas analyzer effort, "In order to do 2-D chromatography, we're microfabricating our gas separation columns but



THE NIGHT SHIFT crew of the 858EL MicroFab (seen here in a photo from 2009) works around the clock on solid-state lighting initiatives. "More than half of Sandia's LDRD Grand Challenges over the last four years have been centered in MESA, reflecting the multidisciplinary, cross-laboratory nature of microsystem R&D," says MESA director Gil Herrera. (Photo by Randy Montoya)

we need valves that don't use rubber or plastic seals because those substances absorb the tiny amounts of gas being analyzed."

Instead, using Sandia's complex, multilevel Sandia SUMMIT 5 program, Joe's team (with primary designer Paul Galambos (1749) has been able to fabricate seals of silicon, silicon dioxide, and silicon nitride. "It's a unique achievement," Joe says.

To Malcolm Carroll (1725), leading an effort involv-

"What we have here is a collection of excellent scientists and engineers, excellent tooling capabilities and infrastructure — in many respects the strongest in the country — and a magnet for attracting young bright people to work with other bright people on state-of-the-art technologies."

— Sandia researcher Charles Sullivan

ing quantum dots and single electron devices, "We've demonstrated MOS quantum dots that are charge-sensed. That is, if a structure next to a quantum dot is sensitive to the electron occupation of the dot, it senses any change in occupation. So we know something about the charge state of the quantum dot, an important component of a quantum bit for quantum computing.

Capabilities not available elsewhere

"To do this, the silicon fab provides a custom capability that I can't get elsewhere, because our structures are not consistent with regular processes. Most foundries are like cookie cutters. They build things out of the same material, like houses with two stories and doors all the same sizes. In our silicon fab, sometimes you can do three stories, sometimes double doors. Also, the controls are much better than most university fabs, so the doors are pretty much what you asked for. Foundation is straight, door edges aren't lopped off. We have some of the flexibility of the university and some of the rigor of industry."

Other MESA-based inventions include a silicon photonic modulator that wipes out a third of the power needed to communicate between computing elements, better night sensors for soldiers, surface acoustic waves that detect bindings between antibodies and sensors, work on retinal implants to help the blind to see, microelectronics for the *Europa* mission, and solar-powered louvers for space satellites to help shed heat.

"What we have here," says Charles Sullivan (1742) "is a collection of excellent scientists and engineers, excellent tooling capabilities and infrastructure — in many respects the strongest in the country — and a magnet for attracting young bright people to work with other bright people on state-of-the-art technologies. Impacting old systems is very invigorating."

Says Murat Okandan, "An interview candidate asked me what's interesting, exciting — 'What do you enjoy here?' I told him the technology and interactions avail-

able here are pretty unique. We have the facilities close to that of a commercial foundry and almost the freedom of the university."

Center 1200 Director Julia Phillips, a Bell Labs veteran, says, "What MESA has that is somewhat comparable to Bell Labs is great facilities that can turn a chunk of silicon into a device that can do something special. We have managed to put together amazing intellectual horsepower, working in teams with a sense of camaraderie and belonging, doing cool stuff with great toys. The difference is, we're focused much nearer term than the research arm of Bell Labs was focused on. At Bell, it was more, 'Do you think we could do information processing with light instead of electrons?' You'd build up and if you were lucky, with sustained funding you'd revolutionize the field, though it might take 20 years. MESA is pointing in same direction, but the time scale, resources, and mind set are different."

MESA role in weapons mission

Gerry Sleaf (2210), deputy to the nuclear weapons program, cites the role of MESA in support of the nuclear weapons mission.

He says that MESA successfully delivered on the W76-1 life extension program, providing ASICs (the brains of the weapons) in specialized and radiation-hard form. "Those were made in our fab, and are in weapons today."

David Plummer, director of Engineering Design and Integration Center 2600, agrees. "The first two things we did were about recapitalizing and refurbishing the silicon fab, to fabricate the brains of the W76. By April 1, Permafrost ASIC Controller chips were under the water and on patrol [in nuclear submarines]. Permafrost chips could hold information far longer than any other contenders. The core of the story is, it makes me proud to have MESA rad-hard ASICs on patrol protecting our country."

Significant progress in next-generation microsystems for upcoming B61 and W78/W88 microsystems have been achieved, says Gerry. "They're functionally very integrated, more flexible, with much better customization." He sees MESA work that will include advanced MEMS switches for possible weapon insertion, and also micro-optical components for nuclear weapons safety.

The situation gets more complicated when peering into the use of modeling and simulation, and the intended semi-free-form collaborations that were intended to be part of the MESA process.

"In parallel with MESA was the ASC (Advanced Scientific Computing) program, developing modeling and simulation tools," says Gerry. "But the tools weren't fully matured and proven during the W76-1, so we haven't had a chance in the weapons program to put them all together. In the upcoming B61 LEP [Life Extension Program], we are already seeing an increased use of the computational simulation tools."

Says David, "We're spending a lot of time reorganizing how we use the space. The pod design facilitates our interactive capability. All labs in the middle of the building are connected through doors or wide utility corridors; we're trying to figure out how to do it even better. We'll see an increase in people moving in and out more easily and rapidly as mission targets change. Plus, the proximity to JCEL will become more evident."

A Sandia story:

Tom Hunter was born at home, in rural northern Florida, in 1945. This was a place and a time that, a generation before Disney World transformed the character of the state, was remote, off the beaten path.

Those inclined to read signs and portents into the everyday turn of events might view it as meaningful that Tom was born — allowing for the differences imposed by the International Dateline — on the day the US dropped an atomic bomb on Hiroshima. It's true that Tom, during the course of his career, became one of the world's top nuclear weapon experts. But there was nothing inevitable about his career path.

To begin with, life wasn't easy in that place at that time, not easy for anyone. And not easy, especially, for a young widow with three sons, middle son Tom and his two brothers. Tom's father died when Tom was six years old, and that had to leave its mark.

"We struggled," says Tom matter-of-factly. No self-drama, but no dodging the plain facts, either. Things were hard.

An energetic and uncommonly gifted young man, Tom graduated from high school at age 15. "I skipped a couple of grades," he says.

Bulldozers and land surveying

Tom's teachers had rarely seen the likes of him, with an intellect and a curiosity that could not be contained. It must have been obvious to the most perceptive adults in his life that this was a boy who was going places, who was going to amount to something.

Tom entered the world of work early. By age 14 he was doing a man's job; before he even had a driver's license, Tom was driving bulldozers and dump trucks at construction sites in a state that was enjoying a post-war building boom, a boom that would only accelerate as the state became a mecca for retirees from "up north."

Tom entered a local community college and then transferred into the mechanical engineering program at the University of Florida. Throughout these years, Tom continued to work in construction, but also began to show early indications that he would not only welcome, but seek out new career challenges.

While still in college, Tom began work as a party chief for a land surveyor — again, a man's job for someone hardly more than a boy. He worked as a junior engineer with the Procter & Gamble Co. — Tom didn't care much for that

one. As he puts it: "People wore suits and went to meetings." He even headed for the oil fields of Louisiana, noting that he was working as a roustabout at Black Lake, La. — near the site of the nation's Strategic Petroleum Reserve (SPR) — decades before any other Sandian worked there.

"I established the Sandia beachhead there," he says jokingly. (Sandia has played a key technical role in the SPR since its inception in 1975.)

Tom wasn't one to wait for opportunity to come to him. Taking what he had learned in construction and surveying, Tom took another turn — again, while still in college — as a land developer, buying up and reselling parcels of land around northern Florida. He made some money at it, but there was more to it than that.

