

Sandia LabNews

Managed by Lockheed Martin for the National Nuclear Security Administration



Status report:

Senior managers begin 'brokering' stage of Managed Workforce Transition process

All affected employees notified

Programs in the Integrated Technologies and Systems (ITS) Strategic Management Group (SMG) have received needed reinforcements, and staffing levels in the Nuclear Weapons SMG are at or below their targets — the result of five months of work as part of the Managed Workforce Transition (MWT) process.

MWT is a systematic Labs-wide approach to moving people to work and work to people (*Lab News*, Dec. 8, 2006, and Feb. 16, 2007).

But some mismatches remain. The ITS SMG needs more people to support its direct programs than remain available at the Labs, and considerable movement is still needed from Sandia's indirect programs to meet staffing targets.

(Continued on page 5)

Handheld instrument assesses dental disease in minutes

Uses may include faster cancer diagnosis, rapid detection of biotoxins

By Neal Singer

Who would have guessed that when the Star Trek medical diagnostic tool known as the tricorder makes its appearance in real life, the first user might be . . . your dentist.

According to a paper in the March 27 *PNAS* (the Proceedings of the National Academy of Sciences), a recently completed pilot study conducted with the University of Michigan shows that a Sandia-developed handheld device determined in minutes — from a tiny sample of saliva alone — not only if a patient has gum dis-



AMY HERR prepares human saliva samples for analysis that will be conducted using Sandia's lab-on-a-chip clinical diagnostic instruments.

(Photo by Randy Wong)

ease but quantitatively how advanced the disease is.

"The gold standard for any medical test is when instruments are used to examine human patients," says Sandia researcher Amy Herr (8321). "The pilot study allowed us to compare our results to accepted clinical measurements. Then we could statistically validate both the periodontal disease biomarker and the new microfluidic instrument.

"We achieved faster and more reproducible results because we combined steps that ordinary

(Continued on page 3)

Patternable surface chemistry makes for robust, versatile, and accurate biomolecule detection

Sandia system will allow for simultaneous detection of thousands of proteins, DNA, whole cells, pathogens

By Chris Burroughs

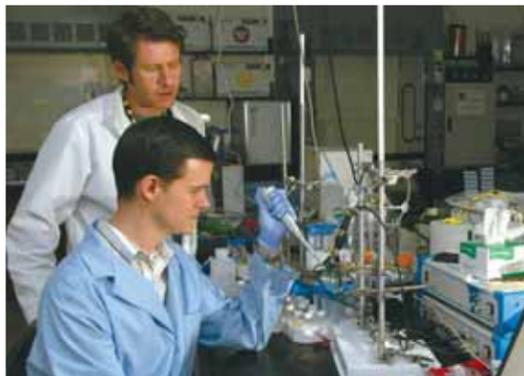
A new type of electrochemical sensor that uses a unique surface chemistry to reliably and accurately detect thousands of differing biomolecules on a single platform is being developed by a Sandia research team led by Susan Brozik (1714).

The new bioagent detection system could be applicable in homeland defense, safeguarding warfighters, and clinical diagnostics.

"A problem with the majority of existing biosensors is that they only look for one type of biomolecule [DNA or protein] at a time," says Jason Harper (1714), research team member.

"This can often lead to inaccurate or inconclusive results and limits the use of the sensor. Where our sensor differs is that multiple characteristics of several bioagent targets can be tested on a single chip. Identification of several DNA sequences and protein markers are needed for detection of multiple targets and will allow for accurate discrimination between similar bioagent threats."

For example, instead of using only an antibody that binds to the surface



JASON HARPER, sitting, and Ronen Polsky (both 1714) are working together to develop multi-target electrochemical biosensors. (Photo by Bill Doty)

of an anthrax spore, the new Sandia sensor could test for several DNA sequences and internal and external proteins unique to anthrax. This provides numerous positive readings for the target agent or agents, significantly increasing confidence in the sensor results.

The new Sandia sensor will be able to simultaneously detect thousands of biomolecules on a single platform. By integrating antibodies, DNA, and other biomolecules on a single device, the number of lab instruments, volume of reagents required, time for analysis, and the cost of effectively performing thousands of tests are all reduced.

The platform, a microfabricated chip, is just one inch by one inch in size. Several technological advances in microfabrication processes have increased the numbers of electrodes that can be produced on a sensor platform. A major challenge is how to pattern different biomolecules onto closely spaced micrometer-sized electrodes. Brozik's group believes the answer lies in the electrodeposition of aryl diazonium salts.

The surface chemistry, produced by team members David Wheeler and Shawn Dirk (both 1714), possesses several advantages over currently used

(Continued on page 5)

Sandia will surf the waves of change, Tom Hunter says at all-hands meeting

By Bill Murphy

Note: This story offers some highlights of Labs Director Tom Hunter's all-hands meeting held in New Mexico on April 3. To view the entire presentation and to gain the full context of Tom's remarks, go to the streaming video on Sandia's internal web at www-irm.sandia.gov/TomHunter-20070403. Tom will be conducting an all-hands meeting in California on May 3.



TOM HUNTER

Everything, it seems, is in transition, at least in Sandia's world.

And the Labs has been intentionally positioning itself to remain an essential national resource

as the world changes and as the nation's expectations for Sandia and the other national laboratories change, as well.

That was the key message offered up by Labs Director Tom Hunter during last week's all-hands meeting at the Steve Schiff Auditorium.

In his remarks, which he called "Surfing the Waves of Change," Tom asserted that those waves will either engulf and overwhelm you, or you will learn to surf them, demonstrating a mastery over the new environment. Sandia, he suggested by implication, intends to not stand on the beach but get in the water, board at hand.

What's changing? Tom listed several areas of

(Continued on page 4)

Latest org chart reflects new management changes. Page 9.

Inside . . .



Wild horses, albatross, hoarfrost highlight Environmental Photo Contest winners on pages 6-7.



Mission success: Swarmy the robot clears drums full of sludge from old tank. Story on page 12.

What's what

Even though we're mostly a law-abiding bunch here at Sandia, we all get an urge now and then to tweak the system's nose — especially if the tweak is symbolic or seems basically harmless.

Like the guy who bought a go-cup of coffee at the Thunderbird Café recently, stood outside and drank it, then instead of throwing the cup away, lodged it carefully in some rocks before going through the gate into the tech area.

Right after the tobacco ban made refugees out of some Sandians, one was seen standing on the yellow lines in the middle of F Avenue between the northwest corner parking lot and the Air Force parade ground puffing away.

And chewing gum. It's as American as cheeseburgers, and so must be throwing it on the ground when it's all chewed up — judging from the gooey gobs of it laying around all over the parking lots and sidewalks.

Well, aggravating as these little rebellions might be to some of us, just think of them as relief valves. At least after the tobacco ban, the indignant and angered just thumbed their noses at authority by standing just outside the lab site — they didn't march on Bldg. 802 with pitchforks and torches.

* * *

A colleague said recently that he's become a member (tongue-in-cheek) of Sandia's "high blood pressure club," complete with a pocket-size blood pressure recorder from Medical, and that he and some others in our group are supposed to have their blood pressure checked from one to three times a week. "And I understand from Medical that it's a growing 'club' at Sandia," he said.

