**Sandia, SES set new world record for solar-to-grid efficiency**

**31.25 percent efficiency rate topples 1984 record**

By Chris Burroughs

On a perfect New Mexico winter day — with the sky almost 10 percent brighter than usual — Sandia and Stirling Energy Systems (SES) set a new solar-to-grid system conversion efficiency record by achieving a 31.25 percent net efficiency rate. The old 1984 record of 29.4 percent was topped Jan. 31 on SES’s “Serial #3” solar dish/Stirling system at Sandia’s National Solar Thermal Test Facility.

The conversion efficiency is calculated by measuring the net energy delivered to the grid and dividing it by the solar energy hitting the dish mirrors. Auxiliary loads, such as water pumps, computers, and tracking motors, are accounted for in the net power measurement.

“Gaining two whole points of conversion efficiency in this type of system is phenomenal,” says Bruce Osborn, SES president and CEO. “This is a significant advance that takes our dish-engine systems well beyond the capacities of any other solar

(Continued on page 4)

**New protection methods keep labs’ mobile devices mobile**

By Charles Shirley

Imagine not being able to take a laptop computer, personal digital assistant, or even a flash drive containing a few documents outside the Sandia fences. Because of broadly publicized incidents in which personal information was compromised when laptops or other hardware was lost or stolen, DOE was considering a ban on removing any mobile device from DOE sites, says Sandia Chief Information Officer Art Hale (9600).

Sandia and its sister labs Los Alamos and Lawrence Livermore, along with the federal government, have addressed critical mission and operational issues Sandia will be dealing with over the next few years. The all-hands meeting, held Feb. 6 in the Steve Schiff Auditorium, attracted a full house of Sandians and was viewed via video link at other Sandia sites around the country.

Tom noted that the evolving national security environment poses challenges the Lab’s leadership has addressed in the current strategic plan.

(Continued on page 5)

**Moving into an era of broader national security engagement**

Tom Hunter’s all-hands meeting focuses on future

By Chris Burroughs

Note: On Feb. 6, Labs Director Tom Hunter conducted the first all-hands meeting of 2008. The hour-and-a-half session began with Tom citing a number of key accomplishments from FY07 and noting that FY08 looks to be an “extremely exciting time” to provide exceptional service in the national interest. Tom’s all-hands included about 65 minutes of prepared remarks and 25 minutes of questions and answers. The following story highlights just a few of the key subjects addressed by Tom.

In his first all-hands meeting of 2008, Sandia President and Labs Director Tom Hunter addressed critical mission and operational issues Sandia will be dealing with over the next few years. The all-hands meeting, held Feb. 6 in the Steve Schiff Auditorium, attracted a full house of Sandians and was viewed via video link at other Sandia sites around the country.

Tom noted that the evolving national security environment poses challenges the Lab’s leadership has addressed in the current strategic plan.

“Each of our two strategic management groups — Nuclear Weapons and Integrated Technologies and Systems — has mapped out a strategic future, which is spelled out in the strategic plan. It basically says we will move the nuclear weapons complex into a new posture and that the national laboratories will be moving into the broader arena of national security.” In that role, Tom said, the national laboratories will not only carry on with their traditional nuclear weapons mission but also will increasingly apply their capabilities to a broad set of

(Continued on page 5)
That's that.

The other day I went through a routine medical procedure, which in the interest of delicacy I won't describe in any detail. Suffice it to say that this particular procedure has been called a “rite of passage” for so-someting. There’s no telling when you’re born before surgery, you may be launched probably know what I’m talking about. For the rest of you, well, you’ll find out soon enough.

The procedure itself is innocuous enough; it really is routine. A bit more problematic is the prep for the procedure. The instruction sheet I got from my doctor said that starting three days before said procedure was not to ingest any fruit or vegetables. I was especially cautioned not to eat anything containing seeds. So far, so good.

But I grabbed my attention was the new admonition. Do not, under any circumstances (it said) eat any green chile. And I thought to myself, only in New Mexico would you see a note like that. Someone from away would read that warning and shrug it off as a harmless bit of local eccentricity. No big deal. Of course, we New Mexicans know that it’s not as simple as that.

“No green chile” basically means: no breakfast (‘cause you’ve gotta have green chile with your scrambled eggs or breakfast burritos); no lunch (because you just can’t bring yourself to eat a hamburger sans chile verde); and — especially in this bleak midwinter — no supper (because it’s this cold for this long, all you want to do is eat green chile strew by the gallon).

