

Defense Secretary Chuck Hagel visits Labs

Impressed by Sandia's technical know-how, dedicated people

By Sue Major Holmes

Secretary of Defense Chuck Hagel was impressed by what he saw in a recent 90-minute visit to Sandia — impressed not only by the Laboratories' technical capabilities but also by the talent of the people who work here.

"I was impressed with the kind of people I met today, what they're doing, how they're doing it, the commitment that they have made to this country and to the future of the country," Hagel told members of the national press corps who traveled with him on Jan. 8 to Sandia and the Air Force Materiel Command's Nuclear Weapons Center at Kirtland Air Force Base. "And they do it . . . because they understand the privilege of helping make this a better world."

He said he wanted to look at Sandia's work in nuclear weapons modernization and research and

(Continued on page 5)



Z FACILITY TOUR — Secretary of Defense Chuck Hagel, right, pauses outside Sandia's Z Pulsed Power Facility during a Jan. 8 tour. With Hagel are, left to right, Donald Cook, deputy administrator for Defense Programs at NNSA; Madelyn Creedon, assistant secretary for Global Strategic Affairs; VP and Chief Technology Officer Julia Phillips; VP of Science and Technology Div. 1000 Duane Dimos; Geoffrey Beausoleil, manager of the NNSA Sandia Field Office, and Sandia President and Labs director Paul Hommert. (Photo by Randy Montoya)

Remembering Tom Cook



Longest-serving California site VP passes away at home at age 87. Tom provided Sandia with 35 years of distinguished service, beginning in 1951 when at age 24 he was the youngest PhD on staff. He wrapped up his career as Executive VP, a role he filled from 1981 until his retirement in 1986. See page 4.

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USSTRATCOM commander spends day being briefed on Sandia's NW mission



STRATCOM TOUR — Sandia President and Labs Director Paul Hommert, left, discusses the work of the Microsystems and Engineering Sciences Application (MESA) facility during a Jan. 10 tour for Adm. Cecil Haney, right, commander of US Strategic Command. Among the others on the tour were VP of Science and Technology Div. 1000 Duane Dimos, center; Executive VP and Deputy Director for National Security Programs Jerry McDowell, behind Haney; and Wahid Hermina (1710), senior manager for microsystems research, development, and application/integration, far right. (Photo by Randy Montoya)

By Sue Major Holmes

The commander of US Strategic Command (USSTRATCOM) says he has wanted to come to Sandia for years to see firsthand the Labs' nuclear weapons program work and "to connect the dots between the missions, where we are today with the capability, and where we have to be tomorrow."

Adm. Cecil Haney spent all day Jan. 10 touring Sandia, hosted by Sandia President and Labs Director Paul Hommert and Executive VP and Deputy Director for National Security Programs Jerry McDowell. Paul presented an overview of Sandia's work and briefed the admiral on the Labs' nuclear weapons mission. Haney also toured Sandia's nuclear weapons display area, heard about its work on weapon modernization programs and the advanced hypersonic weapon, participated in discussions about the

(Continued on page 4)

Sandians honored by White House for early career achievements

By Stephanie Hobby & Heather Clark

Sandia researchers Matthew Brake (1526), Adrian Chavez (5629), Seth Root (1646), and Daniel Stick (1725) have been named by President Barack Obama as recipients of the Presidential Early Career Award for Scientists and Engineers (PECASE). The PECASE Award is

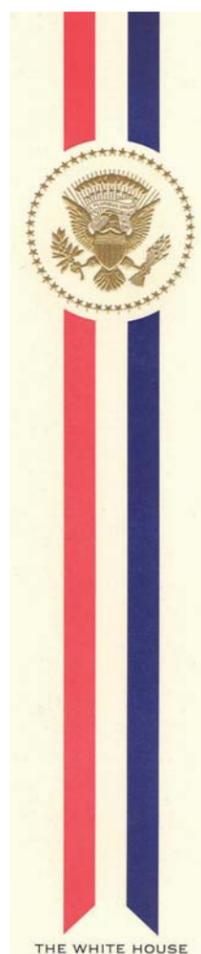
"We are grateful for their commitment to generating the scientific and technical advancements that will ensure America's global leadership for many years to come."

— President Barack Obama announcing the 2014 PECASE recipients

the highest honor bestowed by the US government on outstanding scientists and engineers who are beginning their independent careers.

The four Sandians are among 102 researchers nationwide to receive the honor, and Sandia is tied with Princeton for the most PECASE recipients this year. All recipients were either funded by or employed by 13 federal agencies, including DOE. Winners will be

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That's that

The email went down yesterday in IPOC. So did the web. Access to the network. Down. All down. Something to do with a bad component. A preemptive five-minute shutdown, a quick replacement of the part, and we'd all be up and running again. Easy peasy. Not.

This isn't to blame the hard-working network ops team charged with keeping us connected to the cloud. To the contrary, they sweated this one out, worked the problem, and 16 hours later, had us back online. To paraphrase a quote attributed to George Orwell, those of us affected by the outage were able to sleep peaceably in our beds that night only because others stood ready to do whatever it took to fix the problem.

So again, and emphatically, no blame redounds to the network team for thinking this would be an easier fix than it turned out to be. That's life; how many times have you started a little home improvement project, like tightening the screws on the screen door, only to end up replacing the entire door frame? Hey, it happens.

Our computer network folks are heroes as far as I'm concerned, and heroes we too often take for granted. There's probably nothing in this world so complicated as a computer network. In their intricacy and elegance, they're almost like the cathedrals of our age, a bringing together, in one construct, of everything we've learned. I'm grateful to these folks, our own team of St. Georges, who take on the dragons out there.

* * *

The thing that strikes me about these network episodes – and here at Sandia they are relatively few and far between – is their reminder of how utterly dependent we are on these tools. It's hardly an original insight, but the fact is, the tools we rely on every day hardly existed when I joined the Labs 19 years ago and existed only in the minds of science fiction writers when we were helping the nation win the Cold War. Don't you wonder, sometimes, how they did it, those pre-computer Sandians? I do. I'm in awe of them, actually.

We're back on line as I write this, so I better reality-check my memory about that Orwell quote I cited above. How in the world would I have done that back in the day? But then again, would you, as the reader, have known the difference? To paraphrase TV detective Adrian Monk: The Internet – it's a blessing. And a curse.

* * *

If there were ever any doubts about the importance of the work we do here, a couple of high-level visits we enjoyed earlier this month should dispel them. Secretary of Defense Chuck Hagel and USSTRATCOM commander Admiral Cecil Haney came to the Labs in separate visits to get briefed on our nuclear weapons mission work and other work we're doing for the nation. These men, both of whom carry huge responsibilities for America's security, don't just pop in at any old workplace. They don't have time for that. The fact that they chose to spend some time with us speaks to the gravity of our mission. That they both went away impressed is gratifying; that they both had some very positive things to say about us is both welcomed and appreciated.

Speaking of nice words, the most telling, pointed, challenging, and inspiring comment I've heard about Sandia in a long time came from another visitor, NNSA Deputy Administrator Don Cook, who in an earlier career headed up some of the most significant programs at Sandia.

Cook, who accompanied Secretary Hagel on this recent visit, spoke at Sandia several months ago about the Labs' central role in ensuring the safety, security, and reliability of the nation's nuclear stockpile. "In aggregate, these technical challenges [of keeping the stockpile viable] exceed anything the Labs has been called upon to do in the past 20 years," Cook said at the time. He noted that while Lawrence Livermore and Los Alamos national laboratories each touch part of separate systems in the stockpile, Sandia is responsible for the nonnuclear systems in all the warheads in the stockpile.

"If Sandia fails," Cook said, "the deterrent fails."

Think about that. That's why what we do here is more than "work." It's more than a job. It's a mission. I'd even say it's a calling.

– Bill Murphy (505-845-0845, MS0148, wtmurph@sandia.gov)

Rick Fellerhoff named chief operating officer of NW SMU

NW systems engineering work undergoes restructure

By Sue Major Holmes

Rick Fellerhoff is the new director of Nuclear Weapons Planning, Operations, and Integration Center 200 and chief operating officer of the NW Strategic Management Unit (SMU), replacing Larry Walker, who retired after more than 36 years with Sandia.