This points up that Sandia's workforce is aging, and the years — and, for many, increasing stress in our work — make it all the more important to pay attention to our health. Medical emphasizes this over and over, with blood pressure clinics, testing for diabetes, etc., etc. All this emphasizes the fact that our in-house medicos are truly concerned about Sandians' health.

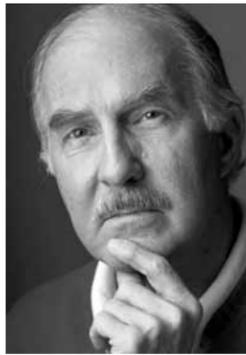
Many of us are trying to help hold the aging process at bay by lacing up our walking shoes and making a few brisk laps around Hardin Field at midday. This colleague says he's even noticed that keeping his walking shoes on in the afternoon helps to reduce his stress and fatigue, and therefore greatly improves his disposition.

Then, as a light bulb lit up over his head, he added, "Hey, if wearing walking shoes reduces your stress and fatigue and improves your disposition, maybe they should be mandatory for everyone in the executive suite."

Maybe so.

By the way, with all that exercise walking on the track around Hardin Field, maybe we could get the Air Force to let us call it Sandia Common, since it appears (you can just tell) that most of those walkers are Sandians. Maybe just from 11 o'clock or so until about 1.

— Howard Kercheval (844-7842, MS 0165, hckerch@sandia.gov)



HOWARD KERCHEVAL

Weapons complex employees donate more than \$11 million to fund drives across US

Note: This story is based on information from the February 2007 issue of NNSA Newsletter. (Sandia's total includes \$50,000 from Lockheed Martin. Los Alamos' total includes a dollar for dollar company match.)

Contractor and federal employees of NNSA and its facilities throughout the nation donated \$11,288,593 last year to a wide variety of local, regional, and national charities and nonprofit organizations and institutions through the Combined Federal Campaign and local United Way-affiliated fund drives.

Sandia employees in Albuquerque pledged a record-breaking \$3.175 million to the United Way of Central New Mexico. The total for Sandia, including the SHARE campaign in California and the Employee Caring Program in Carlsbad, N.M.; Las Vegas, Nev.; and Amarillo, Texas, was \$3,586,379.

Overall, NNSA's contractor employees at all facilities pledged \$10,522,316 to community fund drives and federal employees contributed \$766,277 to the Combined Federal Campaign.

Here are the totals for the other NNSA facilities and federal offices:

- Los Alamos National Laboratory — \$1.5 million to Northern New Mexico United Way programs
- Lawrence Livermore National Laboratory — \$1,472,086 for HOME (Helping Others More Effectively) campaign
- Savannah River Site — \$1,926,791 (Washington Savannah River Company, Bechtel Savannah River Inc., Energy Solutions Savannah River Corporation, BWXT Savannah River Company, and CH2 Savannah River Company employees; total includes a WSRC \$60,000 corporate gift)
- NNSA Headquarters — \$238,221
- Livermore Site Office (Calif.) — \$34,069
- Los Alamos Site Office (N.M.) — \$17,600
- Sandia Site Office (N.M.) — \$27,000
- NNSA Service Center (N.M.) — \$200,000

Retiree deaths

James Howard Scott (age 79)	Jan. 1
John Albert Larson (93)	Jan. 2
Rachael O. Duncan (88)	Jan. 3
Charles J. Puglisi (89)	Jan. 4
Maclovio S. Suazo (92)	Jan. 4
Edward L. McKelvey (68)	Jan. 4
C. Hilton Deselm (93)	Jan. 5
Charles E. Roehrig (84)	Jan. 7
Adam Trujillo (76)	Jan. 7
Hazlet J. Edmonds (71)	Jan. 7
William E. Walker (80)	Jan. 7
Edward E. Brass (78)	Jan. 8
Thomas Orin Meyer (87)	Jan. 8
J. Lloyd Williams (88)	Jan. 10
Basil K. Laskar (85)	Jan. 14
Alice J. O'Meara (92)	Jan. 15
Doyle K. Morgan (77)	Jan. 17
George W. Perkins (74)	Jan. 20
Gene H. Jeyes (81)	Jan. 28
John W. Wood (79)	Jan. 28
Jorman A. Koski (65)	Feb. 1
Carl A. Denney (85)	Feb. 2
George Edgar Reis (86)	Feb. 2
Willard A. Benson (86)	Feb. 3
Jose Demus Jojola (91)	Feb. 12
Herbert L. Webster (90)	Feb. 12
Howard D. Hayden (69)	Feb. 17
James N. Demas (87)	Feb. 18
Kenneth J. Shumway (82)	Feb. 22
Samuel Blaylock (93)	Feb. 24
Roger C. Buehler (83)	Feb. 25

Writing an ethical will

Rabbi Min Kantrowitz will be at Sandia on April 19, Bldg. 810 auditorium from noon to 1 p.m., to explain writing ethical wills. Ethical wills pass along values, not just possessions. They can help relate life stories and convey values held dear. The presentation is sponsored by the Sandwich Support Group. Questions to Dick Steele (10004) at 284-4353 or rsteale@sandia.gov, Debra Babb (4227) at 845-0898 or dgbabb@sandia.gov, and Bonnie Hardesty (10741) at 844-1817 or bjharde@sandia.gov.

Sandia LabNews

Sandia National Laboratories

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Employee death

Greg Thomas remembered as respected, influential leader

No one better embodied 'exceptional service in the national interest,' says former California VP Mim John

"When you looked to the Livermore Valley from New Mexico — whether from Sandia or Los Alamos — no one was respected more than Greg," says Sandia/California VP Paul Himmert.

Greg Thomas was a leader both at Sandia and in the Livermore community, where he served as an elder at Cedar Grove Community Church. He died March 27 in a motorcycle accident. He was 49. He is survived by his wife Susan and children Jonathan and Andrea.

"Greg's death is a bitter, bitter blow," says Rob Allen (8112). "I'm proud to have worked with him and I will miss him more than I can ever say. He was a great friend."

More than 500 community members and colleagues from both Sandia and Lawrence Livermore attended Greg's funeral on March 30. Mim John, who retired last year after serving as VP of Division 8000 for seven years, spoke at the service.

"His contributions live on in national security advancements, such as end-to-end command and control, and conventional carriers, and in programs such as chemical and biological weapons defense, that are having direct impact in making the nation and the world safer," Mim said. "There is simply no better person who has lived President's Truman's original vision for Sandia of 'exceptional service in the national interest.'"

Like many at Sandia, John Hinton (8112) knew Greg as a colleague and close personal friend. Greg's son Jonathan will be a groomsman at the upcoming wedding of John's daughter.

"Greg graced everything he did with innate goodness, integrity, and humility. He didn't wear his good character on his sleeve — he radiated it," says John. "Although right now it's hard for me to imagine work without Greg, I'm sure that in time, I'll draw deeply and often from my memories of him for inspiration, guidance, and strength."

Ed Talbot (8965), another close personal friend and coworker, recalls "the effortless grace with which Greg handled politically charged situations. I believe that many of us would agree that Greg's determination, sensitivity, deep caring, and integrity made our dreams take flight. I'll miss his gentleness and quiet competence."