But I’m a good soldier, and I sure didn’t want to go through this process twice, so I followed the prep instructions to the letter. And, per those instructions I didn’t eat a single thing in the 24 hours leading up to the procedure. (I won’t talk here about the junk you have to drink . . . or why.)

But the procedure itself? I was out cold and that’s fine with me. When I woke up, I was hungry as all get-out. After getting a debrief from the doctor, my wife was there to drive me home. We got about a mile down the road when I suddenly – and probably rather alarmingly — insisted that she take a quick right. Into one of those familiar red-and-white tiled hamburger stands. I just had to have a green chile and cheese Lotaburger. Best I ever had.

Our next issue of the Lab News will be something special. We won’t be mailing out the regular newspaper. In its stead, we’re distributing our annual Labs Accomplishments publication. In my humble and totally unbiased view, it’s the best single summary of Sandia’s work that you’ll find anywhere. When you look through its 12 colorful pages and see the full breadth and depth of the work we do for the nation, I think you’ll agree that the breadth and depth of the work we do for the nation, I think you’ll agree that anyplace. When you look through its 12 colorful pages and see the full breadth and depth of the work we do for the nation, I think you’ll agree that anyplace.

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A note related to the above: Because we won’t be doing a regular Lab News for Feb. 29, we won’t be doing a classified ad page. The next issue that will include ads will be March 14. The ad deadline for that issue is noon March 7.

See you next time.

— Bill Murphy (505-845-0845, mwrmp@sandia.gov)
Fresh off innovative ‘bionic contact lens’ project, Harvey Ho brings growing reputation to Sandia

By Patti Koning

A surgeon is in the middle of a complicated procedure and doesn’t want to take his eyes away from his patient. He doesn’t have to — thanks to a bionic contact lens that displays the patient’s vitals in his field of vision.

Or, imagine a driver who doesn’t need to look away from the road to see critical information because it’s projected onto his windshield.

Another scenario is a diabetic who sees an LED flash in the corner of his eye when his glucose levels begin to drop.

That might sound like the stuff of science fiction, but not to Harvey Ho, who was hired in September to the Surety Design Engineering Dept. 8226 at Sandia/California. Last year Harvey completed his MS in electrical engineering at the University of Washington (UW) under Babak Parviz, an assistant professor of electrical engineering.

For his master’s thesis, Harvey designed the circuitry that would go around display elements, such as LEDs for what is being referred to as the “bionic contact lens.” He presented the results at the International Conference on Microelectronics and Electronics Engineers’ International conference on Microelectromechanical Systems last month.

Building the contact lenses posed a technical challenge because materials that are safe for use in the body, such as the flexible organic materials used in contact lenses, are delicate. Manufacturing electrical circuits, however, involves inorganic materials, scorching temperatures, and toxic chemicals.

Harvey and other researchers built the circuits from layers of metal and silcon dioxide — only a few nanometers thick, about one-thousandth the width of a human hair, and constructed light-emitting diodes one-third of about one-thousandth the width of a human hair, and constructed light-emitting diodes one-third of a millimeter across. They then sprinkled the grayish powder of electrical components onto a sheet of flexible plastic. The shape of each tiny component dictates which piece it can attach to. A microfabrication technique known as self-assembly. Capillary forces — like those that make water move up a plant’s roots and cause the edge of a glass of water to curve upward — pull the pieces into position.

Harvey began working with Parviz as an undergraduate at UW. Math and science interested him from a young age.

Always interested in how things work

“I grew up surrounded by technology, always very interested in how things work,” he says. “In high school I had some great physics and math teachers who put me on the scientific track.”

The project, now in prototype stage, recently garnered media attention from the likes of National Geographic News, The Economist, CNBC columnist Bryn Nelson, Science Daily, CNET, Seattle Post-Intelligencer, EEtimes, Fox News, and technology bloggers worldwide.

At just 24 years old, Harvey has attained the type of high-profile accomplishment many researchers dream about. “I did feel I was working in something cutting edge, something that kept me going when I worked in the lab late into the night,” he says. “I feel like I have contributed something meaningful to the field of electrical engineering.”

Parviz describes Harvey as a solid engineer who is an asset to any company or organization that is fortunate enough to have him onboard.