The change took effect Jan. 2. Rick has worked in the NW program for the past 15 years — half of his career at Sandia. He had component development responsibilities in Centers 5300 and 2600 during the develop-



RICK FELLERHOFF

ment of the W76-1, served in the NWSMU as weapon science and technology and Div. 1000 deputy, and was a technical adviser on assignment to NNSA. For the past several years, he directed Surety Assessment, Engineering, and Analysis Center 400.

Rick also has served as US chairman for the US/UK Joint Working Group JOWOG 44 - Safety Assurance, with participants from Los Alamos and Lawrence Livermore national laboratories, the Pantex Plant, and the UK's Atomic Weapons Establishment and Ministry of Defence. Rick has a BS and MS in electrical engineering, both from the University of New Mexico.

In another personnel move, Gerry Sleafie was named to lead Group 250, the National Security Executive Office, effective Jan. 10.

Most recently, Gerry served as a Congressional Fellow, advising the House Committee on Homeland Security on issues related to national security, science and technology, and weapons of mass destruction. Before the Washington assignment, he served as acting deputy chief engineer for Nuclear Weapons and as the senior technical deputy for Div. 2000. He has been with Sandia for 27 years, and has held line organization leadership roles within Divisions 2000 and 6000 and programmatic leadership roles in the NW and DSA SMUs.

In addition, Bruce Walker, Div. 2000 VP for Weapons Engineering and Product Realization, announced that all legacy stockpile systems, use control systems, and advanced & exploratory (A&E) work at Sandia/New Mexico have moved from Weapon Systems Engineering Center 2100, led by Director Jim Handrock, to Stockpile Systems Center 2200, led by Deputy Chief Engineer Gary Sanders.

The NW systems engineering restructuring went into effect Dec. 20.

Sandia's work in Life Extension Programs (LEPs) and major alterations (ALTs) has grown substantially in the past few years, and the realignment will help balance the workload, Bruce says.

The restructuring puts all LEPs and major ALTs for New Mexico weapon systems under Center 2100 and all New Mexico stockpile systems, use control systems, and A&E under Center 2200. It aligns Center 2100 directly with NNSA/NA-19 and Center 2200 directly with NNSA/NA-12. California weapons system engineering was not affected by the restructuring.

accountable for their performance.

Nomination forms with detailed instructions are available from Sandia's internal web at <http://info.sandia.gov/era>. Each division has an ERA coordinator, also listed via the link above.

Any current, regular Sandia employee may nominate individuals or teams.

A separate nomination form must be submitted for each individual and team nomination. A combined total of 122 individuals and teams will receive corporate Employee Recognition Awards. Individual recipients and designated representatives for winning teams will be recognized at a Corporate Awards event Saturday, August 16, in Albuquerque.

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Employee Recognition Award nominations sought

The Employee Recognition Awards program honors individuals and teams whose work or contributions in support of

Sandia's mission and values have been exceptional. Nominations for the award will be accepted through February 4. The ERA program recognizes excellence in five categories, four for individual nominees and one for teams.

The individual categories are: technical excellence; exceptional service; leadership (which is also the category to acknowledge an individual for demonstrating exceptional people skills, etc.); and Sandia values, ethics and integrity, which recognizes employees who have exemplified Sandia's values and demonstrated the highest standards of integrity and ethical business conduct.

The team category recognizes teams whose exceptional achievements are critically enabled by teamwork and model the value of people working together toward a common goal, proactively looking for and acting upon opportunities to improve, while being fully



Retirement

Retiring and not seen in the *Lab News* pictures: Yvonne Batchelor (2992), 30 years.

Sandia adds rad detection scenario to Urban Shield Exercise

By Patti Koning

A nuclear device has been detonated in the Midwestern United States and intelligence indicates that a second device is coming into the San Francisco Bay Area. Federal assets, due to the urgency and lack of specific intelligence on the adversaries' transport route, cannot deploy adequate resources quickly enough. As a result, S.W.A.T. teams are requested to set up checkpoints throughout the Bay Area to covertly detect and interdict the threat, but how successful will they be in such an unusual, high-consequence scenario, using equipment they may never have trained on?

In late October, a Sandia team from Homeland Security and Defense Systems Center 8100 put 34 S.W.A.T. teams through this very scenario as part of the Alameda County Sheriff's Office (ACSO) 2013 Urban Shield exercise. Now in its seventh year, Urban Shield is the largest full-scale training exercise in the nation, bringing together more than 150 local, state, and federal agencies.

Over a 48-hour period, the S.W.A.T. teams participated in 32 tactical scenarios. Other first responders such as fire, Urban Search and Rescue (USAR), and hazmat teams participated in scenarios simulating hazardous materials, improvised explosive devices (IEDs), active shooter, natural disasters, and search and rescue incidents.



IN THE R/N DETECTION EXERCISE at Urban Shield 2013, S.W.A.T. teams engage with "adversaries" intended to distract them from the radiation source in a different vehicle. This scenario, which the Sandia team ran 34 times over a 48-hour period, evolved differently each time.

Sandia California News

Sandia's involvement in Urban Shield came about after Donna O'Connell (8118), Stacy Mui (8112), and Andrew Cox (8116) engaged law enforcement officials from ACSO and Washington State in developing case studies to characterize preventative radiological and nuclear (R/N) capabilities. "We wanted to do something for regional law enforcement agencies in return for the time they gave us in interviews to develop the case studies," says Donna. "We offered them an R/N awareness briefing by Gary Richter (8116) and assistance in developing an R/N scenario for Urban Shield."

With funding from the Department of Homeland Security Domestic Nuclear Detection Office (DNDO),

Sandia's role evolved from just developing the scenario to executing it as well. Donna and Stacy, along with Troy DeLano (8137) and Ann Hammer (8112), designed and ran the scenario. Numerous other Sandians and partners from LLNL and DNDO contributed to execution of the scenario.

DNDO is the primary entity in the US government for implementing domestic nuclear detection efforts for a managed and coordinated response to radiological and nuclear threats, as well as integration of federal nuclear forensics programs. Additionally, DNDO is charged with coordinating the development of the global nuclear detection and reporting architecture, with partners from federal, state, local, and international governments and the private sector.

Active radiation source adds realism

Early on, the team decided the scenario would

include an active radiation source and personal radiation detectors. "Using an active radiation source instead of a simulated source required a tremendous, coordinated effort," says Stacy. "This was the first Div. 8000 work level project to undergo the new engineered safety process. We wanted a successful exercise — successful not just in terms of execution, but also in safety and security."

The R/N detection scenario took place in a large airplane hangar at the Oakland Airport. The team set up a simulated checkpoint with eight vehicles, including a panel van housing the radiation source in a mockup of a nuclear weapon and immediately behind it in line a U-Haul truck that was not involved in the simulated nuclear weapon transport.

The S.W.A.T. teams had to locate the radiation source using personal radiation detectors as covertly as possible and contain the scene, which included a distraction from several cars behind the U-Haul truck. The S.W.A.T. teams did not know how many devices they were looking for or how many people were involved.

Each S.W.A.T. team underwent a pre-briefing on what they would encounter in the scenario, training on specialized equipment, and a debrief following the scenario. Tom Seif, Illinois Emergency Management Agency, and Jeff Oakley, Illinois Law Enforcement Alarm System Special Response Team, provided training on the personal radiation detector. This was especially effective, says Ann, because the S.W.A.T. teams learned directly from other law enforcement personnel.

The presence of a real radiation source brought the scenario much closer to real life and gave the S.W.A.T. a rare opportunity to conduct tactical operations in that environment. "We batted around the question of was it worth the effort and safety concerns, but ultimately this was the biggest benefit to our scenario," says Ann.

That benefit extended beyond the S.W.A.T. teams to the volunteers who helped put on Urban Shield. "Some of the volunteers were Police Academy cadets or recent graduates. Others were people just interested in helping. So this was a unique training opportunity to educate the general public on radiation hazards and detection," says Stacy.

The Sandia team ran the scenario 34 times over the 48-hour period. They found that each time the scenario evolved, it was different. "I was deeply impressed with how capable, adaptable, and effective the S.W.A.T. teams are in doing their job," says Troy. "I thought we'd see patterns emerge, but something different happened each time."