Greg had a 27-year career at Sandia. Most recently he was deputy director of the National Security Engineering Center, which focuses on stewardship of the



GREG THOMAS with daughter Andrea, wife Susan, and son Jonathan.

Livermore Valley component of the nuclear weapons stockpile.

His career at Sandia included serving as Mim's deputy and managing the Exploratory Systems Department. He led research and development of detector technology, advanced decontamination foams, agent transport modeling and simulation, protein modeling, and infrastructure protection system demonstrations as manager of Sandia's Chemical and Biological Defense Program.

"Greg's passion at work was contagious to many. The foundations that he laid in a number of areas will have significant impacts to the nation's nuclear stockpile for a long time to come. Sandia will surely miss Greg's leadership, especially during this period of transformation," says Ming Lau, manager of B83 Systems Engineering Dept. 8237. "It was an honor to have known and worked with Greg. I will miss him dearly."

"Few other senior managers at Sandia combined his grasp of national policy issues, his outward-looking vision and willingness to consider new ways of doing things, and his depth of technical knowledge and experience with the design of real weapon systems," Rob says.

"Greg had the willingness and courage to do what he felt was the right thing, even if it was unpopular, or uncomfortable. These days that type of courage and resolve is sorely needed and hard to find," says Jim Handrock (8810).

Pat Smith, acting VP of Human Resources Div. 3000, recalls that "as Site Operations director, I've had the opportunity to get to know the VP deputies quite well. Greg herded us cats admirably, giving us the necessary jolts of reality that we sometimes needed and always deserved. He used his sharp wit to cut to the chase and to challenge us to do better."

Greg gracefully incorporated his deep faith into everything he did, from his work at Sandia to serving as a counselor at a church youth camp. He was very active in Cedar Grove Community Church, where he played many roles, including chairman of the elders.

Tim Shepodd (8778) says he remembers most "not what Greg said, but rather that he was proud to openly share his family and faith with all those who walked through his office door."

— Patti Koning

Dental diagnosis

(Continued from page 1)

ily require time-consuming manual handling by many people, into a single automated device."

Because the amount of sample fluid needed for testing is so small, Amy sees further applications in other disease areas — including potentially improved diagnosis of prostate and breast cancer — as well as rapid measurements of serum in animal models employed in vaccine development research.

Says Sandia researcher Anup Singh (8321), "This technology also has great promise for Sandia's efforts in homeland defense. We have on-going efforts to use the diagnostic platform to detect biotoxins and other markers in bodily fluids to be able to diagnose exposure to a biological agent."

"We've filed patents and technical advances to protect the work," Amy says. "The study has sparked commercial and university interest in our inventions. Our team — an interdisciplinary group of internal and external collaborators — believes Sandia's contributions in this area could advance personalized medicine. So we're motivated to extend the limits of Sandia's lab-on-a-chip tools."

A "lab on a chip" refers to an entire automated laboratory on an area the size of a computer chip, able to perform chemical analysis on minute amounts of material.

How it works

While components of the saliva-detection technique were reported earlier by Sandia, this is the first comprehensive study of Sandia's integrated clinical method.

The basic principle? "Biomedical researchers have suspected that changes in the amount or type of proteins present may be useful as biological markers in disease diagnosis," says Amy.

Sandia California News

"Our current work with a particular enzyme in saliva supports that hypothesis regarding periodontal disease."

Aiding dental practitioners, the pocket-sized device measures the state of biomarkers to determine how much the disease has been set back. Its progress may be cloaked, silently advancing or retreating without showing any signs.

"Periodontitis can be episodic in nature," says Amy. "You need to know the stage of disease progression to diagnose and treat the illness most effectively. The enzyme [biomarker] that we monitored decreased or stabilized if the treatment was working well."

Often, owing to the time and expense involved, practitioners formerly had not been able to perform extensive biochemical investigations.

The work, funded by the National Institute of Dental and Craniofacial Research (NIDCR) — one of 20 institutes in the National Institutes of Health — is the first application using microliters of saliva, a painlessly and easily secured fluid. The real-life alternative for the most part has been quasi-subjective physiological measurements, such as gum recession and gum bleeding on probing, to diagnose periodontitis.

Unlike Sandia's MicroChemLab — its patented version of a lab on a chip — which reports multiple protein signatures in fluids of interest, the clinical diagnostic instrument described in *PNAS* is a lab on a chip designed to quantify the amount of a specific protein (or panel of proteins) present in particular biological fluids. Monitoring quantities of specific proteins makes the tool useful as a clinical diagnostic.

Using a disposable lab-on-a-chip cartridge, the device makes use of a molecular sieve made out of a polyacrylamide gel. The location of the sieve in the microfluidic chips is determined using photolithographical methods adapted from the semiconductor industry. The gel is porous, with very small openings. A low electrical current (measured in micro-amps) is passed through the gel and a process called electrophoresis moves charged proteins through it. The gel has a Jell-O-like consistency and, by permitting the easy passage of smaller molecules and slowing the passage of larger ones, quickly separates proteins contained in the saliva. Prior to this separation, the proteins are brought into contact with specific antibodies chosen for their ability to bind to the biomarkers. The antibodies are pre-labeled with fluorescent molecules attached to them. Interrogation by laser of these combined molecules — fluorescent antibody and fluorescent antibody bound to the biomarker — determines the amount of biomarker present, indicating the degree of periodontitis.

Sandia authors of the study, in addition to Amy and Anup (the NIDCR project primary investigator), include Anson Hatch, Daniel Throckmorton, James Brennan (all 8321), and Huu Tran (8755), as well as Will Giannobile of the School of Dentistry at the University of Michigan, Ann Arbor.

More information can be obtained at the Sandia website www.sandia.gov/mission/homeland/chembio/development/biotechnology/nih2.html.



Photos by Bill Doty

All-hands

(Continued from page 1)

change with particular significance for Sandia and how Sandia is addressing those changes:

- The nuclear weapons complex, which grew to maturity in a bipolar Cold War environment, will by necessity undergo an “amazing transition,” assuming a shape more in line with 21st century deterrent requirements. The national debate about the future of the stockpile (and the related issue of the future of RRW) will be healthy one for a free society; its outcome will influence the shape of the complex. The Labs has been charged to play a key leadership role in the transformation of the complex.

- Concerns over the proliferation of nuclear materials have assumed a sense of urgency in the post-9/11 world. Sandia is deeply invested in developing means to get a handle on proliferation.

Moving people to work

Note: See related story beginning on page 1.

The Managed Workforce Transition process — the process of moving people to work — is spot on in one area and still being worked in another, Tom Hunter told an audience of Sandians at last week’s all-hands meeting in the Steve Schiff Auditorium.

The Labs, in anticipation of and response to a changing mix of work, realized that it needed to move people to work to match the Labs’ current needs. To that end it devised the Managed Workforce Transition plan.

“If you recall,” Tom said, “the plan was to have about 300 people move into the work that is neither indirect nor nuclear weapons. Under the plan, about 200 people in nuclear weapons and about 150 in the indirect world would move over to support Al Romig, Les [Shephard], Paul [Hommert], and Jerry [McDowell] in the ITS [Integrated Technologies & Systems] work.”