"I always had a yearning to get out in the woods," Tom says, and exploring real estate opportunities gave him just such a chance.

Road trip! — 16,000 miles' worth

That yearning "to get out in the woods" manifested itself most notably when he was 18. Tom and an old high school buddy took some time off to take what could rightly be called the trip of a lifetime. Loading up a 1957 DeSoto



A 19-YEAR-OLD Tom Hunter in 1965 on the day he headed to Macon, Ga., to spend the summer as a junior engineer with the Procter & Gamble Co.

Tom Hunter's mother recalls . . . 'A well-rounded kid,' and 'full of surprises'

Tom Hunter, recalls his mother Harriet Carpenter, was "full of surprises" as a boy, so much so that nothing he has accomplished in his adulthood has surprised her at all.

She and her husband, who passed away when Tom was six, knew Tom was something special right from the start. "We did have several indicators pretty early" that Tom was unusually bright, "especially about his mathematical ability," says Mrs. Carpenter.

There was the time, for example, when Tom was maybe four years old, that, out of the blue he came up and said, "Daddy, I know what 99 and 99 is — it's 198!" To which his delighted father exclaimed, "How do you know that, son?" So Tom explained his reasoning. He couldn't add in any conventional sense, of course. He hadn't been to school yet. But he walked his father through his analysis: "Well, 99 is one less than 100 and two 100s is 200, so two 99s is two less than 200. And that's 198!"

"We didn't even know he could count that high," says Mrs. Carpenter, who, at age 97 still lives in the home where Tom was born in northern Florida.

"Tom's advancement in school was just amazing," she says, noting that he skipped a couple of grades and ended up as the youngest high school graduate ever in



TOM HUNTER, mid-1950s

Putnam County, Fla. He graduated at age 15. And he always worked hard. "He never wasted a minute; he always had to be doing something," Mrs. Carpenter recalls. "He has worked all his life."

Tom may have excelled in school, but he was also all boy. "He was a well-rounded kid," says Mrs. Carpenter. "He played baseball, was in the Boy Scouts, he went to church regularly, and was president of the local youth group at church." And unlike the stereotype of the brainy kid picked on by the bullies, it wasn't that way with Tom, says Mrs. Carpenter. "He always found a way to make people like him."

Tom's leadership skills, like his intelligence, manifested themselves early on. "He was always a leader; even being two years younger than everyone else in high school didn't change that. No matter what he was doing he always went straight to the top," his mother says.

And is Mrs. Carpenter proud of her son's career accomplishments?

"Of course I am, and his brothers are too." Tom was the middle of three sons. "We're all real proud."

Proud. But not surprised. Says Mrs. Carpenter, "He's amazed me from the time he was three years old."

Tom Hunter's 43-year career driven by desire to render exceptional service to the nation

with camping gear, the travelers headed north to Alaska by way of Washington, D.C., and New York. It was the first time Tom had been out of state, and, while his subsequent career has made him a world traveler, this adventure was something special.

The 16,000-mile trip included long stretches on gravel roads — driving to Alaska was no easy thing in the early 1960s. There was one stretch in Canada, Tom recalls, that was gravel for 400 miles.

"The Mounties [the Royal Canadian Mounted Police] inspected your car before they'd let you drive that road," Tom recalls. Luckily for the boys, the car was deemed OK and the trip continued. They got as far north as Fairbanks before pointing their DeSoto south. Their route home brought them into the Southwest, where Tom is pretty sure they drove through Albuquerque.

Speaking of Albuquerque, four years after that Alaska trip, Tom was back in the Duke City, this time for a job interview at Sandia.

"AT&T was recruiting top students from the engineering schools," Tom says "and Florida had a good reputation. They asked me if I would be interested in working at Sandia." AT&T managed Sandia for the Atomic Energy Commission at the time, the predecessor agency to the Department of Energy. AT&T was held in extremely high regard in science and engineering circles for its world-class Bell Labs.

"There was, I think, a very strong resonance between the things I was interested in and what Sandia did," Tom recalls, "but I knew nothing about Sandia at the time. I didn't know they did nuclear weapons or anything. They weren't known at all. So what attracted me was the visit, the on-site visit. And then the name of AT&T. It was AT&T, the Bell Labs name, and the visit to Sandia — those were the factors that convinced me this was the right place for me."

'The work looked really exciting'

When Tom arrived in 1967, the Cold War was at its height, and that had some bearing on Tom's decision. "It was clear that the Cold War was a huge deal for the nation and it was clear, too, that Sandia was front and center in it. And the work looked really exciting."

In 1967, the US was deeply involved in the war in Vietnam; the first signs of the civil unrest that characterized the late 1960s were becoming apparent; the arms race with the Soviet Union was paralleled by the space race. Technical prowess was widely seen as a metaphor for the viability of the competing systems of government, and with the stakes just as high as they could be, both the Soviet Union and the US were putting everything they had into massive, complex, showcase technical endeavors. With global tensions high, the US was testing nuclear weapons at the Nevada Test Site at a rate of almost one underground test per week. The technical demands and logistics required to sustain the growing weapon stockpile were tremendous.

It was into this environment that Tom, a young engineer with a lot of promise, came to Sandia. And it was that culture — particularly the field test culture that he became part of — that colored his early experiences at the Labs.

Early on, Tom was immersed in the weapons testing regime, learning everything he could about nuclear



DURING HIS TENURE as Labs director, Tom Hunter made safety a high priority, taking a personal interest in all aspects of the issue. Here he conducts a walkthrough of the MESA construction site in 2005.



THE PROUDEST MOMENT — Tom Hunter, second from left, at the dedication of the MESA facility in August 2007. With him are, from left, NNSA Administrator Tom D'Agostino, Sen. Pete Domenici and then-DOE Deputy Secretary Clay Sell. (Photo by Randy Montoya)

weapons testing. Meanwhile, with Sandia support and encouragement from his management team, Tom continued his education, earning a master's degree in mechanical engineering from the University of New Mexico and a master's and doctorate in nuclear engineering from the University of Wisconsin. When one looks at his resume, it's hard to figure out where he had time for school, so deeply was he involved in Sandia's evolving mission work.

An awesome responsibility

Because his career has been identified — not exclusively by any means — with nuclear weapons, Tom has developed strong ideas about what he calls "the awesomeness of the responsibility" of making sure the nation's stockpile remains safe, secure, and reliable. And he has thought deeply about the goal, outlined most notably in a speech in April 2009 by President Barack Obama, to see a world free of nuclear weapons.

Is that a realistic goal?

"I've actually spent a lot of time in these policy circles," Tom says. "I spent time with the four horsemen of the 'path to zero' policy — Henry Kissinger, Sam Nunn, Bill Perry, and George Schultz. [These are senior US statesmen who have gone on record in support of the nuclear weapons-free goal.] So I understand the deep desire to go to a world with less nuclear danger. I understand the deep desire to achieve this goal; it is an admirable path and I have the deepest respect for the people who advocate that path, yet I advocate caution."

"In fact, the goal is very consistent with what we've been doing with the stockpile. As we move in this direction, though, it is vitally important that we move with caution and deliberation; the goal is to maintain a level of stability as we go forward; a misstep could lead to instability and proliferation — precisely contrary to the goal. So, to reiterate: This process has to be managed very carefully. I see that the people in this administration are, in fact, managing the process carefully, with deep thought and consideration, and that gives me great confidence that we are handling this issue the right way."

A wide range of roles

In his 43-year career at Sandia, Tom has played an astonishingly wide range of roles, enabling him to leave his mark on many of the Labs' most significant developments over the past four decades.