Coming to Sandia represents the next step in his career. He was attracted by the variety of research and top-notch facilities such as MESA. “It’s not quite academia, but not quite industry,” he says. “You can draw upon a lot of different people from many different disciplines.”

Sandia/California named winner of Environmental Spirit Award by Livermore Chamber of Commerce

By Mike Janes

Sandia/California has been selected by the Livermore Chamber of Commerce as recipient of its inaugural Environmental Spirit Award. The award was presented to Sandia for its environmental programs and ongoing commitment to protecting the environment and wildlife on the laboratory’s 400-acre site, says Dale Kaye, chamber president and CEO.

“Sandia has not only shown tremendous sensitivity to the land it occupies, but also a dedicated commitment to its community,” says Kaye. “This is an organization that helps to protect our world and we are delighted to be able to present them with this award.”

Gary Shamber (8516), manager of the site’s environmental management department, considers environmental stewardship to be a fundamental obligation shared by all Sandia employees and staff.

“Many of our program objectives have been specifically designed to not only minimize our environmental impacts in the local community but also to preserve the natural environment and resources that we share,” he says.

Sandia was presented with the award during the Livermore Chamber of Commerce annual Installation and Community Awards Gala Feb. 2. In his acceptance speech on behalf of Sandia, Gary emphasized the growing importance of environmental stewardship by individuals, companies, and communities.

“[W]hen one considers the state of our planet it is evident that we all have much work to do to correct the ills of the past and the undesirable trends of the present,” he says. “As a Native American proverb says, ‘We do not inherit the earth from our ancestors, we borrow it from our children.’”

Last spring Sandia/Caifornia won a DOE Pollution Prevention (P2) Star Award for the implementation of the site’s Environmental Management System (EMS). The site’s EMS has been ISO 14001-certified since September 2006.

The International Standards Organization (ISO) specifies the requirements for establishment of EMSs. Sandia’s EMS includes all of the elements of ISO 14001:2004. Among the many different components of the EMS are: policies; objectives and targets; procedures for identification, monitoring, and measurement; preventive and corrective actions; involvement at all levels; and continuous improvement.
Sandians demonstrate verve in transferring Labs technology to private sector

Four awards from Federal Laboratory Consortium exceed in number every other federal lab

By Neal Singer

Three Sandia research teams and one Sandia executive have won national awards for their skills in making technology transfer happen.

Team trophies and individual leather-bound certificates will be provided to 2007 winners on May 8 in Portland, Ore., by the Federal Laboratory Consortium (FLC), the nationwide network that helps link federal laboratories with the marketplace.

The four awards (one was joint) were the most won by a single federal lab. The labs will certify that laptop computers serve an industrial need; encrypt sensitive information; and chair of the CSU Deployment Team that tests procedures protect Sandia from threats introduced by using laptops, LOFT offers foreign travelers BlackBerrys and external hard drives.

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The labs' portfolio includes LOFT's award-winning Secure Sensor Platform, which is a perfect storm of sorts. The Secure Sensor Platform (SSP) is a technology commercialization in national and regional forums. The applications for the awards were coordinated by Margaret Lowell (0304) and Jackie Kirby Moore (1033).

The FLC, organized in 1974, according to its own role in national initiatives where technology transfer has a vital role.

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national security customers. “Joan and Al and Les and Paul and Jerry Mc Dowell all are spending time each day meeting these strategic objec-
tives,” Tom said. “We’re referring, respectively, to Deputy Labs Director for Nuclear Weapons Joan Woodard; Deputy Labs Director for Integrated Technologies and Systems Al Romig; Energy, Resources, and National Security Management SMU VP Les Shepherd; Homeland Security and Defense SMU VP Paul Hommert; and Defense Systems and Assessments SMU VP Jerry Mc Dowell.

Regarding the broader role of the national labs, Tom said that the workforce restructuring is already under way and therefore necessary. “We have to keep that in our mind to ensure that partnering with other national security cus-
tomers is ‘not just tolerated but encouraged.’”

“Tom said, referring to Deputy Labs Director for Nuclear Weapons Joan Woodard; Deputy Labs Director for Integrated Technologies and Systems Al Romig; Energy, Resources, and National Security Management SMU VP Les Shepherd; Homeland Security and Defense SMU VP Paul Hommert; and Defense Systems and Assessments SMU VP Jerry Mc Dowell.