For the Sandia team, it was an opportune time to work directly with first responders. "We tend to do a lot of analysis in the intersection of science, technology, policy, and operations, but most of us do not have operational backgrounds," says Stacy. "It's critical to engage with operational stakeholders when designing products and solutions for them."

If funding is available, Sandia may work with ACSO on developing another R/N training exercise, possibly as part of next year's Urban Shield.

"The success of our involvement with Urban Shield could open a lot of doors," says Donna. "I think there could be opportunities for other groups at Sandia, bioterrorism or the Reachback Center perhaps, to become involved in this kind of exercise in the future."

Visitor badging shifting to open campus

By Mike Janes

Representing the latest implementation of Sandia/California's long-term site development plan, visitor badging operations for the site will soon be shifted from the trailer (Mobile 53) at East Avenue and Vasco Road to the kiosk known as Post 17, near the Combustion Research Facility (CRF) and adjacent parking lot.

The new Visitor Badge Office at Post 17 will become operational on Feb. 5 for main site visitor badging and on Feb. 6 for general access area (GAA) visitor badging. This new badge office will be staffed by two badging specialists, while the former badge office in Mobile 53 at East Avenue/Vasco Road will cease operation.

Maps, driving directions, campus signage, and both internal and external Sandia websites are all being updated to reflect the new visitor badging location and procedures. Additional infrastructure changes, such as parking, external signage, and public transportation, are being examined and will be phased in following the opening of the new badge office.

'Front door' and other advantages

The move is an important step in creating a new "front door" to Sandia/California on the eastern edge of the campus, says John Garcia (8510). The vision, he says, is for external visitors — including job candidates, academic partners, industry collabo-

rators, and vendors — to enjoy a more inviting and welcoming introductory experience when arriving at the California site.

Another advantage of the move is that all visitor badging activities will be consolidated into one facility, providing badges for visitors, new employees, contractors, DOE and non-DOE cleared visitors, as well as GAA/Livermore Valley Open Campus badges.



SANDIA/CALIFORNIA HAS MOVED its badging operations from MO 53 to the kiosk known as Post 17 near the Combustion Research Facility.

Eventually, a new building, which will be called the Collaboration in Research and Engineering for Advanced Technology and Education (CREATE) facility, will serve as the centerpiece of the front-facing entrance to the site. The CREATE facility will house both programmatic research

areas, such as hydrogen and bioscience, as well as some "public interface" functions like badging.

What isn't changing?

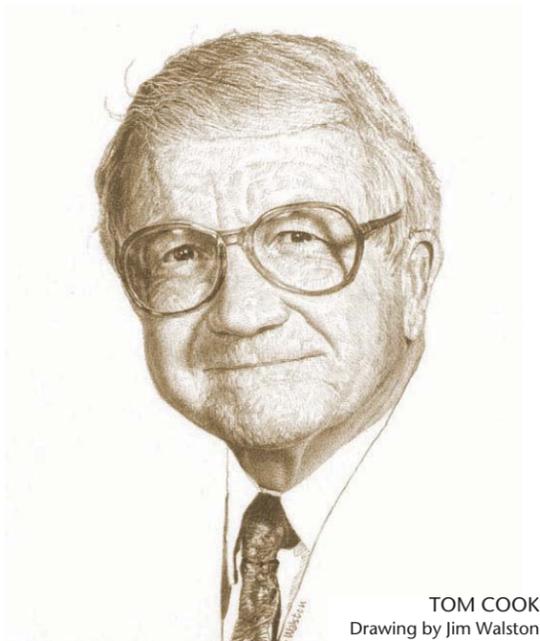
When the new Visitor Badge Office at Post 17 becomes operational, already-badged members of the workforce may still enter the California site via East Avenue and Vasco Road.

In addition, the badging functions currently in Bldg. 911 will remain operational for services such as HSPD-12 federal credential issuance and renewals, security clearances, and lost and found.

Questions about the relocation and consolidation of visitor badging activities can be directed to the Badge Office Helpline at 925-294-1358 or Linda Sager (8511) at 925-294-3021.

Remembering Tom Cook

Sandia pioneer, longest serving California site VP passes away at age 87



TOM COOK
Drawing by Jim Walston

On Dec. 27, 2013, Tom Cook passed away at his home in Pleasanton, Calif. He was 87 years old. Tom was the longest-serving vice president of Div. 8000, Sandia's California site.

Tom provided Sandia with 35 years of distinguished service, beginning in 1951 when at age 24 he was the youngest PhD on staff. Within his first eight years at Sandia, he moved from section to division supervisor and then department manager. Tom became director of physics and mathematics research in 1962 and vice president of research in 1967. He served as vice president of the California Laboratory from 1968 to 1981. Tom finished his Sandia career in Albuquerque as an executive vice president. He retired in 1986.

Tom's technical accomplishments centered on weapons effects. "The importance of Tom's work remains critical to this day for ensuring that our homeland is protected and that our own military forces are able to operate through such an environment, if ever generated by the bad guys, to accomplish the mission," says former Div. 8000 VP Mim John, who delivered a eulogy at Tom's funeral on Jan. 2.

"What made Tom so special to us at Sandia," says

Mim, "was his philosophy about leadership — 'people first.' He took a genuine interest in what individuals were doing, and almost all of us experienced his 'management-by-walking-around' approach — whether it was dropping by our office or lab or joining us for lunch at the South Cafeteria [at LLNL]."

Tom's 1954 reference publication on high-altitude effects, a classified reference document commonly known as "The Cook Book," was for years the principal source for such information in the United States. Tom was known as one of America's most decorated nuclear weapons physicists.

In 1971, he received the prestigious E.O. Lawrence Award from DOE's predecessor agency, the Energy Research and Development Administration (ERDA), in recognition of his contributions to the understanding of weapons effects. Tom was elected to the National Academy of Engineering in 1981 and was awarded DOE's Distinguished Associate Award in 1986. He was a Fellow of the American Physical Society and a member of the Sigma Xi Honorary Research Society.

Tom served on several boards and panels that focused on national defense, including the Vulnerability Task Force of the Defense Science Board, which he chaired; the Air Force Scientific Advisory Board; the Scientific Advisory Group of the Joint Strategic Target Planning Staff; the Department of Defense Scientific Advisory Group on Effects; the Steering Task Group of the US Navy Strategic Projects Office; and the Air Force Penetration Program Panel.

Former Executive VP for programs Orval Jones, who immediately followed Tom in that role, notes that Tom's abiding vision for Sandia was that both its sites, Albuquerque and Livermore, would be recognized not only as leading engineering laboratories, but also as premier scientific laboratories. That vision, Orval says, has been fulfilled due in large part to Tom's initiative and leadership.

For example, at Sandia/California, Tom suggested in 1975 that Sandia propose a national center for combustion research that would feature both advanced diagnostics and computational techniques. With funding from ERDA's Division of Physical Research and Division of Conservation Research and Technology, Dan Hartley led the highly successful effort to establish the program and facility. Dan credits Tom with the foresight and courage to nurture and grow the idea from the start.

Like Mim, former Div. 8000 VP Rick Stulen recalls



TOM COOK BRIEFED JOYCE FREIWALD, technical consultant to the energy research and production subcommittee of the House Science and Technology Committee, on Sandia's energy and weapon programs before she toured several Labs facilities.

Tom's unique management approach. "He loved to come by and talk to the staff about their work and never forgot a thing, so you had to be careful you didn't contradict yourself the next time you saw him," Rick says. "What I remember most about Tom was his humility; his gentle Southern accent; his ability to reassure and instill confidence; and, above all, his emphasis on achieving success through others, always staying out of the limelight himself."

"I remember Tom as the ultimate Southern gentleman, always unflappable and exhibiting grace under pressure," says Barry Schrader, former public relations officer for Sandia/California.

When Tom became Sandia's executive VP in 1981, then-Labs President George Dacey was moved to adapt Gilbert and Sullivan's "Modern Major-General's Song" from *The Pirates of Penzance* to the specifics of Tom's career.

He is the very model of executive vice president.