Among the most notable for him? "We were asked to develop a whole new technology for nuclear testing." Wasn't that a huge responsibility for a young engineer and

his team? "Well, it didn't seem that way; it was just our job," says Tom. What helped — a lot — was what Tom called "a very strong management team."

"I found it very rewarding to work with them; I learned so much," he says.

Other milestones: Tom helped stand up the Labs' energy program, established in the mid-1970s in the wake of the 1973 oil embargo. That program has grown and evolved over the years in response to changing national priorities; Tom was there at the creation.

Tom was also present at the creation of WIPP — the Waste Isolation Pilot Project — the successful underground repository near Carlsbad, N.M., that has now been operating effectively for 10 years. Tom also cites as a career highlight his leading role in the post-Cold War nonproliferation program in the Former Soviet Union.

"Traveling through East Germany [in the early 1990s]," he recalls, "I came to appreciate for the first time the massive scale of the nuclear energy program" in the Soviet bloc, and became aware of the profound environmental concerns left in the wake of that enterprise.

Tom made many trips to Russia beginning in the 1990s and found it a bit disconcerting to visit the weapon labs of a society that had been America's chief adversary for decades. However, he adds, he didn't perceive any resentment on the part of Russian scientists about the Americans' presence. To the contrary, he says, "We enjoyed open and candid discussions with our Russian counterparts, and I think together we helped secure materials that would have been extremely dangerous had they fallen into the wrong hands."

The proudest moment

A real high point in his career — maybe the highest of the high — was the completion ahead of time and under budget of MESA, the Microsystems and Engineering Sciences Applications project. The MESA project dedication, Tom says, "was probably the proudest single moment" he has



DEVELOPERS OF THE FAST-ACTING CLOSURE, a key component of Sandia-conducted nuclear weapon tests at the Nevada Test Site, are from left, Robert Stinebaugh, Leroy Honeyfield, an unidentified official from a private-sector firm, and Tom Hunter. "Not only was the scale of the [test] site enormous in landscape terms, the scale of the hardware we used was enormous."

experienced at Sandia. MESA represents the largest construction project in the Labs' 60-plus year history. The MESA complex is designed to integrate the numerous scientific disciplines necessary to produce functional, robust, integrated microsystems. Tom lauds DOE, and specifically then-senior DOE officials Vic Reis, Gil Weigand, and Tom D'Agostino (who is now NNSA administrator), for supporting the MESA vision right from the start. And he especially acknowledges the role of Don Cook, the project director, and Bill Jenkins, the project manager, for their efforts in making the complex project a success. He also cites as critical the key support the project received in Congress because of the efforts of Sen. Pete Domenici.

MESA, Tom says, potentially represents "a crowning redefinition of the way we do our work" at Sandia.

Tom also values the relationship he has built with DOE and specifically with the NNSA Sandia Site Office management team of Patty Wagner and Kim Davis. "That has been an immensely rewarding relationship for me personally, and an invaluable one for the Laboratory," he says.

While his decision to retire was the right decision and one he has



Story by Bill Murphy

weighed for some time, Tom knows there are things he'll deeply miss about the job.

"I'll miss a lot about it. It's easy, almost a cliché, to say that I'll miss the people, but it's true. I'll miss the people at the Laboratory and the people I engage with outside [Sandia]. Those are extremely important and valued relationships. I'll miss the regular engagement with the other lab directors, especially Mike Anastasio [director of Los Alamos National Laboratory] and George Miller [director of Lawrence Livermore National Laboratory]. I'll miss our management team, and most of all, I will miss the time I've spent with the working staff, all the working staff. I'll miss the challenges."

But, he adds, "I won't miss the daily pressure of being responsible for everything that happens at the Laboratory; there will be a sense of freedom from this enormous sense of personal responsibility."

For all its demands, though, Tom wouldn't have had it any other way. Perhaps he might have done some of the small things differently; he might have gone through grad school sooner, for example, but he would have studied engineering in any case.

"If I'd had the talent to be a great blues guitarist or write country music, maybe I would have gone there," Tom says, "but I didn't and, looking back, I really can't imagine where I would have found more fulfillment in my career than here. Scientists and engineers have a unique opportunity to contribute to the betterment of society and it's been extremely gratifying to be part of that."

Will find ways to serve the nation

While he has no specific plans for July 9 and thereafter, Tom feels confident that, one way or another, he'll find ways to support the nation. Perhaps that will include — but not be limited to — continuing to support Secretary of Energy Steven Chu in the ongoing *Deepwater Horizon* oil spill crisis.

He might even find time to rebuild an old car or two.

"I've always been a car guy," he says, adding that he would love to get his hands on a 1957 Dodge D501 convertible. He says he'd settle for a Mercedes 300 SLR supercar, but admits that "that's not likely to happen." (The latest SLR starts at \$500,000.)

When Tom came to Sandia in 1967, it was, by and large, a nuclear weapons lab with a single, focused, urgent, and intense mission. Today, 43 years later, after serving as Sandia's 12th president and Labs director, Tom has presided over an increased expansion of the Sandia mission portfolio, one that now sees well more than half the Labs' mission involve nonweapon work.

"Diversification has redefined our role as a national laboratory," he says. "I don't believe a laboratory this great can be focused on just one mission; our laboratory is about national security. We're about exceptional service and we're about national security."

Tom's is the story of a boy from the piney woods of Florida who ended up advising presidents and cabinet secretaries, senators and representatives, generals and diplomats. He's the boy who drove bulldozers at 14 and ended up affixing his own signature to documents affirming the safety, reliability, and security of the nation's primary strategic deterrent. Tom is the man whose mother, now 97, still lives in the house where he was born, still self-reliant and active; that's the kind of people he comes from.

Tom's story is, ultimately, an American story . . . and a Sandia story, through and through.



IN AN EARLY HIGHLIGHT of his service as Labs director, Tom Hunter welcomes President George W. Bush to Sandia. The president signed the Energy Policy Act of 2005 in an official ceremony at the Labs.

Sandia pioneer helped shape Labs culture

Remembering Glenn Fowler

Former Sandia Vice President Glenn Fowler died June 8 at the age of 92. He retired from Sandia in 1983 after 28 years as a Sandia vice president.

At the start of World War II, the newly-graduated electrical engineer was already working on airborne radar at Massachusetts Institute of Technology, subsequently migrated to the newly constructed Pentagon to serve under General Henry H. "Hap" Arnold, and was later assigned to the Manhattan Project for the duration of World War II. He came to Sandia Base in 1945 along with a small contingent of others from Los Alamos' Z-Division, remaining to become one of the first Sandia Corporation employees.

"It's impossible to overstate Glenn's monumental contributions to Sandia," says Sandia President and Labs Director Tom Hunter. When Tom came to Sandia in 1967, Glenn was his first VP.

"Glenn made a huge impression on all of us who worked with him. I don't know anyone, not a single person, who spent any time with Glenn who was not impressed with his style and leadership. What made it so great — and so inspiring — to work with Glenn is that he was never a 'me' person. Whenever he talked about his very substantial accomplishments, it was never about him personally. It was always about the team.

"The first generation of Sandia leaders was extraordinarily accomplished and many made a lasting impression on the Labs. I don't think it's too much to say, though, that Glenn may be the man who, more than any other, made Sandia what it is today."

Longtime friend and colleague Jim Rea recalls Glenn as a leader who inspired his team to reach higher and accomplish more, often under incredibly demanding circumstances.

"Glenn was very proud of each of these early assignments and their contributions to our national security," Jim says. "He spoke proudly and often of the people who had worked in his various organizations while at Sandia, considering them the best and the brightest, and had the highest regard for the principles of teamwork.