The movement of the 200 people from nuclear weapons to ITS has been successful. “We’ve done it; it basically has happened,” Tom said. He added, however, that “we have not been able to move as many people in indirect into the ITS world but we are still working on that. We were able to get to the nuclear weapons/ITS balance very quickly and we’re now working on the indirect/ITS balance. I think we’re making good progress. That’s where the effort is — to try to get the people in the right places.

“We are running exactly where we want to be in terms of the size of the Laboratory. We couldn’t be closer [to our FTE targets]. John Stichman manages this and I think it’s been working very well.”

- The nation’s policy-making leadership is changing, with many new faces in congressional leadership positions, new leadership at NNSA, and a new administration just two years away. The Labs has hosted new congressional leaders, introducing them to the breadth and depth of Sandia’s capabilities.

- Corporations are going global at an astonishing rate, and those corporations will look for science and engineering resources in a global talent pool, a pool no longer dominated by the US. Changes are needed in the nation’s educational system to keep the US at the forefront of science and engineering in a globalized world. Sandia has taken on a leadership role in the effort to recharge the nation’s science and engineering pipeline.

- Energy, always an important national concern, has become the dominant issue of the day.

With concerns over carbon emissions and climate change, the nation is more ready than ever to invest in alternative energy solutions. Notably, those concerns have spawned renewed interest in nuclear energy; for the first time in 30 years, the

nation seems ready to consider nuclear energy as a viable alternative to fossil fuel. But in the 30 years since the US retreated from new investment in nuclear energy, leadership in that arena passed to others. Can concepts like DOE’s GNEP — the Global Nuclear Energy Partnership — help restore the US to a leadership position? Sandia continues to be a leader in all areas of energy research and plays a key role in the GNEP effort.

Sandia taking a proactive role

In every area of change (and Tom mentioned others; those listed above represent some of the highlights) Sandia has taken a proactive role, Tom said. He noted that the 2007 Strategic Plan, unveiled early in the FY07 fiscal year, reaffirmed that, even in a changing environment, the Labs retains its highest goal: “To become the laboratory that the US turns to first for innovative, science-based, systems-engineering solutions to the most challenging problems that threaten peace and freedom for our nation and the globe.”

He said Sandia is actively pursuing that highest goal by assuming a leadership role in the transformation of the weapons complex; developing leading-edge technology and innovative systems that bolster national security; and achieving world-class excellence in operations and in innovative science and engineering that support and enable the Labs’ missions.

Workload is changing

As the world changes, the Labs’ workload changes as well.

“We will always have to deal with the balance of our work,” Tom said. “Nuclear weapons is now about 47 percent of the laboratory. The work in these other areas [areas that fall under the Integrated Technologies & Systems Strategic Management Group] represents about 53 percent. The

question is, where will it go?

“Over time, that work balance will move slightly; nuclear weapons will become somewhat smaller. Not a lot smaller. It’ll still be the dominant program in the laboratory; it will still offer an enormous amount of opportunity to contribute. But the projection is that these [nonnuclear areas] will grow and they are growing, while [the nuclear weapons side] will be stable or not see quite as much growth. That will define the portfolio of the laboratory.”

Thinking about capabilities

As the work balance shifts, will Sandia be able to maintain the capabilities that allow it to claim authoritatively to be one of the world’s great laboratories?

“We have to think about our capabilities,”

“As we move from less dependence on nuclear weapons . . . we will have to figure out a way to be sure we will maintain [our] capabilities and keep them world class.”

— Labs Director Tom Hunter

Tom said. “We can’t be everything to everybody, but in some areas we can be world-class. In some areas we are world-class. What are we going to do about that? In some of these areas, like computing, we are world class. In integrated micros-

systems, we just invested more than \$400 million; we clearly are world class there. In pulsed power, we are world class; in our environmental testing capabilities — at least in the national security area — we are second to none in many cases. In nanotechnology [we are leaders]. And there are others. As we move from less dependence on nuclear weapons as the provider of the largest part of the laboratory, we will have to figure out a way to be sure we will maintain those capabilities and keep them world class. Joan [Woodard] and Al [Romig] are working on this issue virtually as we speak. You don’t stay world class in these areas without deliberate and intentional investment.”

Innovation corridor

Tom concluded his prepared remarks by noting that the vision for the nearly completed MESA complex has evolved into a more ambitious concept, which he called the innovation corridor. He showed a brief video that described the innovation corridor, an area encompassing Red Storm, the Computational Engineering Facility, the Weapons Integration Facility, the MicroLab and MicroFab, the new Center for Integrated Nanotechnologies, and other facilities. The video characterized the innovation corridor as a place where Sandia and its partners will collaborate in state-of-the-art facilities to develop innovative solutions to key technical challenges. “We are committed to a strong integration of knowledge, education, collaboration, and problem-solving that makes our world a better, safer, place,” the video narration stated.

“The innovation corridor,” Tom said at the close of the video, “will support what we call a Discovery Institute, which we are putting forward as a place to create new partnerships all around the country in response to the competitiveness initiative the president announced about a year ago. So stay tuned; a lot to be seen there.”

Sensor

(Continued from page 1)

chemistry, David says.

"This diazonium-based surface chemistry can be selectively deposited onto several types of substrates by controlling the charge of the substrate in the diazonium solution," David says. "Because the deposition of the diazonium molecules is based on the application of an electrical potential, the selective patterning of individually addressable electrodes is possible. Upon deposition, covalent bonds are formed with the substrate, producing a highly stable film."

The chemistry is also compatible with a wide variety of biomolecules. DNA, antibodies, enzymes, and peptides all have been patterned onto arrays at Sandia using this chemistry.

After treating the sensor with the target solution, the array is washed and treated with a different solution containing molecules that bind to the other end of the target biomolecule, forming a "sandwich." These secondary labels form an electroactive product that is detected by the electrode.

Says team member Ronen Polsky (1714), "We

are also investigating a new electrochemical detection method, using electrocatalytic nanoparticles, that we hope will eliminate the extra washing and labeling steps. This will greatly simplify the end device."

Some of this work was recently featured in an article in *Langmuir*, published by the American Chemical Society. Diazonium chemistry was used to selectively deposit the enzyme horseradish peroxidase, which was then used to electrochemically detect hydrogen peroxide.

Electrochemical detection holds many advantages over other common optical-based biosensors, Jason says. By eliminating optics and using semiconductor microarrays, the end device is smaller, more rugged, and simpler in design.

Eventually the sensor array will be integrated in a deployable electrochemical sensor that will have an electronic readout identifying the biomolecules detected, or wirelessly transmit the results to a computer or network. Reaching that point will take anywhere from two to five years, says Ronen.

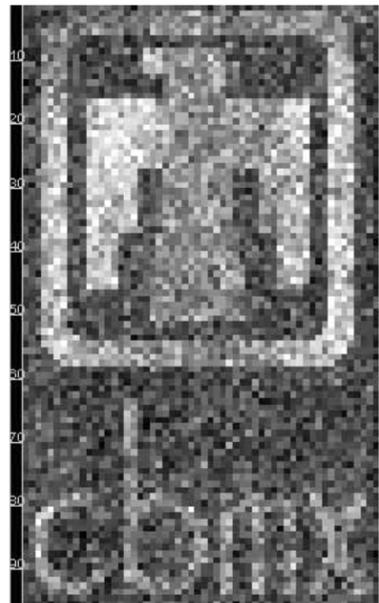
Currently the sensor arrays in the project allow for selective identification of nine biomolecules, Jason says. However, the work has kindled the interest of commercial sensor companies. The

Sandia team recently traveled to Seattle to test their surface chemistry on a commercial array produced by CombiMatrix, a company that specializes in producing semiconductor arrays with more than 12,000 individually addressable electrodes in an area less than one-inch square.