On atomic information he's Sandia's guru-resident.

He knows effect of weapons and all the tests historical From Trinity to Misty Rain, in order categorical.

He's very well acquainted, too, with matters mathematical

He understands equations, both the simple and quadratical.

About binomial theorem he's teeming with a lot of news

With many cheerful facts about the square of the hypotenuse.

USSTRATCOM commander Adm. Cecil Haney visits Sandia



USSTRATCOM COMMANDER Adm. Cecil Haney addresses an all-hands meeting during a day of briefings about Sandia's nuclear weapons work and other national security programs. (Photos by Randy Montoya)

(Continued from page 1)

nation's nuclear detonation detection system and space programs, joined a group of Sandia weapon engineers for lunch, and addressed Sandians at an all-hands meeting in the CNSAC auditorium.

Haney told the packed all-hands meeting that strategic deterrence often is framed as a discussion of the triad, with its legs of bombers, submarines, and ICBMs. "But it's more," he said. "It's the ability to detect in enough time, to process that information in enough time, to get that information moved through our command and control apparatus in enough time for the president to make a decision."

While he said he hopes that scenario never plays out, putting all the deterrence pieces together gives the strategy its credibility.

Sandia's work plays a role, Haney said in an interview with the *Lab News* following the all-hands session.

"Just the snapshot that I got today in seeing some of the work that's being done, the chance to meet these incredible people who are behind the scenes, to me is also a part of our nation's deterrence."

"We have a mature arsenal when you look at our strategic capabilities today in terms of warheads," and it's inspirational "to know we have gotten as much life as we have out of what we have today but even more to see the talented people making sure we can sustain this capability, as we must, for some time to come," he said.

Haney was joined on the visit by Steve Callicutt, USSTRATCOM's director of capability and resource integration; Brig. Gen. Jim Dawkins, principal assistant deputy administrator for military applications in defense programs for NNSA; and Jim Colasacco, division chief of USSTRATCOM's Global Strike Capabilities Division, Global Strike.

Haney came to Sandia with strategic deterrence in mind, but said he also was impressed by the Labs' other

national security work. He mentioned seeing a display of Sandia's contributions, decade by decade. "I admire that, and I'm glad to see Sandia has taken the time to post that history so it can be a reminder to all who come to visit, but also a reminder to the workforce," he said.

He was familiar with Sandia's work before his visit, but said he wanted to put "boots on the ground" to get a more personal understanding and to talk to Sandians about their work and what motivates them. "That ultimately gives me a deeper appreciation than I came with," said Haney, who said he was struck by how passionate Sandians are about their mission.

He ended the interview with a message to Sandia's workforce: "I know I can count on them to maintain the standard of excellence that Sandia was built upon. I can't thank them enough for the support they have, and will continue to provide, for the mission areas of US Strategic Command but also for their dedicated efforts for our country at large."

Secretary Hagel

(Continued from page 1)

development because “that technological edge that we have been able to maintain is critically important, especially in the world that we’re in today.”

In R&D and such national security programs as weapons stewardship and nuclear monitoring, he said it’s especially vital “to continue to be able to recruit and keep the cutting-edge minds in the world on our team.”

Among those accompanying the defense secretary were Frank Kendall, under secretary for acquisition, technology, and logistics; Andrew Weber, assistant secretary for nuclear, chemical, and biological defense programs; Madelyn Creedon, assistant secretary for global strategic affairs; and Don Cook, NNSA’s deputy administrator for defense programs.

The agenda included briefings on the modernization, safety, and security of the nuclear arsenal and proliferation assessment, along with walk-through tours of Sandia’s nuclear weapons display area; the Microsystems and Engineering Sciences Applications complex, or MESA; and the Z machine facility. Sandia President and Labs Director Paul Hommert and Executive VP and Deputy Director for National Security Programs Jerry McDowell escorted Hagel, who also met with other Sandia officials and staff during his tour.

“It’s very important to all of us who have some responsibility for the national security of this country to pay attention to every aspect and area of that responsibility,” Hagel said as he wrapped up his day by briefing reporters at Kirtland’s 377th Air Base Wing headquarters.

The nation’s nuclear deterrent has prevented World War III, Hagel said. “We’ve had wars, but not on the scale of what we saw in the first half of the 20th century,” he said.

The defense secretary noted that presidents since Richard Nixon have advocated reducing the nuclear stockpile along with corresponding Soviet/Russian reductions. However, he described himself as both a realist and an optimist. “I also understand the reality of the kind of world we live in,” he said. “We can’t just unilaterally cash in our nuclear chips.”

“I think the reality is that we are going to continue to need nuclear deterrence for our future, but that doesn’t mean it [the number of weapons in the stockpile] can’t continue to come down and still protect our country and our security,” he said. “It is the slogan: Peace through strength. As long as we have the strongest national security system of any nation in the world and we continue to keep that modern and strong, then we should also continue to promote that de-acceleration and bringing down the threat of nuclear weapons.”

Hagel acknowledged that tight budgets will mean making choices about where resources will do the most good. “To modernize your nuclear weapons stockpile — ensure that they continue to stay secure and safe — takes resources. This country has always been willing to make that investment. I think we will continue to make it, and that Congress will be a strong partner,” he said.



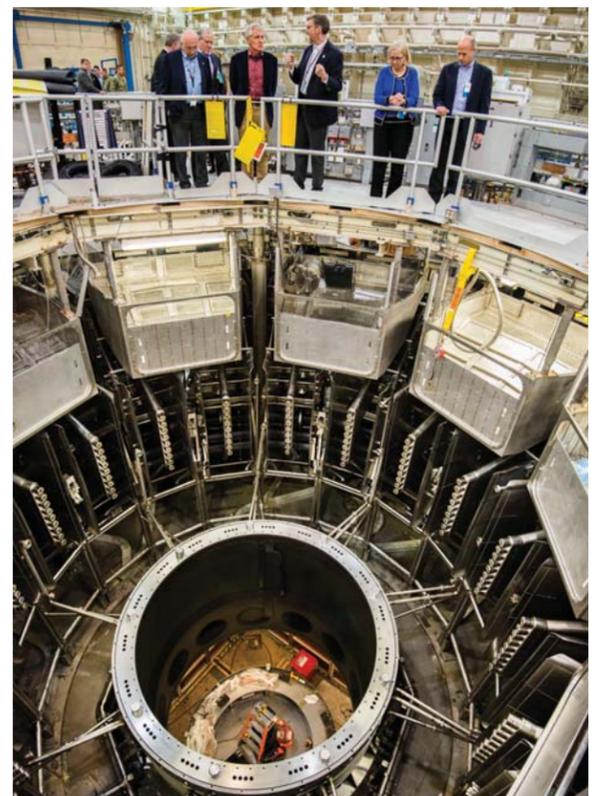
EXPLAINING RESEARCH — Sandia researcher Stephanie Hansen (1684) briefs Secretary of Defense Chuck Hagel and Frank Kendall, under secretary of defense for acquisition, technology, and logistics, at the start of a tour of Sandia’s Z Pulsed Power Facility. (Photo by Randy Montoya)