"Glenn treasured the members of his teams and their ability to work together, and never forgot anyone. He had a real gift of being able to define a complex problem in its



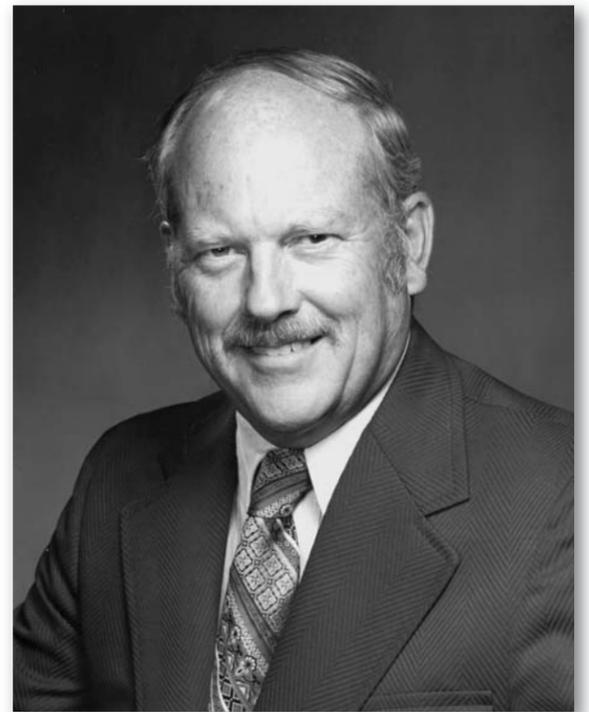
THE EARLY YEARS — Glenn with his wife, Mary Alice, pose for this photo early in his career. Glenn came to Sandia Base in 1945 and became one of the first Sandia Corporation employees.

most basic terms, take the ideas of dozens of experts, help put these ideas together into a workable plan, and oversee the successful implementation of a solution."

Glenn will be remembered by all who knew him at Sandia for what became known as Fowler's Law: 'No matter what the rules say, don't do anything stupid.' He was honored in 2006 at a special ceremony and presented the plaque that now resides in the front lobby of Bldg. 800, which is often the first face of Sandia seen by visitors. The plaque prominently recites Fowler's Law and further states that "Glenn became the first head of Test Operations in 1945 while Sandia was still Z Division [part of what was then known as the Los Alamos

Scientific Laboratory]. He established the independent, capable culture of field testing and was instrumental in the selection of the Tonopah Test Range as Sandia's primary weapon test facility. Universally respected for his leadership and communication skills, he was influential in bringing basic scientific research to Sandia and the related promotion of advanced education for the technical staff. Under his guidance, Sandia leveraged these new abilities and diversified, taking on work in satellites, space nuclear power, sensors, advanced telemetry, and, eventually, nuclear security systems and energy programs."

After his retirement, Glenn was involved with the Boy Scouts at the Philmont Scout Ranch, where he contributed significantly to their records management processes and their written history. He built a cabin on Heron Lake and kept a sailboat there. His friends recall many windless days sitting on the boat on the lake with Glenn, recounting past events at Sandia and — most notably — the people who had contributed to them.



GLENN FOWLER later in his career at Sandia.

"Glenn was the father of field testing in 1947," says his friend Bill Myre. "He would go out in the field and mix right in with all the guys. He knew the first name of everyone in his organization. He really was your friend.

"He was a man's man who treasured the outdoors. He loved to go whitewater rafting in Colorado. He also liked to go kayaking. He was more organized than the rest of us. He could pack in a kayak everything he needed to live for a week."

Glenn was an accomplished pilot of both powered aircraft and soaring aircraft. He held the world altitude record for gliders for a number of years.

"He had this ability to do whatever he decided to do," says friend Bob Statler.

Bob, who worked with Glenn and was his friend, recalls another aspect of his leadership style.

"Glenn was a great listener, and preferred to hear what others had to say," Bob says. "In my opinion he was the biggest reason Sandia became the great company it is."

In a story written by Glenn for Sandia's 40th anniversary he says, "We worked around the clock to develop the first Strypi and help get the nation back on track in its nuclear testing program. We designed, built, and successfully fired Strypi in less than two months. Each of us had a deadline and, if meeting that deadline meant working 16- to 18- hour days, that's what we did.

"I don't know of anyone else ever doing that. We did three test launches of the rocket to verify the whole system's integrity. Then, on command from the task force, we fired the system with a Los Alamos device about 100 miles above the earth and detonated it on schedule."

"Mere mortals do not compare to him", says Jim.

— Iris Aboytes



FOUNDER'S AWARD — Glenn Fowler receives the Founder's Award from Sandia President and Labs Director Tom Hunter during a ceremony held at Sandia on March 16, 2006. The plaque honoring Glenn now hangs in the lobby of Bldg. 800. (Photo by Randy Montoya)

Fowler's Law: 'No matter what the rules say, don't do anything stupid.'

— Sandia pioneer Glenn Fowler

Glenn Fowler on the famous — at Sandia, anyway — law that bears his name

Those who worked directly with Glenn Fowler remember him as an extraordinary leader, one who played a key role in shaping the Sandia we know today. Others at the Labs know him, perhaps, only through Fowler's Law: "No matter what the rules say, don't do anything stupid."

About the time Glenn retired in 1983, he sat down and talked with historian Necah Stewart Furman, author of *Sandia National Laboratories: The Postwar Decades* (published in 1990 by the University of New Mexico Press).

Furman, of course, had to ask Glenn about that law. Here's what Glenn said:

"What I was trying to do with this statement — once people got over chuckling about it — was to say . . . you can write the rules for the average situation, but you can't write them for every possible situation. And yet, I've seen people say, 'Well, this doesn't make sense to me, but I'll go ahead and do it, because that's what the rules say.'

"What I was trying to say was, 'Don't do that — and particularly don't do that in a field test job. Question it. Don't do it if you don't think it ought to be done.'

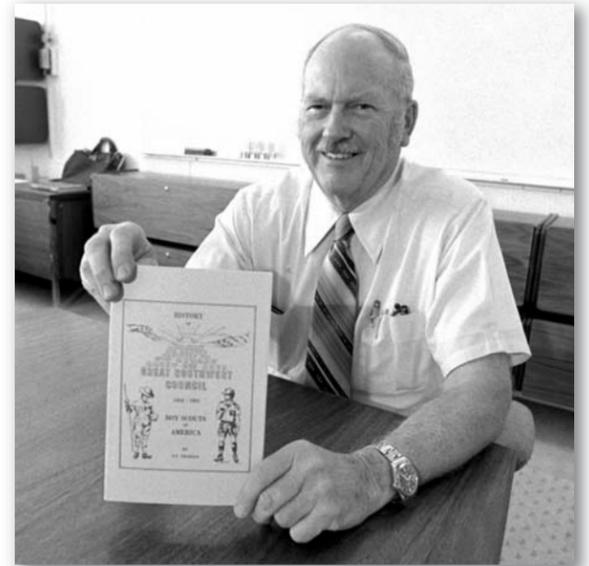
"It's not a license to do anything you want; not by any means. It's just a license to use your head and do what makes good sense . . . What I was trying to say was, 'Use your head and if you're right, I'll back you up. . . .'"



ON THE BRINY — As director of field testing, Glenn and his team opened Salton Sea Test Range in southern California. The range was intended to help researchers learn how weapon drops would be affected by the denser air at lower altitudes. Here members of the team chug across the Salton Sea on the *SS Fowler*, named after their popular boss, Glenn Fowler.