"The team successfully patterned peptide ligands onto 2,151 individual electrodes out of an array of 12,544 electrodes," says Susan. "The resulting electrochemical signal from the captured peptide was used to pattern the Sandia thunderbird symbol as well as the CombiMatrix logo."

Because of this initial success, Sandia and CombiMatrix are pursuing a cooperative research and development agreement (CRADA) for further development of a sensor using Sandia's surface chemistry and CombiMatrix's electrode array, to ultimately test for thousands of biomolecules simultaneously. Funding for this research has been provided by Sandia's internal Laboratory Directed Research and Development (LDRD) program, the National Consortium for Measurement and Signatures

Intelligence (MASINT) Research, a Defense Intelligence Agency program that seeks to promote collaborated research among academia, industry, laboratories, and DOE. CombiMatrix is funded by the Defense Threat Reduction Agency.



SOON-TO-BE SANDIA CRADA partner CombiMatrix's 12,544-electrode array, patterned by Susan Brozik's team to form a T-bird and the CombiMatrix logo. Bright pixels correspond to protein detected on patterned electrodes.

Electrochemical sensor team members

Principal investigator — Susan Brozik (1714)

Electrochemistry — Jason Harper, Ronen Polsky (both 1714)

Surface chemistry — David Wheeler, Shawn Dirk (both 1714)

Link to *Langmuir* paper:

http://pubs3.acs.org/acs/journals/doi/lookup?in_doi=10.1021/la062916a

MWT process

(Continued from page 1)

As a result, senior managers across the Labs recently began the more aggressive "brokering" stage of the MWT process to find additional matches between people's skills and available jobs, says Esther Hernandez (3010), Deputy to the VP for Human Resources.

'Brokering' begins

MWT, which helps the Labs adjust to evolving customer and mission needs, is part of a larger strategic staffing systems approach expected to be an annual process. It is about establishing an intentional, managed approach to aligning the workforce with the work to be done, says Esther.

In an all-hands meeting April 3 at Sandia/New Mexico, Labs Director Tom Hunter said the staffing targets that prompted the MWT

process are "based on a clear vision of Sandia's future size and budgets."

"The Laboratory has to be agile," he said. "We have to have people go to where the work is. This is something we have to master."

How brokering works

Brokering requires senior managers with staffing overages (due to budgetary or program restrictions) to scan lists of job openings into which employees occupying those affected skills groups might be placed based on their skills and abilities.

If a senior manager sees a possible match, that senior manager makes contact with the senior manager with the job opening to discuss the fit and potential transfer. The accepting manager and the employee have the final say in whether to make the transfer.

(There will not be a senior manager brokering meeting, which was a previously considered step. Instead, such interactions will occur on a one-on-one basis during the next few months.)

Both the positions being reduced and the

job openings were identified in a December call from Human Resources Div. 3000. The staffing data was compiled and submitted by each division at Sandia, says Karen Gillings (3550), senior manager for Talent Management.

All employees whose positions are affected have been notified by their senior managers, she says.

'Strong commitment to our people'

For some employees, their current skills may not fully match those needed in an available position. One option, says Esther, for situations where brushing up certain skills can help an employee succeed in a new position, is short-term corporate retraining funds made available as part of MWT. Another option is for organizations to retain a person for several months in anticipation of future work.

As is always the case, a person may not have skills that match the Labs' mission needs. If an individual cannot meet Sandia's current or near-term needs, a separation decision will be made on a case-by-case basis consistent with Sandia's approach in the past, says B.J. Jones, director of Human Resources Center 3500.

"Inevitably the question arises as to what we will do if we cannot move some of the remaining people to other work," says Labs Deputy Director John Stichman. "The changing nature of our business dictates that we become more agile. I am confident that we can match people with work. But if we cannot place someone, we will have to consider other alternatives."

John says he expects that such situations will be relatively few.

"With our strong commitment to our people, and with our staff's commitment to flexibility, this lab will adjust in a way that sharpens its focus on the mission," he says.

As smooth as these processes may sound on paper, there can be a lot of anxiety and frustration, adds Karen. Employees should talk to their managers about the changes, she says. Other available resources include Sandia's Corporate Ombuds, as well as each division's Human Resources Consultants.

"We encourage everyone to communicate their experiences with the MWT process and its subsequent evolution to their management, to HR, or informally and confidentially to Sandia's ombuds," says B.J. "This feedback is essential in improving this new process and ensuring its success."

Shocked ... don't be!

Electrical office equipment is potentially hazardous, causing shocks, burns, and injuries if the equipment is improperly used or maintained.

■ Electrical Hazards Include:

- Ungrounded equipment and/or overloaded circuits
- Overloaded outlets
- Defective, worn, frayed, or cut cords
- Failure to disconnect equipment before cleaning/repairing it

■ Helpful Reminders:

- Inspect cords, equipment, and outlets regularly
- Avoid tripping hazards—roll up excess cords and keep them out of traffic areas
- Use extension cords only temporarily
- Use equipment on/off switches: never pull a plug out by the cord

For additional Electrical Safety information:
<http://zap.sandia.gov>



Winning photos tell Sandia's environmental story

From New Mexico to Tonopah Test Range to Kauai Test Facility – Here are the winners of the 2006 Annual Site Environmental Report photo contest



FIRST PLACE – KAUAI: Dean Manning (5402) found this mother albatross guarding her egg during an annual migration of the “gooney birds” to Kauai. As a safeguard, the birds and their eggs are typically moved by state officials to a preserve across the island.



FIRST PLACE – TTR: Jim Galli listened to a coworker describe a TTR locale with profuse wildflowers and then headed off at sunrise to capture it. He used two exposures to get both the shadow detail and the highlights.



FIRST PLACE – NEW MEXICO: Mark Rumsey (6333) made this photo of Wesley Johnson sitting atop a generator housing on a wind turbine in eastern Colorado, near Lamar.

Mark Rumsey, a field test engineer in Sandia's Solar Technologies Dept. 6333, made a breathtaking photo of colleague Wesley Johnson (6333) working 300 feet above the plains of Eastern Colorado atop a wind turbine. Michael Pacheco (10827) captured the decisive moment as demolition contractors turned Bldg. 805 into history. And technologist Jeff Zirzow (6338) found beauty in a rusty bolt.

These were some of the stories of the winners in the 2006 Annual Site Environmental Report photo contest. Photos entered in the contest are used in an environmental annual report and other web and printed publications of Environmental Management Dept. 10331.

Mark, who isn't particularly afraid of heights, says the key to working on the wind farm projects is being in shape. "I was very involved in the project and there was a lot of climbing up and down," he says. He, Wesley, and other team members instrumented turbines in the Colorado Green Wind Farm to measure nighttime stresses on the structure in special meteorological conditions.

"It's going to be hard to take another picture just like that one," says Michael Pacheco of his demolition shot. As part of his oversight role, he caught the action just as contractors punched through one of the

building's vertical columns.