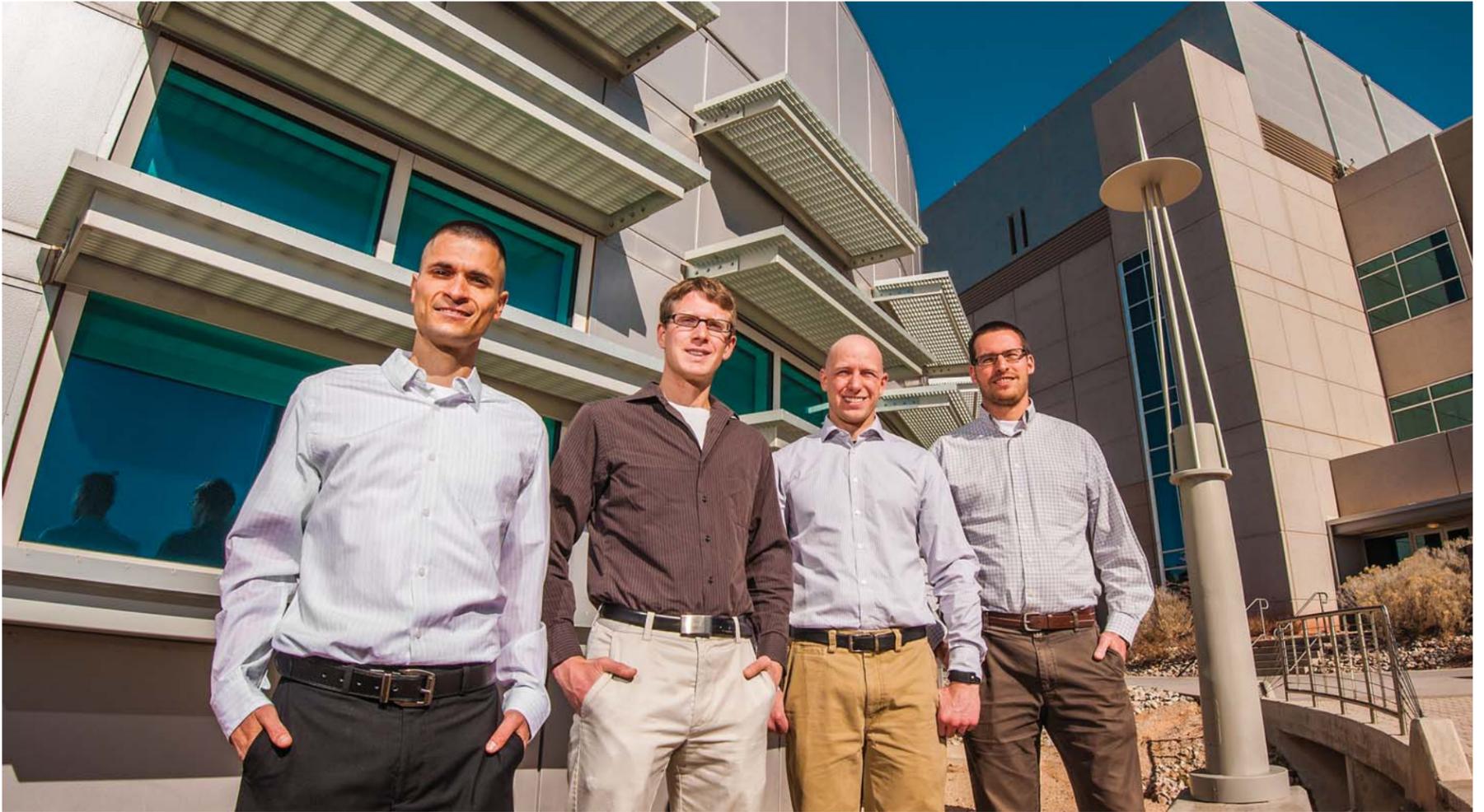
SECRETARY OF DEFENSE Chuck Hagel and Sandia President and Labs Director Paul Hommert listen as Center 1700 Director Gil Herrera leads a tour of the Microsystems and Engineering Sciences Application complex, part of the secretary’s Jan. 8 visit to the Labs. (Photo by Randy Montoya)



DISCUSSING SANDIA’S WORK — Sandia President and Labs Director Paul Hommert and Secretary of Defense Chuck Hagel talk during the secretary’s Jan. 8 tour of the Labs. Hagel said he was impressed by Sandia’s people and their commitment to the nation. (Photo by Randy Montoya)



Z PULSED POWER FACILITY — Mark Herrmann, director of Sandia’s Pulsed Power Center 1600, explains the Z machine to the visiting delegation. (Photo by Randy Montoya)



EARLY CAREER ACHIEVEMENTS — Sandians, left to right, Adrian Chavez (5629), Matthew Brake (1526), Seth Root (1646), and Daniel Stick (1725) will be recognized in a ceremony later this year as recipients of the Presidential Early Career Award for Science and Engineering (PECASE). The award is the highest honor the US government gives to outstanding scientists and engineers who are beginning their careers. (Photo by Randy Montoya)

Sandians' early career achievements honored by White House

(Continued from page 1)

recognized later this year at a ceremony in Washington, D.C., for their work in advancing the nation's science and engineering.

Matthew Brake

Matt, a graduate of Carnegie Mellon University's mechanical engineering program, joined Sandia in early 2008 after earning his PhD. One aspect of his work focuses on understanding interfacial mechanics, or how two objects interact when they impact and rebound. "You want to be able to predict how a joint will perform in different shock environments. You could build a mesh and have thousands and thousands of degrees of freedom, but to simulate that with the necessary number of elements to get convergence for your contact models, it's going to be prohibitively expensive. There's no way to actually do that in a feasible amount of time and get the correct answer," Matt says. "So the whole philosophy behind this modeling effort is rather than having the extremely large number of elements needed to get convergence, why don't we use a course mesh, but have a very high fidelity representation of contacts, so we can very quickly and accurately do these simulations of how a strong link will respond in different environments." Shrinking the models means an analyst can now understand in a few days with a desktop what would have otherwise taken years on a supercomputer.

Matt is currently studying friction and energy dissipation between two bodies and has become involved with the global community of joints researchers, taking on several leadership positions. He is the secretary of the American Society of Mechanical Engineers and is also organizing the 2014 Sandia Nonlinear Mechanics and Dynamics Summer Research Institute, which will bring researchers from around the world to Sandia to study some of the biggest challenges of predicting the behavior of jointed structures.

Adrian Chavez

Adrian, an Albuquerque native, started at Sandia in 2000 as an intern in the Center for Cyber Defenders while a student at the University of New Mexico. He spent four years there, learning about computer security. In 2004, he took advantage of Sandia's Master's Fellowship Program to pursue his master's degree at the University of Colorado, Boulder and returned to Sandia in 2006. Since that time, he has focused on cybersecurity for critical infrastructure systems and adding security to systems like the power grid, oil and gas refineries, and water pipelines to make sure that responses and

protections are in place in the event of a cyberattack. Adrian has worked on several projects focused on securing these systems.

"The vision of each project is to secure the hardware and software of critical infrastructure systems that harness our nation's most critical assets. My research focuses on retrofitting new security protections into an architecture that supports both the legacy and modern devices," Adrian says. "Protections that were previously unavailable in these systems include end-to-end cryptographically secure communications, secure engineering access, and built-in situational awareness."

Building on that model, Adrian and his team are working on randomizing networks, essentially turning computer networks into moving targets, making it more difficult for an adversary to locate and attack a specific system.

"I am honored to receive this award. It's great to have all of the excellent research we perform at Sandia be recognized at such a high level," Adrian says. He is working on his doctorate in computer science at the University of California, Davis and is interested in continuing research to help secure critical infrastructure systems.

Seth Root

Seth earned his bachelor's and master's degrees in physics at the University of Nebraska and his doctorate in physics from the Institute of Shock Physics at Washington State University. He joined Sandia in 2008 for the opportunity to work on the Z machine, the world's largest pulsed-power facility.

"You are working on a platform that can generate pressure and temperature regimes that few else in the world can access to understand material behavior at extreme conditions," he said. "The opportunity to do research at extreme conditions at a facility like Z is really exciting."

Seth has been involved in a team combining theoretical and experimental methods. The team is applying density functional theory, a method of calculating energies and pressures using quantum mechanics, to noble gases — which are odorless, colorless, and chemically inert under standard conditions — at extreme pressures and high temperatures. In one experiment, the physicists cryogenically cooled xenon gas to a liquid and then shock-compressed it to 8 million atmospheres of pressure. "We were able to show that density-functional-theory simulations can capture the response of the liquid xenon at very high pressures," he said. The research helps explain the physics of atoms with relatively high numbers of electrons and has helped to verify and improve theoretical methods used in computer

simulations.

Seth says the PECASE was more than just an individual award, but rather a recognition of the many people involved. "We have a really good team at Sandia. The award shows that the work we do in understanding material properties at high pressures is greatly appreciated on a national level," he says.

Daniel Stick

Dan earned his undergraduate degree in physics from the California Institute of Technology and his PhD at the University of Michigan. He was nominated for his development and demonstration of miniaturized ion traps for quantum computing. Moore's Law predicts that about every 18 months the processing power of classical computers double, but as devices shrink, they will run into fundamental physical limits at which transistors start behaving unpredictably. Quantum computing is one strategy to circumvent these limitations, but there is a lot of work to be done.