NUCLEAR TESTING — This photo of field test managers and visitors that came from a Nevada test site scrap book page dated April 1976. Glenn is center front in quilted ski jacket.



A GOOD SCOUT — Years of extracurricular effort have gone into Glenn's work with the Boy Scouts. Here he shows off the new *History of the Great Southwest Council*, a book he edited (and keyed into his home word processor) between 5 and 6 each morning for several months. The photo above appeared in the *Lab News* 6/12/1983 upon Glenn's retirement.

The Trinity test

Here's Glenn's own account of his role in the test of the Trinity Device in July 1945:

"I was in one of the two observation/instrumentation aircraft for the Trinity Shot. We hit some terrific thunderstorm activity so we had to drop down from our assigned 23,000 feet to 18,000 or so and simply circle the site. I was sitting in the navigator's seat just behind the pilot, and since he naturally circled to the left, I had a front-row view of the shot.

"It created the biggest fireball that had ever existed till then. And I remember thinking — it sounds corny now, I guess — 'Here's the start of a new era. We're releasing large amounts of energy in a way that's never been done before.'"



UJELANG ATOLL — Sandia President James McRae, Glenn Fowler, Richard Bice, and Everett Cox stand by the Sandia Corporation tent on Ujelang Atoll for the Operation Redwing tests, May 1956.

On radar and Oppenheimer

When Glenn Fowler got out of school in 1941, he jumped pretty quickly into war work, signing on with the Radiation Laboratory at the Massachusetts Institute of Technology. While there, he was the hands-on developer of one of the first working models of a short-wavelength radar. Built around a British invention, the magnetron tube, the device was perhaps the best-known example of "reverse lend-lease," where the US gained a major technical boost based on a British technology. During a transatlantic training/test flight with the new device, Glenn got his first view of the Irish and English coasts on the radar screen. Ultimately, the device proved so useful and effective that it was developed into a commercial model that was used by US forces throughout the remainder of World War II.

By early 1945, Glenn was assigned from a Pentagon job to the Manhattan Project. He recalled his first interaction with legendary project director Robert Oppenheimer.

"About two or three weeks after my arrival, I needed to talk to Oppenheimer about something. So I called his office and arranged with his secretary for an appointment. Maybe an hour later, he [Oppenheimer] just walked into my office and said, 'I hear you want to talk with me.' Quite a change from the Pentagon!"

Technology Ventures Corp. connects inventors and investors to commercialize ideas

By Heather Clark

J.B. Tuttle had 10 minutes to convince investors attending a recent Technology Ventures Corporation (TVC) symposium in Albuquerque that an "electronic sniffer" known as the MicroHound™ developed at Sandia in the mid-1990s is worth the financial risk to bring to the marketplace.

The CEO of Microtection LLC stood before two giant screens showing the company's revenue projections and other graphics at the Equity Capital Symposium, explaining how the device could detect minute traces of explosives, narcotics, or accelerants used in arson.

"The advancements developed by Sandia have enhanced these capabilities by three orders of magnitude or 1,000 times greater than anything offered on the market right now," Tuttle told the audience of hundreds.

Field tests comparing MicroHound with similar systems found that a current model placed in the trunk of a car with several hundred pounds of explosives failed to detect them after several hours, he said. "Once the trunk was opened, this technology found it in a matter of seconds," Tuttle said.

Tuttle is seeking \$1.4 million over three years to market MicroHound to airports, customs and border patrol, the insurance industry, and international ports to use for cargo screening. By 2015, Microtection hopes to earn an estimated \$57.8 million.

A few weeks after the presentation, Tuttle says he's "hopeful" that an investor will take an interest in the company. He says the advice and mentoring he and his business received from TVC improved his presentation and business plan.

"I don't think it would have been of the caliber that it was," he says.

It's companies like Microtection and devices like the MicroHound that TVC wants to help.

Sherman McCorkle, a former banker who has been the president and CEO of TVC since its inception in 1993, says the Lockheed Martin Corp. nonprofit charitable foundation serves as an intermediary between the inventors of technology seeking equity capital to commercialize their ideas and private equity investors.

"We provide innovators — that would be somebody in the laboratory — with expertise in the formulation of a business case," McCorkle says. "At the same time, we're working the other side of the street to provide investors with guidance on the identification and the opportunity for high-growth investment opportunities."

Lockheed Martin created TVC as part of its bid to operate Sandia. The idea was to create jobs and to work with entrepreneurial startups based in New Mexico.

After 17 years, TVC has created 12,700 jobs, helped launch 105 companies and brought entrepreneurs \$1.08 billion in equity investment. In 2002, DOE awarded TVC a contract to work with additional DOE laboratories, such as Idaho, Argonne, Brookhaven, Oak Ridge, and Savannah River national laboratories.

Because TVC picks high-quality companies, it has a good record when it comes to the longevity of the companies it helps and a good reputation among investors. Seventy percent of the startups that worked with TVC are still in business after five years, McCorkle says.

McCorkle hopes more Sandians will participate in TVC. He thinks the return of Sandia's Entrepreneurial Separation to Transfer Technology (ESTT) program after a short hiatus and the start of Center for Commercialization and Entrepreneurial Training (CCET) courses (see box) that teach aspiring entrepreneurs how to start and develop technology companies will bring out the entrepreneurial spirit at Sandia.

"The average attendance of Sandians at CCET courses bodes very well for 2011," McCorkle says.

Sandians have been successful working with TVC in the past. One such company, formerly known as WaveFront Sciences Inc., emerged from the work of ex-Sandian

Dan Neal, who used a Shack-Hartmann wavefront sensor on high-energy laser applications at the Labs, but left Sandia under the ESTT program to commercialize the sensor, which measures optical quality.

Though taking the step to leave Sandia was difficult, Neal says once he made the decision, he never looked back.

"One thing I realized is I enjoy interacting with customers and finding out what their problems are and getting paid for being innovative to solve them," he says.

Tim Turner, Neal's business partner, says they worked for a couple years to figure out the best market for the sensor until Neal suggested anyone with a laser might be interested and a company was born.

"We took advantage of every program we could find to make this happen," Turner says.

At TVC, companies like WaveFront can get their technology evaluated to determine its potential for commercialization. TVC selects technologies that the market demands and helps companies assess the market, prepare business plans, assess potential investments, and

identify entrepreneurs, McCorkle says. TVC also provides innovators with people experienced in making a business case, long-term mentors, professional advisers, and educational seminars.

WaveFront appeared in its first TVC symposium in May 1996. Less than four months later, Turner and Neal received the funding they needed and the company opened its doors.

"Having a forum where you can come together and present to 50 to 100 investors at one shot is huge," Turner says. "We were very fortunate."

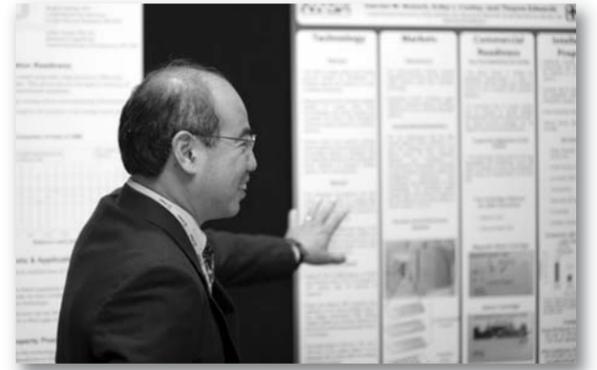
That's not to mean it wasn't difficult. Some weeks, the company was concerned about making payroll, Turner says.