The Tonopah Test Range in Nevada and the Kauai Test Facility in Hawaii are also part of the annual contest and winning entries are also displayed here. Jim Galli (2915), a test photographer at TTR and occasional contributor to Lab News, won for two of his submissions. The hoarfrost, a rare occurrence at TTR, prompted Jim to take some time to make some landscape shots. His top-placing wildflower shot was actually two exposures combined to reveal the shadow detail and the highlights. Steve Feador (2915) also won for his shot of mustangs on the range.

Dean Manning (5402) took the shot of the mother albatross in the launch field at KTF. Although they look clumsy on the ground, they are beautiful in flight, Dean says. They migrate to Kauai in winter.

Tess Goering and Stephanie Salinas, 10331, coordinated this year's contest. Lab News photographer Randy Montoya and writer Will Keener judged the contest. Winning entries from this and other years can be seen at this website:

http://www-irr.sandia.gov/esh/depts/envmgmt_intgtraining/photocontest.htm



SECOND PLACE – TTR: Steven Feador (2915) captured this quiet moment with a small herd of mustangs on the test range.



SECOND PLACE – NEW MEXICO: Michael Pacheco (10827) was doing his job of documenting the destruction of Bldg. 805 when he caught this action.



THIRD PLACE – NEW MEXICO: Jeff Zirzow (6338) spotted this rusty bolt on a World War II-vintage sled at the ARM Climate Research Facility in Barrow, Alaska.



THIRD PLACE – TTR: Jim Galli, who doesn't get a lot of time from his photometrics duties for "pretty pictures," took an hour to explore an unusual occurrence of hoarfrost on the test range.

Employee death

John Stephens' 'positive, let's do it attitude' will live on

Nationally recognized metallurgist dies at age 51 from complications of cystic fibrosis

Over the nearly 20 years John Laing (1522) knew and worked with John Stephens, he always appreciated his coworker's "positive, let's do it attitude" — whether for mechanical testing or making the strenuous scramble up Cabezon Peak near Rio Puerco Valley.

Laing is just one of the many people who will miss John following his death March 22 from complications of cystic fibrosis at the age of 51. John worked at Sandia as a metallurgist for more than 20 years. At the time of his death, he was in Materials Reliability Dept. 1825.

Laing particularly remembered one hike he took with John at Cabezon Peak.



JOHN STEPHENS

"I recall that John told us about getting his hiking boots down from his home attic after some years of storage," Laing says.

"An hour or so into the hike, John's boot heels debonded from the soles and were flapping, just as we were starting up the chimney crevice. John didn't want to abandon the hike short of the summit, so we lashed the heels on with athletic tape. We had just enough time for ongoing repairs to make it to the summit and return to the trailhead."

John had many personal interests, notes his father, John J. Stephens, Sr. He was an avid numismatist. He also loved financial investing and playing blackjack, an interesting combination. He was especially supportive of the Stanford Cardinals football program.

John had a distinguished career in metallurgy at Sandia. He received a BA degree in physics from Cornell University (1977), an MS in metallurgy from Stevens Institute of Technology (1980), and a PhD in material sciences from Stanford University (1984). He was a Fellow of ASM International, the American Welding Society, the

American Society for Testing Materials, and the Minerals, Metals, and Materials Society.

He was a principal scientist and engineer at Sandia and was widely published with many citations, patents, and awards for scientific papers. He was also acknowledged at the laboratory through employee team recognition, quality, and nuclear weapons program awards, particularly for his work in active metal brazing and high-temperature mechanical properties of engineering alloys.

Survivors include Linda, his wife of more than 18 years; parents John J. and Anna Stephens; brother Nick Stephens of Bronxville, N.Y.; nephews Zack and Richard Stephens of Bronxville; in-laws Bill and Wilma Brown of Milwaukee, Ore.; and uncle Thomas Stephens of Columbus, Ohio.

His family would appreciate any anecdotes from his friends and collaborators at Sandia to use in their service Sunday, April 22, at St. Maron Parish at 11 a.m. Send your stories to Jill Glass at sjglass@sandia.gov or Mike Hosking at fmhoski@sandia.gov. —Chris Burroughs

Sandia signs memorandum of understanding with U of Illinois

Agreement formalizes relationship between two institutions

A memorandum of understanding between Sandia and the University of Illinois at Urbana-Champaign was signed at an official ceremony April 3 at the Urbana-Champaign campus.

The agreement formalizes the relationship between the two institutions and describes common fields of research interest in nanoscience, cognitive neuroscience, information technologies, water technologies, high-performance computing, energetics/combustion, complex systems/system-of-systems, and high-frequency imaging and communications.

Sandia Senior Manager Russ Skocypec (6340), who earned his BS, MS, and PhD in mechanical engineering at Illinois, serves as Sandia's lead representative involved with developing the agreement.

Dave Carlson, director of Nuclear Weapons Planning, Operations, and Integration Center 200, serves as campus executive for the U of I relationship. He says the agreement will allow Sandia and the university to develop and pursue joint research initiatives that leverage both institutions' strengths and infrastructure.

"The general areas of collaboration include activities to support complementary institutional goals and share and leverage specialized research facilities and equipment," says Dave, an Illinois alumnus with MS degrees in astronomy and nuclear engineering. "The agreement will also increase inter-institutional collaborative engagement of faculty, staff, and students."

"By joining our resources together with those of Sandia National Laboratories, we can have a significant impact on an incredibly broad range of research," says Ilesanmi Adesida, dean of



SANDIA AND UNIVERSITY OF ILLINOIS OFFICIALS (from left) David Carlson, Sandia campus executive; Pierre Wiltzius, director of the Beckman Institute; Melanie Loots, U of I associate vice chancellor for research; Wendy Cieslak, senior manager of Sandia's Science, Technology and Engineering Strategic Initiatives; and Ilesanmi Adesida, dean of the College of Engineering, sign a memorandum of understanding for collaborating on a wide range of research efforts.

(Photo by Rick Kubetz, College of Engineering, University of Illinois)

the College of Engineering at the University of Illinois at Urbana-Champaign.

Pierre Wiltzius, director of the Beckman Institute for Advanced Science and Technology, notes that historically the University of Illinois and Sandia have had a very strong relationship in the physical sciences and engineering.

"We are very much looking forward to expanding our interactions with Sandia into new areas including cognitive sciences, neurosciences, and human and computer speech and vision," says Wiltzius. "This expansion will also engage faculty and students from the College of Liberal Arts and Sciences and is squarely aligned with the strategic initiatives of the Beckman Institute and the University of Illinois."

Sandia currently has 19 active agreements with 15 universities across the US.

— Stephanie Holinka

Labs senior management changes announced

Labs Director Tom Hunter has announced the following executive management changes, effective immediately:

- Deputy Labs Director John Stichman is taking on the additional role of acting VP for Infrastructure Operations and Business Management Div. 10000. Frank Figueroa has taken an assignment to support Lockheed Martin in pursuit of new DOE business opportunities. Frank remains a VP on special assignment to John Stichman.