"For these devices to be a viable platform for quantum information processing, they have to be made more reliable and be engineered to eliminate particular sources of noise that make quantum computing extremely difficult," Dan says. "Quantum computing is something that is usually talked about in terms of its promise for exceeding classical computing, but everyone realizes that the technical challenges for actually realizing such a device are extraordinary."

Dan came to Sandia as a postdoctoral researcher in 2007 and was hired on as a staff member two years later. With his background in experimental atomic physics, he worked with Sandia's microfabrication experts to design and fabricate novel trap geometries.

"My main contribution is the experimental demonstration of these traps. They've become really successful in that a lot of the leading ion-trapping groups around the world use Sandia-fabricated ion traps for their quantum experiments," Dan says. "This award is a wonderful recognition, and I'm honored to receive it. There are so many people at Sandia who deserve some of the credit for this as well."

Three of the four winners, Matt, Dan and Adrian, were or are supported by LDRD funding. The awards were established by President Bill Clinton in 1996 and coordinated through the Office of Science and Technology Policy in the Executive Office of the President. Awardees are selected for their pursuit of innovative research at the frontiers of science and technology and their commitment to community service as demonstrated through scientific leadership, public education, or community outreach.

Sandia Classified Ads Sandia Classified Ads Sandia Classified Ads Sandia Classified Ads

MISCELLANEOUS

TREADMILL, NordicTrack A2350, \$450; Bowflex Xtreme machine, \$450; chin-up stand, \$50; all three, \$750. Storch, 414-0767.

GE WASHER, model GHWP1000MOWW, 1-1/2 yrs. old, \$200; unused rim, 14-in., 4 lugs, w/tire, \$50. Wolfgang, 505-414-1483.

CHAIR, La-Z-Boy rocker recliner, fabric, modern pattern, earth tones & burgundy, <1 yr. old, still tagged, photos available, \$425 OBO. Noack, 828-1180, dnoack@q.com.

MATCHING CONVERTIBLE CRIB & DRESSER, Babi Italia, dark wood, brand new in box, must sell ASAP, \$650. LeVon, 505-918-6469.

TABLET, ASUS Vivotab Windows RT, w/dock, \$300. Marchi, 321-7101.

JUMPING JACK/RAMMER/TAMPER/COMPACTOR, Dynapac brand, runs perfect, looks & works great, \$500. Mihalik, 281-1306.

STONEWARE, Noritake Warm Sands, six 4-pc. place settings, plus 5 pcs., ex. condition, \$375. Spear, 259-6873.

CAMPER SHELL/BED RUG, for Toyota Tacoma short bed, black, operable window, latch lock, \$250/both. Eanes, 293-4298.

VACATION WEEK, Streamside at Vail, Aspen bldg., sleeps 8 comfortably, available Jan. 25-Feb. 1, ski week, \$2,000. Marchi, 321-5600.

DOWN SWEATER HOODY, Patagonia Hi-Loft, men's large, hickory color, new condition, retails \$299, asking, \$185. Kramer, 281-8516.

GPS UNIT, SkyCaddie SXGw, car/home chargers, cart/hip mounts, travel case, 1-1/2 yrs. transferable subscription, extras, \$200. Adams, 821-0899.

LOVESEAT, electric reclining, leather, purchased fall '10 from JCPenney Homestore, must sell, \$750 OBO. Barrick, 414-5962.

CHANDELIER, rustic, downward facing, takes 2 med. light bulbs, rust colored, \$50. Knarr, 505-492-0990.

PLATE GLASS MIRROR, 3'x 4' x 1/4", free. Smith, 898-8429.

WEDDING DRESS, brand new, size 4, http://tinyurl.com/let9v4x, paid \$850, asking \$600. Garcia, 505-977-5889.

BABY GRAND PIANO, Baldwin, black w/matching seat, excellent condition, \$5,500 OBO. Ratzler, 410-7269.

FILE CABINETS, 4-drawer, 15" x 24" x 52", \$30 ea. Stevens, 298-7688.

EMBROIDERY SEWING MACHINE, Bernina Artista 730, bought new, home use only, very good condition, all boxes, accessories, BSR, manuals, \$2,000. Ginn, 506-7680.

GAS STOVE, \$200; refrigerator, white, side freezer, w/water & dispenser, \$100. Gonzales, 505-610-4164.

TIMESHARE, Cape Cod, May 24-30, 1 bdr., sleeps 4, pool & more, www.holly-tree.com/localinfo.html, \$750. Blanch, 505-850-9428.

OVER-THE-STOVE EXHAUST FAN, white, like new, \$10; chainsaw, new, 18" W/YK60 drive links, fits McCulloch/Wildcat/Eager Beaver/Silver Eagle, \$15. Garcia, 280-5815.

PUPPY GATE, extra wide, white metal, w/personnel door, \$40; bike rack, holds 4 bikes, fits into hitch receiver, \$50. Perreault, 505-228-8819.

ACOUSTIC ELECTRIC GUITAR, Esteban ALC-200, American Legacy Master Class Cutaway, w/amp, stand, instructional videos, \$600 OBO. Lambert, 505-307-0916.

JACK RUSSELL TERRIER, male, ~ 1 yr. old, long hair, long legs, sweet, energetic, good w/other animals, \$60. Anderson, 505-980-3023.

VACATION CONDOS, Ski Wolf Creek, Pagosa Springs, 1-2 bdrs., sleeps 4-8, \$90-\$140/night, call for more info. Fernandez, 238-4722.

HAY, cow & horse, Los Lunas, \$5-\$7/bale, can deliver for extra. Sanchez, 865-0527, ask for Andy.

UNM LOBOS BASKETBALL TICKET, vs. San Diego State, Feb. 22, sec. B, row 22, seat 9, \$45. Gregory, 252-3373.

WHEELBARROW, like new, \$10. Wacek, 268-8579.

WASHER, Kenmore, HE2, white, king-size plus; gas dryer, Kenmore HE2, white, super capacity, ~'07, excellent condition, \$395/pair. Martin, 248-1212 or 980-0456.

SLIDING GLASS DOORS, 2, sliding glass storm doors, w/frame & garage door opener, free. Luna, 872-0193.

SOFA BED, full-size, beige, photos available on request, \$200 OBO. Brooks, 797-7703, ask for Carlton.

TREADMILL, Reebok V8.90, purchased from Costco, low miles, great shape, many features, \$200 OBO. Weed, 822-1871.

How to submit classified ads
DEADLINE: Friday noon before week of publication unless changed by holiday. Submit by one of these methods:
 • EMAIL: Michelle Fleming (classads@sandia.gov)
 • FAX: 844-0645
 • MAIL: MS 1468 (Dept. 3651)
 • INTERNAL WEB: On internal web homepage, click on News Center, then on Lab News link, and then on the very top of Lab News homepage "Submit a Classified Ad." If you have questions, call Michelle at 844-4902. Because of space constraints, ads will be printed on a first-come basis.

Ad rules

1. Limit 18 words, including last name and home phone (If you include a web or e-mail address, it will count as two or three words, depending on length of the address.)
2. Include organization and full name with the ad submission.
3. Submit ad in writing. No phone-ins.
4. Type or print ad legibly; use accepted abbreviations.
5. One ad per issue.
6. We will not run the same ad more than twice.
7. No "for rent" ads except for employees on temporary assignment.
8. No commercial ads.
9. For active Sandia members of the workforce, retired Sandians, and DOE employees.
10. Housing listed for sale is available without regard to race, creed, color, or national origin.
11. Work Wanted ads limited to student-aged children of employees.
12. We reserve the right not to publish any ad that may be considered offensive or in bad taste.

WEIGHT LIFTING BELT, Nike XL, used, but in excellent condition, \$20. Hennessey, 915-241-8634.

iPAD AIR, 64GB, WiFi, Retina display, Space Gray, new in box, w/black Smart cover, \$650. Greene, 505-463-3260.