As it turned out, the sensor was good for measuring the human eyeball and hit the marketplace just as lasik surgery was becoming more common. In 2007, the company was purchased by Advanced Medical Optics, which was acquired by Abbott Laboratories two years later. WaveFront is now part of Abbott Medical Optics division and its 45 employees continue their work in Albuquerque, says Turner, now director of research and development.

The Intellectual Property Management, Alliances and Licensing Department is sponsoring Center for Commercialization and Entrepreneurial Training (CCET) classes right now to foster the entrepreneurial spirit in Sandians who are interested in learning how to commercialize their ideas and technology. The remaining summer session dates are: July 8, July 22, July 29, Aug. 5 and Aug. 12. The classes will be held in 858EL/L1410 from 11:30 a.m.-1 p.m.



THE INTELLECTUAL PROPERTY MANAGEMENT, Alliances and Licensing Department sponsored a daylong tour for investors to several Sandia facilities, including the Thermal Test Complex, just ahead of Technology Ventures Corporation's recent Equity Capital Symposium. (Photo by Randy Montoya)



HY TRAN, an engineer at Sandia, participates in an evening poster session for investors to get a look at the latest technology at the recent Equity Capital Symposium sponsored by Technology Ventures Corporation in Albuquerque. Hy explains to guests that his low-cost device can increase the accuracy of machine vision systems, which use vision to measure the dimensions of mechanical parts. (Photo courtesy of TVC)

Best of all, Neal says, a million people can see better today because of their work.

Another part of TVC's mission is to promote economic development in New Mexico. McCorkle says such technology jobs pay two to three times the local average wage. Among the companies that presented at the symposium this year were nine from Albuquerque, three from Santa Fe, and one from Roswell.

New Mexico Economic Development Secretary Fred Mondragon attended the symposium and thanked McCorkle for TVC's economic development efforts.

"The success of TVC is just legendary throughout the country," Mondragon said. "His work in helping bring venture capital to our state is leading New Mexico in job creation and economic growth."

McCorkle says when TVC started in 1993 there were no venture capital firms in the state.

"Everyone called New Mexico a flyover state because all they ever did was fly over us," McCorkle says. Now, New Mexico has about 20 equity investment offices, he says.

McCorkle says getting all the stakeholders to work together is what makes for good business deals.

"If the innovator's happy, the investor's happy, Sandia's happy, and DOE's happy," he says, "what a good world it is."

Leslie Phinney named ASME Fellow

Leslie Phinney, a principal member of the technical staff in Microscale Science & Technology Dept. 1513, has been named a fellow of ASME, the preeminent professional organization for mechanical engineers. She came to Sandia in 2003 after serving as a member of the Mechanical and Industrial Engineering Department faculty at the University of Illinois at Urbana-Champaign from 1997 until 2003.

Leslie is noted for her contributions in research and development, particularly in the understanding of thermal phenomena in microelectromechanical systems (MEMS), her leadership in the engineering profession, and education.

Leslie received her training at the University of Texas at Austin, University of Cambridge, and University of California, Berkeley, where she received a doctorate in mechanical engineering in 1997.

To date, Leslie has coauthored 34 peer-reviewed

journal articles and 44 papers presented at national and international conferences. She has given more than 40 invited seminars, tutorials, and presentations at universities, national laboratories, companies, and technical meetings. In addition to her longstanding work with ASME in a variety of increasingly responsible roles, Leslie has served on the Program Committee for three Reliability, Testing, and Characterization of MEMS/MOEMS conferences sponsored by SPIE, the International Society for Optical Engineering. With her strong interest in issues affecting women in science, technology, engineering, and mathematics, Leslie volunteers for SWAN (Sandia Women's Action Network). She also is active in the Junior League of Albuquerque, the Society of Women Engineers-Central New Mexico section, the Albuquerque Rose Society, and the New Mexico Engineering Foundation.

The American Society of Mechanical Engineers (ASME) is a not-for-profit professional organization promoting the art, science, and practice of mechanical and multidisciplinary engineering and allied sciences. ASME develops codes and standards that enhance public safety, and provides lifelong learning and technical exchange opportunities benefiting the engineering and technology community.



LESLIE PHINNEY

Helping hand: Sandia's economic and community impact more than \$910 million in fiscal year 2009

Story by Heather Clark

From oscilloscopes to safety goggles, paper clips to general contractors, Sandia National Laboratories bought nearly \$911 million worth of goods and services in fiscal year 2009. Of that, about \$358 million, or 39 percent, was paid to New Mexico businesses.

Economic experts say the Labs' indirect economic footprint in its home state could be as much as three times what Sandia spends on purchases and salaries, says Don Devoti, manager of the Small Business Utilization Dept. 10222. The department has produced a brochure, "Sandia National Laboratories Economic Impact on the State of New Mexico," outlining the Labs' spending and programs in fiscal year 2009.

"Sandia's goal is to share information with the local community and businesses to help them understand the economic impact we have made, and more importantly to allow those who would like to supply products or services to Sandia to understand what it takes for them to become a laboratory supplier," says Carol Yarnall, director of the Supply Chain Management Center 10200.

Here are the numbers that convey the breadth of Sandia's overall economic impact:

- \$1.2 billion was spent on labor and non-contract-related payments.
- \$910.5 million was spent for contract-related payments.
- \$62.7 million was spent using procurement card purchases. These represented about 83,000 transactions made by Sandia employees, according to data collected by Sandia's Supply Chain Management Center.
- \$61.6 million was paid in state corporate taxes.
- \$490.4 million was paid to small businesses.

Forty-five percent of Sandia's purchases are services, followed by products (26 percent), construction (26 percent), integrated contractor orders (2 percent) and consultants (1 percent), according to Supply Chain Management data.

Not only did the Labs benefit the economy, but Sandia's Supply Chain team also made sure taxpayers got their money's worth. The center's budget was about \$11 million, but the team saved the Labs \$60 million through negotiated savings, Carol says.

"We had more than five times the savings for what we cost," she says.

A number of the companies that Sandia does business with are located in the Sandia Science & Technology Park adjacent to the Labs, a partnership among the Labs, Technology Ventures Corporation, the City of Albuquerque, Albuquerque Public Schools, the New Mexico State Land Office, and BUILD New Mexico/Union Development Corporation.

The 30 organizations located in the park employed about 1,900 people as of October 2009. According to the Mid-Region Council of Governments, the average wage in the park was \$70,400 compared to an average citywide wage of \$37,300.



IMPACT — A new brochure detailing Sandia's economic impact on the state of New Mexico is available for download as a PDF file at <http://tiny.sandia.gov/fd5ym>.

In fiscal year 2009, Sandia employed about 7,900 people at its New Mexico site. According to the brochure, 577 employees were hired in fiscal year 2009 and more than half of those graduated from New Mexico universities.

The brochure also cites Technology Ventures Corporation's (TVC) contributions to the local economy. TVC is funded by Lockheed Martin and DOE and has brought together Sandia's researchers and investors to build companies and create jobs since 1993. In fiscal year 2009, TVC obtained \$53 million in private sector equity funding, the brochure states.