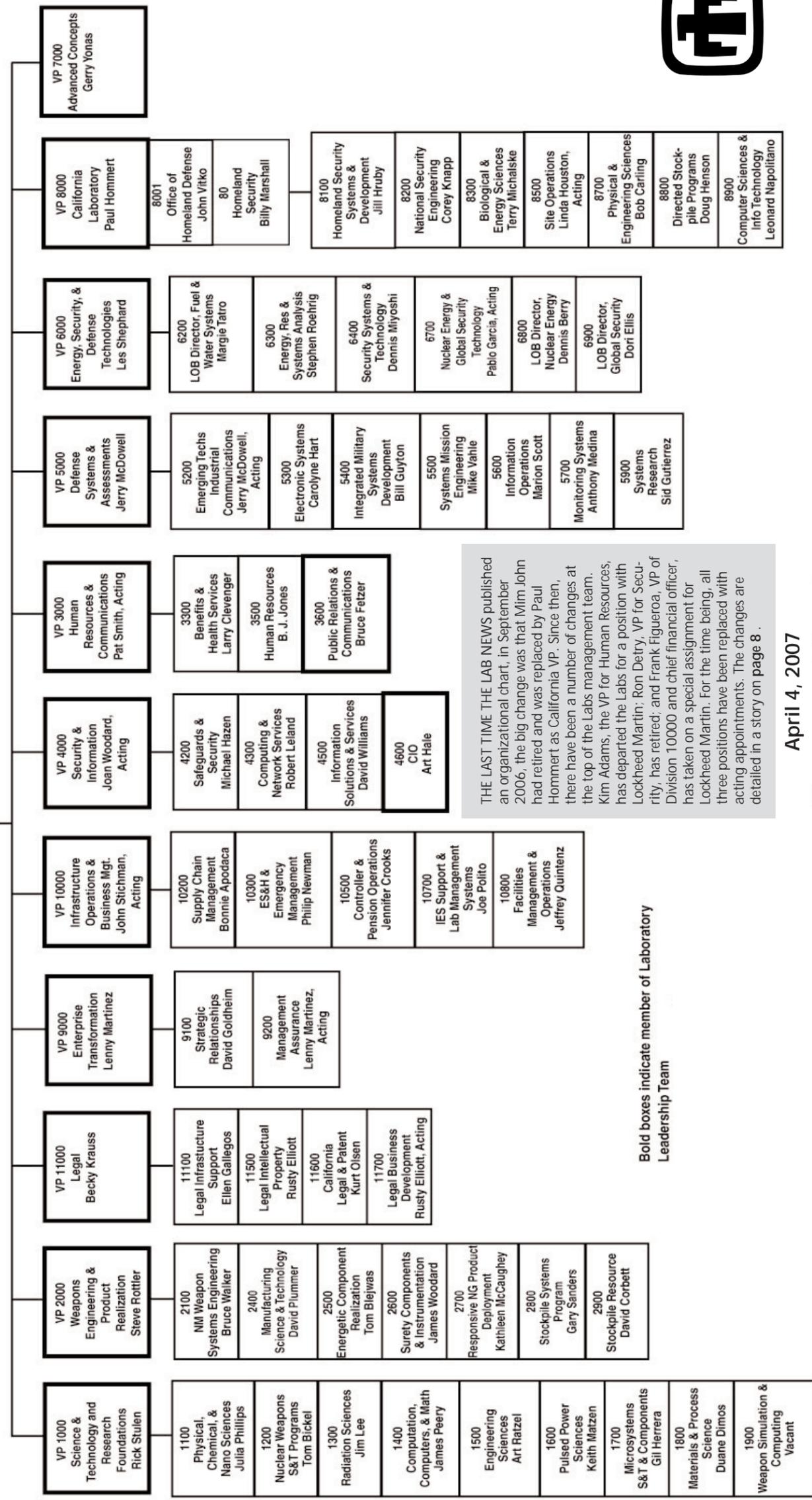
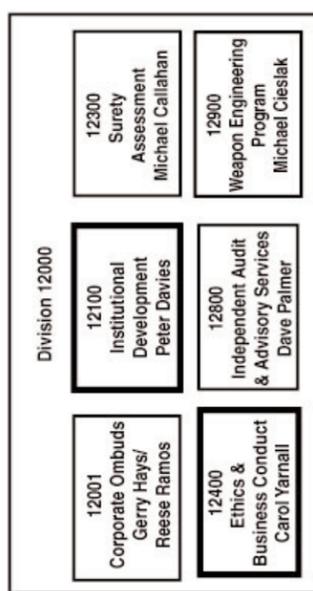
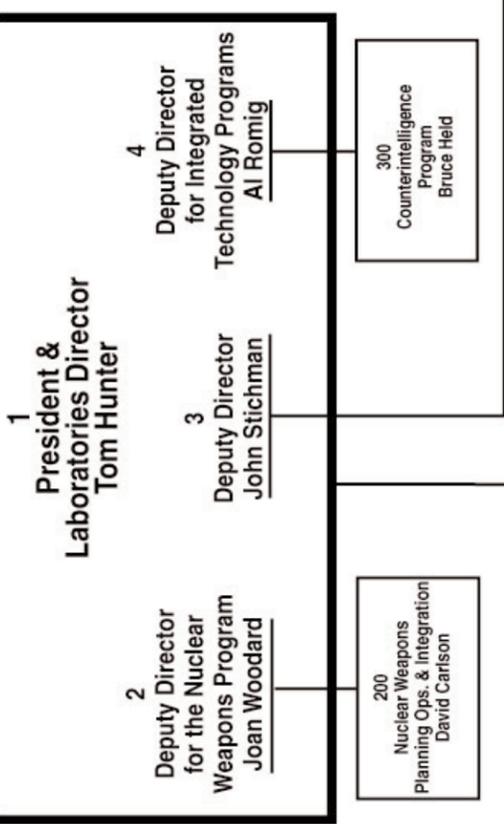
- Jennifer Crooks, director of Controller and Pension Plan Center 10500, is taking on the additional role of acting chief financial officer.

- Labs Deputy Director for Nuclear Weapons Joan Woodard is taking on the additional role of acting VP for Security & Information Div. 4000. Art Hale, who recently was named Sandia's new chief information officer, is taking on the additional role of acting chief security officer. Ron Detry will remain a VP in Division 4000 on special assignment until he retires in May.

- Gerry Yonas, VP of Advanced Concepts Div. 7000, is taking on new responsibilities that support Sandia's engagement on the national scene. Current staff and management of the Advanced Concepts Group will move to the Strategic Futures Group in the new Center for Institutional Development (12100). Gerry will be working closely with Institutional Development, the Labs' Strategic Management Units, lab fellows, and senior scientists.

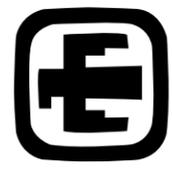
- As recently announced, Pat Smith is acting VP of Human Resources and Communications Div. 3000. Kim Adams recently left Sandia to assume a new position as VP of Human Resources-Enterprise Operations at Lockheed Martin headquarters in Bethesda, Md.

The changes announced here are reflected in the new org chart reproduced on the next page, as are changes at the director level that have occurred since the last org chart was published in the Sept. 29, 2006, issue of the *Lab News*. As various acting assignments are replaced with permanent appointments, the *Lab News* will publish an updated org chart to reflect those changes.