But why reduce the costs at all? Tom said a number of looming cost increases stand poised to impact Sandia’s cost doing business by about 10 percent. “We have more money to pay for that. No one says, ‘Here’s more money because you have more costs.’” They say, ‘Here’s the same money you expected; you figure out how to deal with the costs.’ Simply put, we don’t want to wait until 2011 and say, ‘Oh, we have to reduce the workforce by 10 per-
cent so that we can pay the pension for the 90 percent that will still be here.”

Tom noted that local media coverage of the federal budget process has suggested that Sandia’s workforce siz-
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mately approved by Congress, Ken Karpman said. The Intent of labs leadership, Tom said, is to reduce costs as needed. The Labs did not order a permanent reduction, and it will not.

Red Storm to be upgraded from 124 to 284 teraflops
By Neal Singer

Sandia’s Red Storm supercomputer is expected to be heavily utilized by all three NNSA labs. Tom assured the audience that manage-
domestic customers. The initial research and development program was focused on solving problems through att. But why reduce the costs at all? Tom said a number of looming cost increases stand poised to impact Sandia’s cost doing business by about 10 percent. “We have more money to pay for that. No one says, ‘Here’s more money because you have more costs.’” They say, ‘Here’s the same money you expected; you figure out how to deal with the costs.’ Simply put, we don’t want to wait until 2011 and say, ‘Oh, we have to reduce the workforce by 10 per-
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**An ethical imperative for engineers**

Note in observance of National Engineers Week, celebrated this year Feb. 17-23, the Lab News seeks Executive VP and Deputy Lab Director John Stichman to be the voice of the views of Sandia engineers on a number of subjects. This is John’s article here in his Sendai Technology Symposium presentation: An Ethical Imperative — Drawn from Engineering History. A foreword by Tom Davis, former director of the lab, sets the stage in terms of what the views are, recognition of the importance of ethical issues for engineers, and the expected benefit of engineers bringing a special knowledge in serving a beneficial societal need. In doing so, we are expected to obey the moral minimum — “First of all, do no harm.” Each major discipline within engineering contributes to helping us to do so, but the ethical imperative is not typically discussed, yet we’re at the forefront of good sound engineering. Take positive steps to avoid avoidable errors.

### By John Stichman

1. **Demonstrate utter integrity with respect to the engineered object.**

As a learned view, the Voss, in 1518, Sweden was a major European power, and King Gustavus Adolphus had commissioned a warship to stand against the Swedes. During construction, the designer feared the ship would be prone to capsizing, so he ran tests back and forth across the deck. The ship rode so much that the trees were knocked down. But the king really wanted the ship, so the designer ignored the test and finished the ship. It sank after sailing only a nautical mile with great loss of life.

The saga of the Voss offers an example of “ballistic thinking” rather than “critical thinking.” When we think ballistically, we are essentially bound on a fixed trajectory, ignoring information that would correct our path to our “target.”

When we run tests, we are asking a question of our product, and it behooves us to answer it to its completion. We must be extraordinarily wary in handling test information, because it is one of the keys to our product. Critical thinking involves the “critical least.”

2. **Communication is an ethical endeavor.**

Our management, our customers, and the public have a right to know in our special knowledge as professionals. And clearly, our advice and our insights must be communicated in an effect to be effective, though we may go beyond sharing information to sharing meaning or interpretation. Quite simply, this is the nature of the challenge.

The space shuttle Challenger’s engineers desperately needed to get across the seriousness of the effect of low temperature on the booster O-rings. Their plea was flimsy, factual, and passionate, but the temperature curve was obtained by other data, making the relationship between temperature and O-ring failure unclear, and so the fatal launch decision was made.

3. **Consider the human factor.**

The burgeoning of automated systems has brought great benefits to quality of life for some people, but it also has brought great perils to others. The perils of automation between human autonomy (self-governance and machine automation self-acting).

The Ariane 5’s A320 was only indirectly controlled to run, and software supplied the commands to the 100 or so of its elements. The A320 in the photo here from the 1996 launch on Feb. 1988 shows at Halberstadt, Germany. Subsequent analysis determined that the aircraft’s flight control system was prevented the A320 from climbing into a disastrous low-altitude maneuver. Had the human attempted to fly over the face fire more effectively implemented during the launch, the pilot to more readily assume control when necessary, the aircraft almost certainly would have been lost. As it happens, three of the 136 passengers on board the aircraft were killed.