Since its inception, TVC has obtained more than \$1

billion in equity investment and created more than 12,600 jobs by identifying technologies with commer-

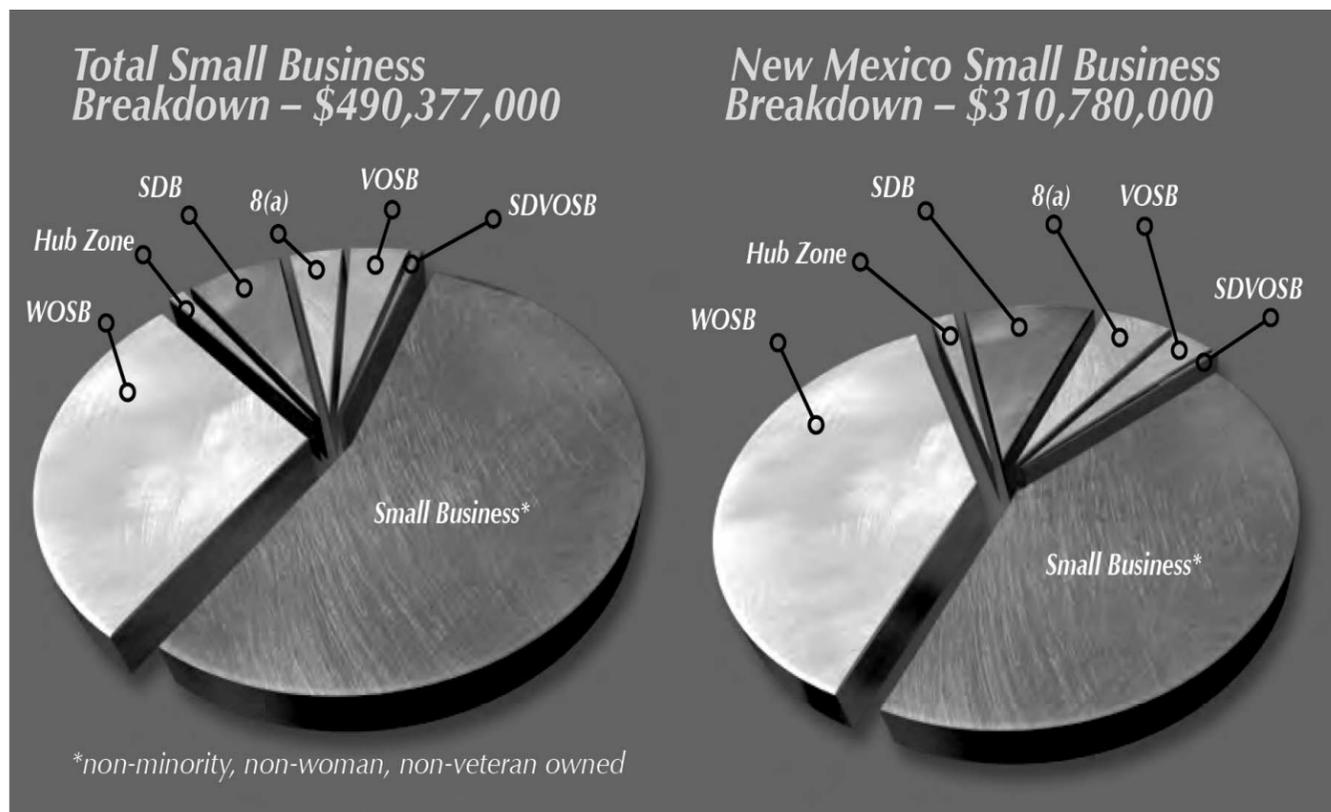


cial potential, helping develop business capabilities and seeking sources of capital investment, says Sherman McCorkle, TVC's longtime president and CEO.

In 2009, Sandia was the largest corporate contributor to the United Way of Central New Mexico, giving more than \$3.7 million. Lockheed Martin, on behalf of Sandia, gave \$1.4 million to nonprofit organizations in New Mexico, the brochure says.

But Sandians didn't limit themselves to financial contributions. They typically give more than 2,000 books, 23,000 school supplies, 63,000 pounds of food, 435 holiday gifts, and 500 pairs of new shoes each year, the brochure and Community Involvement statistics show.

Sandians also have an impact on education each school year. The Labs has provided bilingual Family Science Nights to more than 4,000 elementary school children and their families. Sandians have tried to encourage more than 500 under-represented youths to consider science, technology, engineering, or math careers through the Manos, Dream Catchers, and HMTech programs. The Labs has helped more than 2,000 8th and 9th graders explore career choices at the School to World event and supported professional development for math and science teachers, the brochure says.



Mileposts

New Mexico photos by Michelle Fleming



Paul McKay
40 5936



Billie Weatherly
35 12410



Fran Nimick
30 4140



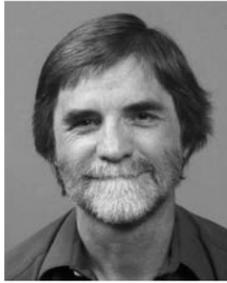
Manny Ontiveros
30 9513



Raymond Sanchez
30 12321



Paul Eichel
25 5937



Donald Potter
25 1515



Dana Striker
25 9343



Mark Vaughn
25 6361



Brenda Wickham
25 2733



David Corbett
20 200



Mark Johnson
20 1128



Theresa Macias-Torres
20 4824



Vicki Porter
20 1542



Timothy Scofield
20 2622



Melissa Sisneros
20 6385



Sheryl Vahle
20 10616



Mark Stevens
15 1814

Recent Retirees



Mark Schaefer
35 6485



William Hossley
21 10653



Josephine Graham
19 8622

Feedback

Questions focus on new PeopleSoft implementation

Q: When will all the external postings be visible again on the external careers website?

A: Job postings on the external careers website are occurring as this response is written. Managers are completing new job postings and the staffing partners are working with the management team to disposition all job postings that were open prior to the PeopleSoft conversion. As managers request that jobs be reopened externally, they will be posted as quickly as possible. Jessica Pascual, 3510

Q: Under the Job/Careers tool listed on the home page, there used to be the option to view the filled postings. Will that be available again? That information was helpful in supporting the center.

A: The continued use of this function is under review. The new PeopleSoft 9.0 system allows a system-generated message to notify all bidders of an action (e.g., position filled, cancelled, etc). With this system communication in place, the communication of a job being filled and the successful candidate should be an action for the hiring organization. The organizational communication ensures that proper notification to the team is completed. Promotion actions (e.g., into management) should follow this same process.

Q: Re: the PeopleSoft upgrade and timesheets, can the Administrator of Record automatically see and review timesheets for all employees assigned to them, or must the manager give permissions?

A: If the manager has assigned the individual as the Administrator of Record (AOR) for the organization, then the individual will be able to see and review timesheets for that organization. Jessica Pascual, 3010

Q: Will the description field, where each individual could enter his or her own text description for each Project/Task, continue to be available for time cards in PeopleSoft v9.0?

A: Individuals are not allowed to enter their own text description for each project and task and were not able to do so in the previous system (ETK) either. The project and task that the employee enters is flowing directly from Oracle Financials and is not configurable for any other options in the new timekeeping system. There is a drop-down menu in the new system where allowable project and task data is viewable, but no description for them is identified through the Oracle Financials into the timekeeping module. For further questions or concerns regarding this question, please contact the payroll help line at 844-2848.