THE LAST TIME THE LAB NEWS published an organizational chart, in September 2006, the big change was that Mim John had retired and was replaced by Paul Hommert as California VP. Since then, there have been a number of changes at the top of the Labs management team. Kim Adams, the VP for Human Resources, has departed the Labs for a position with Lockheed Martin; Ron Deiry, VP for Security, has retired; and Frank Figueroa, VP of Division 10000 and chief financial officer, has taken on a special assignment for Lockheed Martin. For the time being, all three positions have been replaced with acting appointments. The changes are detailed in a story on page 8.

Bold boxes indicate member of Laboratory Leadership Team



Mileposts

New Mexico photos by Michelle Fleming
California photos by Randy Wong



John McBrayer
30 1732



Cecilia Castillo
25 10243



Chris Andreski
15 8700



Deborah Belasich
15 6321



William Hendrick
30 10824



Larry Thorne
25 8134



Michele Kahn
15 8949



Hans Papenguth
15 2522



Timothy Malone
30 6752



Kathryn Hughes
20 8248



Robert Mariano
15 8774



Laura Santos
15 8529

Recent Retirees



Robert Baron
43 1732



Wilson Barnard
39 1736



Ron Detry
37 4000



Jerry Esch
31 4550



Tobias Barros
26 4341



Pam Seigal
24 5624



Meredith Thompson
12 10300

Retirees: Intel International Science & Engineering Fair needs volunteer judges May 15 & 16

Certain categories in critical need



Calling all retirees . . . if you have a technical degree and expertise in certain fields of math and science, the Intel International Science & Engineering Fair (ISEF) 2007 desperately needs you.

Some 1,500 precollege students from around the world, winners in their regional competitions during the past several weeks, are sprucing up their projects and booking flights to Albuquerque to participate in the Intel ISEF in Albuquerque May 13-19.

All they need now are qualified judges to evaluate their work. More than 125 Sandia employees have volunteered to serve as judges, along with another 700-plus technically trained New Mexicans.

Host committee judging cochair Len Duda (5715) says judging shortages remain in the following categories: biochemistry, microbiology, animal science, behavioral & social sciences, plant sciences, medicine & health, environmental science, chemistry, math, and materials & bioengineering.

"We are in good shape in the other categories," he says. "To put on a first-rate science fair, we need more help in these areas."

Judges must have a PhD, M.D., or equivalent, or a BA, BS, or master's degree with a minimum of six years of related professional experience. To volunteer, visit the Intel ISEF website at www.intelisef2007.org and click on "judges," then fill out and submit the online registration form.

The commitment is two days: Tuesday afternoon, May 15 (includes orientation) and all day Wednesday, May 16.

"It's a tough but rewarding experience," says Len. "You get a chance to talk to students who are very self-motivated and enthusiastic about their work."

Feedback

A 'vicious rumor' about pension plans

Straight answer: No active plan to make pension plans in their current form go away

Q: I have been hearing a vicious rumor that our pension plan will be going away. I hope that what I have been hearing are just, in fact, rumors as the reason I came to the Laboratories was because of the excellent benefits plan that it offered. How can a laboratory such as this expect to recruit the "best minds" in the industry if it will not even provide them with a decent pension plan? According to what I have been hearing the "defined" plan that Lockheed Martin now offers its employees is nothing more than a glorified savings account.

A: The straight answer to your concern is that Sandia is not actively considering terminating either its Retirement Income Plan or Pension Security Plan that covers current employees and retirees. Any changes to the Pension Security Plan must be negotiated with the labor unions that represent the employees covered by that plan. We are mindful of the role played by employee benefits in attracting and retaining employees, and Sandia's management continues to evaluate our benefits package, including retirement benefits, to ensure that it remains cost effective and competitive among our peers.

At the same time, it is important that we all remember that the landscape for private sector pension plans is currently evolving. Lockheed Martin and other peer companies have recently made changes to their retirement programs. Lockheed Martin closed its defined benefit pension plans to employees hired after Jan. 1, 2006, although employees hired before that date who were covered

by the plans continue to participate and earn additional benefits. Los Alamos National Laboratory also closed its pension plan to new hires effective June 1, 2006, but provided "substantially equivalent" pension benefits for its incumbent employees. A similar requirement has been included in the RFP for the contract to manage Lawrence Livermore National Laboratory. In each case, newly hired employees were provided with an enhanced defined contribution plan instead of a defined benefit pension plan. This trend is apparent among many other large private sector firms, with companies such as IBM, Hewlett Packard, and Motorola making similar changes. — Mark Biggs (10520)

Q: Recently, while donating blood, I saw people giving their badges to the technician in the BloodMobile. The technician would then attach the paperwork to the badge so that there would be no confusion as to whose paperwork goes with whom. The badges were out of the employees' possession for a short while but they were always visible. Is this an acceptable practice?

A: As a result of this issue, we have contacted the BloodMobile staff and notified them that using a Sandia security badge as identification is unacceptable. We have requested they ask employees/contractors for a state- or government-issued drivers license or ID or Sandia ID card instead. If you observe this practice in the future please remind blood donors that their Sandia badge is to be used only for official government business.

— Sally Uebelacker (4230)



Swarmy saves the day: Robot completes cleanup in Tech Area 5

Story by Stephanie Holinka • Photos by Randy Montoya



DOUG EVANS INSPECTS SWARMY after its tour of duty in the wastewater storage tank.

This past week, Swarmy the robot completed his cleanup assignment — removing the last drum-full of thick sludge from the bottom of a deeply buried storage tank in Area 5.

The 47-year-old tank's shape, depth, and position had made cleanup efforts difficult. Its low-oxygen, confined-space environment had precluded manned entry and inspection.

The tank bottom had a thin layer of old sludge on it that tested positive for extremely small but detectable amounts of radioactive forms of uranium, cobalt, and cesium; additionally, nonradioactive chemicals such as arsenic and cadmium were measured in extremely low concentrations. The sludge had to be removed before the tank could be closed.

"It took a year to find the right process," says Paul Raglin (1380), senior manager for nuclear facilities operations. "The amount of work that got done once we found the right one is amazing."

In only a few weeks, Swarmy removed almost fourteen 50-gallon drums of sludge from the tank in preparation to meet New Mexico Environment Department closure requirements.

The robot was recycled from one of John Feddema's (6473) DARPA programs and pressed into service removing the sludge from the old wastewater storage tank.

Doug Evans, John Montoya, and Jason Garner, all from J.B. Henderson Construction, guided Swarmy remotely as it first pulled a scoop through the sludge and in the final efforts vacuumed the sludge from the tank bottom with a modified Shop-Vac®.

The sludge-free tank will be removed from operation and monitored, awaiting eventual demolition when the building it served is also decommissioned.

Swarmy the robot, the engineers who modified him, and the operators who guided him, Paul says, helped Sandia solve a problem that could have been expensive and dangerous to fix if human beings had to enter the tank and clean it by hand. Swarmy, he says, did it quickly and at a very low cost.

Perhaps, Paul muses, some grateful Sandian should nominate Swarmy for this year's Employee Recognition Awards in appreciation for the robot's exceptional service.



LOOK CLOSELY — J.B. Henderson employee Doug Evans and Sandia Site Office water quality program manager Karen Agonino observe the final drum of sludge.

UP AND OUT — Doug Evans (left) and David Siddoway (10328) pull Swarmy out of the tank for the final time.