4. **Plan: The essence of engineering.**

A plan is more than a project schedule; it is a product of deliberation in which the structure of the work, the interdependencies, resources, and risks are defined, considered, and turned into something that a person can say someone once said, “If you are failing to plan, you are planning to fail.”

This deliberate change of the planning and construction of the Queen Mary of the Clyde in 1934, the ship was a heap of metal and all the way across the decks. The project was a failure, and the ship was abandoned. It was the total, complete disaster. The ship was not only attempted, but the design was also successful. The plan was the design. The planning and the execution of the plan were the design. Critical thinking involves the “critical least.”

5. **Obtain thorough, objective, and authoritative reviews of the work.**

The concept is simple. It is just too easy to overlook one’s own mistakes, and the peer review must not be a friendly review intended to check our work. The Ariane V launch of June 4, 1996, was a glorious demonstration of the European Space Agency’s capability in satellite deployment. Actually, 36.7 seconds into the flight, one guidance software routine handed off control to another, incompatible one, and the result was a $500 million, highly embarrassing disaster for the ESA.

The software incompatibility encountered during the Ariane V launch was the type that could have been — and obviously should have been — caught in an appropriately planned set of reviews.

6. **Know thy product (with apologies to Socrates).**

We are now de to establish a deeper understanding of what we’re engineering, the more we can gain insight into how the product functions, what’s going on inside, etc., the more we can discover and correct problems before they cause catastrophes.

As engineers, we gain insight through the models that we study, and here I mean models in a broad sense theoretical, computational, and physical (testing). When insight is gained in a robust, balanced way, we can gain great insight. Today we have unprecedented capabilities in computational modeling, an ability that can make transparent that has been previously held only by behavoiral and computer systems, and therefore we have an ability to inquire into what-if and therefore we have an ability to inquire into what-if and therefore we have an ability to inquire into what-if and therefore we have an ability to inquire into what-if and therefore we have an ability to inquire into what-if and therefore we have an ability to inquire into what-if and therefore we have an ability to inquire into what-if and therefore we have an ability to inquire into what-if and therefore we have an ability to inquire into what-if and therefore we have an ability to inquire into what-if and therefore we have an ability to inquire into what-if and therefore we have an ability to inquire into what-if and therefore we have an ability to inquire into what-if and therefore we have an ability to inquire into what-if and therefore we have an ability to inquire into what-if and therefore we have an ability to inquire into what-if...what is the point of this?

7. **Work with discipline and pride.**

Engineering is a disciplined approach to the creation of things. Still, it is very tempting to take shortcuts because the rewards for doing this are preserves, but unfortunately, that insight and expertise were only sought out after the fact. We can now ask, “What if this had been done earlier in the program?”

Final thoughts

Having opened this essay with a statement by a prominent person, let me close with another. “Concern for Man [sic] himself and his fate must always form the chief object of our mind. Our main endeavor should have been conducted by objective experts who themselves were not too close to or personally invested in the actual mission.

— Albert Einstein

### About the author

Executive VP and Deputy Lab Director John Stichman came to Sandia in 1972, before assuming his current role in 2005. Prior to that he worked at 3M and before that, he was a research scientist at NASA’s Ames Research Center. Stichman is a senior member of the Institute of Electrical and Electronics Engineers and is a recipient of the “Award of Merit” from the American Society for Engineering Education.

John received a BS, MS, and PhD in electrical engineering from the University of Wisconsin in 1969. He then spent three years at Sandia in research.
39 Sandians move into Distinguished, Senior ranks

Sandia’s special appointments represent employees from all areas of the Lab’s operations: Senior Scientist/Engineers, Distinguished Members of Technical Staff, Distinguished Members of Laboratory Staff, Distinguished Technologists, and Distinguished Administrative Staff Associates. Thirty-nine Sandians were honored with special appointments in 2007.

According to Corporate Process Requirement documents, “Placement in the Distinguished Level signifies a promotion to the highest level of the Technical Staff, Laboratory Staff, Technologist, or Administrative Staff Associate Ladder. This level is different from the other levels in that it is subject to a 10 percent population limitation to preserve the distinction of the level.”

Traditionally, one of the Lab’s key “total rewards” incentives has been the quality of the folks who work here. Being able to offer prospective employees the opportunity to work with the most highly regarded people in their fields is a powerful recruiting tool. The individuals pictured here represent the world-class quality of the Lab’s workforce at its best.