TABLET, Microsoft Surface RT, new, sealed, w/purple Type Cover/Keyboard 2, w/Windows 8 & Office, \$425. Pacheco, 508-6442.

HEATER, Eden Pure, used 1 season, \$250. Tiley, 554-6134.

RECLINER, La-Z-Boy, electric lift, used only 2 mos., \$650. Wright, 681-4438.

TELESCOPE, Celestron C6-S Schmidt Cassegrain, advanced series GT computerized Go To mount, \$550. Elliott, 299-7158, ask for Rick.

POPLAR WOOD, split & non-split, you load, \$75/cord. Larsen, 506-7297.

AQUARIUM, 55-gal., 2 internal filters, 1 external filter, no leaks/scratches, w/stand & light, \$300 OBO. Martinez, 505-792-3608.

HOME GYM, Olympic Smith machine, w/adjustable dumbbells; beautiful, ornate, buffet table, golden brown, excellent condition. de la Fe, 903-0717.

GAS RANGE, GE, 30-in., black, energy efficient, brand new, original box, never opened, retail \$700, asking \$450. Riley, 505-433-4295.

TRANSPORTATION

'02 HYUNDAI SANTA FE, AT, very good condition, \$6,000. Vandevender, 332-8824, ask for Randy.

'11 MINI COOPER, AT, red w/white top, still under warranty, no accidents, great condition in & out, \$17,500. Smith, 505-263-0396.

'04 TOYOTA COROLLA CE, 5-sp. manual, 4-dr., cruise, AM/FM/CD, silver, 112K miles, runs great, \$5,000 OBO. DiBello, 856-3552.

'10 FORD EXPLORER, Eddie Bauer, 4x4, 4.0L, AT, fully loaded, <NADA, \$22,000 OBO. Knight, 307-1927.

'08 ACURA MDX, loaded, 90K miles, excellent condition, <blue book, \$17,999. Tapia, 975-4038.

'10 GMC CANYON CREW CAB SLE, 3.7L, 4WD, bed liner, Roll-N-Lock cover, tow pkg., 24K miles, \$23,500. Mowry, 269-8400.

'03 JEEP WRANGLER SPORT, hardtop, 6-cyl., 4x4, 93K miles, great condition, \$10,600 OBO. Reyes, 459-6393.

'03 JAGUAR XJ8, 4.0L, classic styling, leather, sun roof, premium sound, 54K miles, excellent condition, \$9,200 OBO. Sleefe, 281-4103.

'06 VOLKSWAGEN JETTA, Tiptronic AT, ESC, real leather seats, Voxx wheels, 1 owner, \$7,995. Jones, 934-8799.

'04 VOLVO S60R, AWD, 90K miles, clean title in hand, owner motivated to sell, \$10,500. Bortz-Johnson, 505-362-3499.

RECREATION

'04 SUZUKI GS500, new mirrors, tires, forks, only 12,650 miles, runs great, \$2,000 OBO. Lloyd, 515-9971.

'95 GULFSTREAM RV, 34-ft., Class A, w/12-ft. slide out, new tires, 2 TVs, 2 ACs, many camping accessories, 14.7K original miles, \$22,250 negotiable. Garcia, 505-554-2690.

REAL ESTATE

4-BDR. HOME, 1-3/4 baths, 1,920-sq. ft., 2-car garage, fireplace, refrigerated air, 2-living areas, many new upgrades, Taylor Ranch area, \$180,000. Abrams, 898-3769.

3-BDR. HOME, 2 baths, 1,370-sq. ft., close to KAFB, wood floors, updated kitchen/bath, refrigerated air, MLS#802622. Milimine, 505-440-4116.

3-BDR. HOME, 2 baths, 1,420-sq. ft., green home, tankless water heater, low utilities, Westside. McDonald, 505-554-2048.

2-STORY HOME, Ventana Ranch, built in '98, 1,742-sq. ft. Salmon, 899-8749.

WANTED

HOUSEMATE, 1,067-sq. ft., detached apt. available, SW area, \$600/mo. includes utilities, internet & cable. Romero, 239-9741.

ROOMMATE, furnished room, near Balloon Park, available Feb. 1, \$450/mo., plus 1/2 utilities. Ortiz, 505-710-6617.

MOVING BOXES, packing materials, good condition. Gabaldon, 480-2409.

COMMUTER CAR, modestly priced, older but reliable, 4-dr. sedan preferred. Mandeville, 382-0764.

DIGITAL DVD/VCR TAPE RECORDER, working, w/remote & manual, will pay up to \$50. Chorley, 296-1454.

OUTDOOR TV ANTENNA, UHF/VHF, usable condition. Menicucci, 235-8501.

ELLIPTICAL OR WALKING MACHINE, basic, no frills. Horton, 883-7504.

LOST AND FOUND

LOST: gold wedding ring w/diamonds, sometime in mid-Dec., sentimental value. Campanozzi, 821-5077.

University of Michigan professor sees ties between climate models and nuclear weapons

By Neal Singer

One opinion on why the Soviet Union gave up its nuclear arms race with the US is that Kremlin leadership was tricked into matching President Reagan's exotic Star Wars missile-defense program and went broke doing it.

Another explanation was offered by University of Michigan professor Paul Edwards in his talk, "Cold War and Carbon Knowledge: The Strange Relations of Climate Science and Nuclear Weapons Research," presented Dec. 17 as part of Sandia's Climate Change Speaker Series.

The nuclear race may have ended, Edwards said, at least partly because climate change models were able to graphically describe the catastrophic effects resulting from so-called nuclear winter — the darkening and cooling of Earth by sunlight-blocking particles that might follow a significant exchange of nuclear weapons between warring countries.

In support of his assertion, Edwards quoted former Soviet premier Mikhail Gorbachev in an interview with *Slate* magazine in 2000, in which he said, "[Computer] models made by Russian and American scientists showed that a nuclear war would result in a nuclear winter that would be extremely destructive to all life on Earth; the knowledge of that was a great stimulus to us, to people of honor and morality, to act in that situation."

Not only did climate change models influence the state of nuclear weapons at a critical juncture, said Edwards, but need for information on the worldwide effects of nuclear weapons was part of the driving force for the continued improvement of climate models.

Nuclear tests drove need for better climate models

Nuclear tests measured in 1955 showed carbon travelling across the equator to the southern hemisphere. "But was it bomb radiocarbon or natural radiocarbon?" Edwards asked rhetorically.

Such questions drove the need for more intricate models, requiring data to fill empty grid points depicted horizontally and vertically as a series of boxes, to come up with atmospheric circulation models. Also, the earliest global climate models involved numerical methods similar to those developed by nuclear weapons designers for solving the fluid dynamics equations needed to analyze shock waves produced in nuclear explosions.



PROFESSOR PAUL EDWARDS offered provocative ideas in his talk "Cold War and Carbon Knowledge: The Strange Relations of Climate Science and Nuclear Weapons Research," at the Dec. 17 Climate Change Speaker Series symposium. (Photo by Randy Montoya)

Thus, climate was seen as a sibling field for nuclear thinkers. John von Neumann, the famous mathematician who helped develop the early ENIAC computer, "settled on weather forecasting as the thing to do because it was very similar to simulating the effects of nuclear weapons," Edwards said.

"The big computers cost money — half a million dollars for computing capabilities then as powerful as your digital watch — and everyone understood weather's importance," he said.

Other parts of the lecture featured a smorgasbord of scientific and political reactions to various non-nuclear climate influences. These included ultrafast commercial planes and details of a discussion in the late 1930s on the effect of airborne carbon compounds in raising Earth's temperature that seemed strikingly similar to the pro and con discussions of today.

Mike Cuneo, Igal Brener selected as IEEE Fellows

By Neal Singer

Two Sandians, Mike Cuneo (1650) and Igal Brener (1712), have been elected Fellows of the Institute of Electrical and Electronics Engineers (IEEE) as of Jan. 1.

Igal was selected “for contributions to terahertz science and technology,” and Mike for “developments in inertial confinement fusion with magnetically driven implosions and electrode cleaning.”