Labs, Sandia Site Office pen new PEP agreement



PEP SIGNING — On Friday, June 25, Tom Hunter and Al Romig, along with NNSA Sandia Site Office Manager Patty Wagner and Deputy Manager Kim Davis, signed a new Laboratory Performance Evaluation Plan (PEP) for the remainder of FY2010. The PEP represents the negotiated criteria against which the NNSA assesses the performance of the Laboratories in the Mission, Operational, and Business areas. The new PEP promotes a more constructive partnership between Sandia and the federal government and is part of a broader joint SSO/Sandia Governance and Oversight Reform Initiative. Incoming Labs Director Paul Hommert also attended the signing to demonstrate full support during the transition in Sandia leadership. The new PEP is being piloted in the fourth quarter of FY2010 and is the basis against which the FY2011 PEP is being developed. (Photo by Lloyd Wilson)



I met Mary Tallouzi through emails that she sent to her friends during her son Daniel's battle with combat-related injuries. I was one of the lucky ones to meet Daniel while he was in a coma. According to his uncle Mario Aguirre, Staff Sgt. Tallouzi was just going to bed at Camp Taji when the mortar blast hit. "They cut his skull out and let his brain swell," Aguirre told KRQE News 13. "That was the big problem. He had picked up a piece of shrapnel that went into his head."

*I asked Mary if she could share with us what the flag that draped his coffin meant to her. These are her words.
— Iris Aboytes*

The American flag

Do you remember how proud we were in elementary school to stand by our desk, place our hand on our heart, and recite the Pledge of Allegiance while facing the American flag in our school room? Do you remember how proud we were to be Americans?

I remember as a little girl, at the age of six, knowing that my brothers would be leaving home as volunteers in the military. I remember how proud I was to see them in uniform but didn't realize the danger they would face in serving our nation during the Vietnam War. They would each serve three tours in Vietnam and each retire from the military after 20-plus years of service.

Now, at the age of 55, I reflect, as I watched my own two sons volunteer to serve our nation in one of our current conflicts, Iraq. My oldest would take his tour of duty in 2004 (on special assignment, dressed as a Kurd and crossing checkpoints) while my youngest

son would deploy the following year (a helicopter electrician on the Apache). Back-to-back they served our nation, but only the oldest would return without obvious injury. They wore the flag patch on the chest of their Kevlar or sleeve of their camouflage uniform. They wore the insignias of their brigade/command. They were so proud to be Americans and dedicated to serve their country. They each knew they could make a difference in this foreign land.

Two and a half years after his injury, my youngest son would be laid to rest, his casket draped by the American flag to honor his death. That flag told the story of the man inside. Here lies a hero, my son, your brother, your friend, who gave his life for you. Here lies dignity and character and pride in who he was.

The flag commanded the respect, represented the honor due, and reminded us, as a nation, of the sacrifice given.

Let's honor him, those before

him, and those to follow him, who sacrifice their lives so that we may have freedom and live in peace.

Mary Tallouzi
Proud mother of
Staff Sgt. Daniel E. Tallouzi



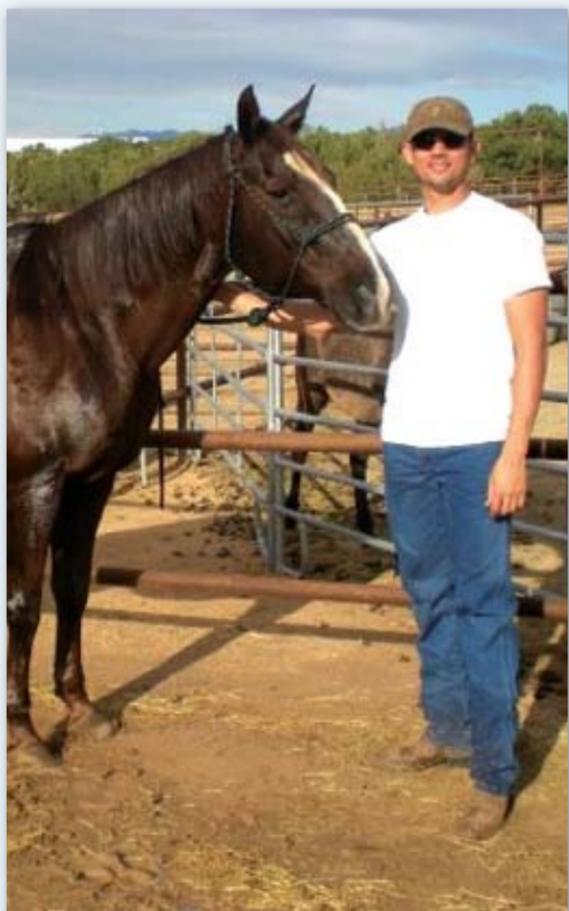
Mary found joy in wrapping her arms around 6-foot-4-inch Daniel.

Rick Iannucci becomes a hero to America's military heroes

By Iris Aboytes

At its second annual Real Heroes Award Breakfast recently, the American Red Cross honored Santa Fe rancher Rick Iannucci as its military hero. Iannucci has established a program called Horses for Heroes – Cowboy UP! at his Crossed Arrows Ranch in Santa Fe County.

Lockheed Martin/Sandia Labs was one of the event sponsors. "It was very humbling to be a part of such a great celebration," says Pam Catanach from Sandia's Community Involvement Department.



A YOUNG PARTICIPANT donates his horse to the program while he goes to medical school.

"I founded Horses for Heroes — Cowboy UP! after Christina Savitsky, manager of the Pecos Bar X Ranch, told me of a 2007 program out of Walter Reed Army Medical Center where US Army soldiers conduct therapeutic horseback riding for some of the returning disabled soldiers," says Iannucci. "The program is intended to help veterans cope with the stress of integrating back into civilian life. Participants learn to care for, train, and ride horses. They work with cattle and experience the camaraderie of working with other veterans and ranchers."

The horse therapy program is free to veterans of US military operations in Iraq and Afghanistan as well as to active military members who have sustained physical injuries or combat trauma (PTSD).

Iannucci is a former US Army Special Forces soldier who was an explosives and demolitions engineer. After his release from the Army, he became a US marshal. He participated in law enforcement operations both overseas and in the US. His last three years were spent as head of a Special Missions unit in Colombia.

His wife Mary lost her battle with cancer in 2004 and Iannucci retired in New Mexico, where he had been a resident when he served here as a US marshal. With his nine-year old daughter, Cris, they purchased ranch land in the Lone Butte area of Santa Fe County and he returned to his lifelong passion of raising and training American quarter horses and cattle ranching.

"I built a professional arena and horse facility on our ranch where we keep upwards of a half dozen horses in various stages of training," says Iannucci. "My daughter, Cris, my fiancée Nancy, and I do all of the work on the ranch. In the spring we help our rancher neighbors with their spring branding and rounding up cattle in the fall. We also serve as a location and wrangle horses for some films, commercials, and recently the History Channel series *Cowboys and Outlaws — the True Story of Wyatt Earp*.

Veterans participating in the program usually come



COWBOY UP! — Rick, Cris, and his fiancée Nancy contemplate the day's activities.

and work with them a day or two at a time. Iannucci is in the process of raising funds to build additional corals and a bunkhouse where vets can stay no matter what part of New Mexico they travel from.

Savitsky is the training director. She has been a certified Therapeutic Riding Instructor for 15 years.

"We take regular people, send them to Iraq and Afghanistan, and train them how to fight," says Iannucci. "Then we bring them home and expect them to turn it off and reintegrate automatically. It's not happening. We need to do more and this is one way that I have found that works."

Iannucci funds the program out of his pension. In the past year he has set up as a non profit 501(c)(3) organization. "Now we hope folks will be more apt to help," he says.

"One of our early participants suffered from post-traumatic stress disorder (PTSD). He embraced ranch life and the cowboy culture. He has just purchased his second horse and donated his first horse to our program. It was his way of giving back, especially since he is attending medical school. We are blessed to know that we make a difference in veterans' lives. Horses for Heroes — Cowboy UP! is endorsed by and partnered with the Military Order of the Purple Heart NM and the New Mexico Cattle Growers Association, whose member ranches serve as our program partners throughout the state.