The number of Fellows chosen annually for the selective honor is restricted to less than one-tenth of 1 percent of the organization’s voting membership, which totals 400,000 in 160 countries. The well-respected organization has developed more than 900 active industry standards and sponsors or co-sponsors nearly 400 international technical conferences each year. Its members participate in subjects ranging from aerospace systems, computers, and telecommunications to biomedical engineering, electric power, and consumer electronics.

IEEE Fellow Mike Cuneo

Over the course of his 25-year Sandia career, Mike



(Photo by Stephanie Blackwell)

MIKE CUNEO

CSI: Dognapping program encourages young scientists



HANDS-ON SCIENCE — The CSI: Dognapping Workshop, conducted at the Advanced Materials Lab, encourages elementary students from low income environments to see themselves as junior scientists in a forensics laboratory. The hands-on experience teaches fundamental science concepts, helps kids see that they can do science, provides interaction with scientists and engineers in a laboratory setting, and gives teachers a pathway forward for scientific resources. And, oh: It’s fun. Here, students from East San Jose Elementary School work with Mercedes Metzgar, an AML intern who is a high school student at the Albuquerque Institute for Math and Science. Last summer, Mercedes was a STAR student, a summer program for exceptional high school students managed by Sandia’s Community Involvement Dept. 3652. (Photo by Rachel Baros)



has pursued the goal of pulsed power-driven thermonuclear fusion.

He worked first with ion beam diodes (1989-1997), and subsequently with wire array X-ray sources (1998-2006). The research efforts to which he contributed include power flow, ion diodes, ion sources, electrode plasma characterization and mitigation, z-pinch-driven direct- and indirect-drive capsule implosions for Inertial Confinement Fusion (ICF), wire array z-pinch physics of soft X-ray sources, magnetically driven direct-drive implosions for ICF, and synergies of ICF work to cold and warm K-shell X-ray sources (which are the most energetic) for radiation-effects science testing on Z.

In magnetically driven inertial fusion, Mike made two key contributions. He experimentally realized a novel concept, the double-ended hohlraum (DEH) radiation source, for Sandia’s Z pulsed power facility. (A hohlraum is the equivalent of a small oven for containing and focusing X-ray radiation onto an ICF target.) Subsequently, his experiments with wire-array z pinch X-ray sources used for the DEH led to a comprehensive understanding of the physics of single and nested wire-array implosions at high current.

The work served as an organizing principle for a broadly influential area of pulsed power, stimulating more than 45 refereed journal articles from other researchers that have been cited more than 1,000 times.

Mike also developed electrode-cleaning techniques to mitigate anode and cathode plasma formation in pulsed power devices. Such formation places fundamental limits on electron-beam and ion-beam diode performance, as well as on other high-voltage devices. Mike did seminal research that showed that the effects of plasmas formed from contaminants on ion diode performance could be significantly reduced using in-situ electrode cleaning techniques. Sensitivity to electrode contamination and mitigation by electrode cleaning are now part of the broader tool kit of all pulsed power scientists.

Mike authored or co-authored more than 150-referenced papers, including three invited topical reviews, with 18 in the premier physics journal *Physical Review Letters*. He was manager of radiation and fusion experiments from 2007-2013, significantly improving the foundations for radiation-effects source development and testing on Z, and for intra-lab collaborations on radiation effects. He is currently senior manager of the Pulsed Power Accelerator Science and Technology group

Says Mike, “The award is ultimately a recognition of the research environment, talented people, and two decades of achievement of Sandia’s entire pulsed power center, which depends on the collaboration of large teams of scientists, engineers, and technicians.”

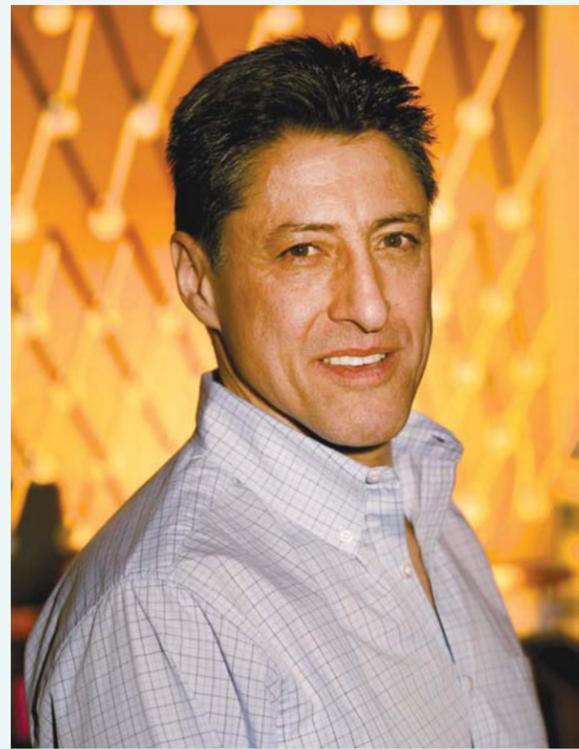
IEEE Fellow Igal Brener

Igal joined Sandia in 2004. Projects on which he has worked include chem-bio sensing, terahertz (THz) science and devices, plasmonics, metamaterials, and solid-state lighting. In 2008 he became Nanophotonics Thrust Leader at the Center for Integrated Nanotechnologies (CINT), a joint Sandia-Los Alamos DOE user facility. A distinguished researcher in the Applied Photonic Microsystem Department and CINT, he holds 14 US patents and has authored more than 180 peer-reviewed journal and conference papers.

Since coming to Sandia, Igal has expanded his research to include passive and active THz metamaterials and new techniques to extend THz time-domain spectroscopy to even higher frequencies. He was a team member of the Terahertz Microelectronics Transceiver and Metamaterial Science and Technology Grand Challenges. His work continues to be highly cited and presented in peer-refereed journals and invited talks at conferences.

A native of Uruguay, Igal received undergraduate degrees in electrical engineering and physics as well as

his doctorate in physics from the Technion, the well-regarded Israeli technology institute. Early in his career, he worked at Bell Labs in ultrafast lasers and spectroscopy of semiconductors, THz phenomena, fiber optical communication, gallium-nitride lasers, and semiconductor heterostructures.



(Photo by Robb Kramer)

IGAL BRENER

Two of Igal’s most notable contributions were the invention of high-efficiency photoconducting THz antennas and generators and the development of THz near-field imaging.

The development of high-efficiency THz photoconducting antennas resulted from the discovery in 1996 by Igal and his team that biased singular-metallic elements in gallium arsenide grown at low temperatures would emit strong THz radiation upon optical excitation. This increase in emission power was between one and two orders of magnitude. The extrapolation with collaborators from a bright THz emitter to an efficient THz detector didn’t take long, and this effect was later harnessed to produce the most efficient photoconducting THz antennas of that time.

Paralleling those activities was Igal’s search for a way to enhance the spatial resolution of THz imaging. Near-field visible imaging was an active area of research at Bell Labs and Igal and colleagues joined forces to develop the basis for near-field imaging at THz frequencies. The initial work used conventional THz emitters and detectors with the addition of near-field coupling but resulted in very low power throughput. Igal’s team then used an ingenious combination of those same efficient THz-antennas and processing to develop a near-field THz detector orders of magnitude more efficient and with superb spatial resolution. These probes enabled THz spectroscopy and imaging to operate at a frequency response comparable to regular time-domain spectroscopy systems and with spatial resolutions of the order of single- to double-digit microns. This technique was later patented and, with other patents, licensed to industry, impacting areas of homeland security, industrial production, and NASA missions.

The field of near-field THz imaging, essentially started by Igal’s work, now has several groups worldwide active in this area. His groundbreaking work also made possible the expansion of THz near-field imaging to include other techniques.

“Overall,” he says, “there are now probably hundreds of papers with exciting scientific breakthroughs that use THz near-field imaging.”

Most of his activities today are in the areas of metamaterials, nanophotonics, and solid-state lighting, he says. He was elected a Fellow of the Optical Society of America in 2007, and is principal investigator for both a Research Challenge at the Solid-State Lighting Science Energy Frontier Research Center and for the LDRD project “Electrically Tunable Metamaterials for Agile Filtering in the Infrared.”

Igal has also mentored PhD students and postdocs, and is proud that some of his graduates went on to pursue successful careers and become leaders in their fields.