Employees selected for the new levels have been recognized with a special plaque and a nontenure salary award, in addition to this special mention in the Lab News.

The Distinguished and Senior levels are part and parcel of the Integrated Job Structure (IJS) goal of providing multiple career paths for employees. The IJS’s dual-track structure — management and staff — makes it possible for employees to advance in salary, prestige, and recognition without following a management track.

As has been its tradition for many years, the Lab News presents photographs of Sandians who have received special appointments this year. Not pictured here are: Mark Ackerman (5928), DMTS; Don Jelinek (5354), DMTS; Jerry Stofleth (5434), DMTS.

Divisions announce DMTS, DMLS, DTNG, DASA, Sr. Scientist/Engineer, Senior Administrator appointments

DMTS — Distinguished Member of Technical Staff
DMLS — Distinguished Member of Laboratory Staff
DASA — Distinguished Administrative Staff Associate
DTNG — Distinguished Technologist
Sr. Sci/Eng — Senior Scientist/Engineer
Sr. Admin — Senior Administrator

DMTS  6342  Dennis Anderson
DTNG  6473

DMTS  10244  Pauline Brutkas
DASA

DMTS  6051  Loretta Humble
DASA

DMTS  4221  Tim Lucero
DMLS

DMTS  5416  David Marks
DMLS

DMTS  4856  Patrick Ortiz
DTNG

DMTS  5356  Cory Ottesen
DMTS

DMTS  5416  Dave Outka
DMTS

DMTS  6771  Paul Pickard
Sr. Sci/Eng

DMTS  9326  Mahesh Rajan
DMTS

DTNG  10200  Skip Reeder
Sr. Admin

DTNG  2453  Duane Schneider
DMTS

DTNG  2132  Scott Skozak
DMTS

DMTS  2137  Colin Smithpeter
DMTS

DMTS  5338  Jeff Spooner
DMTS

DMTS  0330  Dorothy Stermer
DMTS

DTNG  4139  Bill Suderman
DMTS

DTNG  9532  Rebecca Ulrich
DMLS

DMTS  6345  David Wick
DMTS

DMTS  5733  Steve Yearout
Legendary facility comes down after decades of distinguished service

By Neel Singer

No one interceded when a number of Sandians with gold-plated, long-handled, six-pound sledgehammers attacked the white-painted cinderblock walls of one of the closest things to a national historic site at Sandia: the CSRL (Compound Semiconductor Research Laboratory) building. At least one of the vandals expressed qualified remorse.

“There’s always sadness seeing something that represents a big part of your technical life at Sandia going down. But look at the new Microfab and MicroLab [of the MESA Center] taking its place,” says senior manager Tom Zipperian (1740). “It was definitely a fair trade.”

The building, first conceived as a storage building and completed in 1957, metamorphosed into the Laser Physics Lab in 1970, and — with Tom leading the way — into the CSRL in 1987. “Zipperian was the visionary who turned the building into something it became for the next 20 years,” says senior manager Bill Jenkins (420).

Tom credits then-VP John Galt as the man responsible for the installation of “clean rooms” in the building, then-manager Paul Peery for pushing the CSRL through to completion, and Roger Chaffin as another visionary on the project.

Though conceived as an interim facility expected to last only five years, the building and its innovative occupants persisted when an attempt in the early ’90s to line-item a microtechnologies laboratory was killed for lack of program justification, says Tom.

The CSRL-based researchers used their borrowed time well. Workers at the lab were credited with discovering the unique electrical and optical properties of strained-layer superlattices and creating the first epitaxially grown monolithic vertical-cavity surface-emitting laser (VCSEL). It would be hard to overstate the importance of just these two discoveries to modern technology, and there were others.

The complex grew to include 6,500 square feet of class 100 clean rooms, nine epitaxial growth systems, electron-beam lithography, deep etching, and high-density plasma reactive ion etching.

In the divisions between research, development, and application, CSRL was heavily weighted towards development.

But as the facility aged, it could no longer keep up with the increasing demands of modern research. The struggle to find funds to replace it, led by Senior VP Al Romig, President Tom Hunter, and others, got an odd but effective boost when Sen. Pete Domenici — a supporter of Sandia and the replacement MESA project — reported that a toilet had crashed through the rotted floor of one of the trailers housing research offices surrounding the building.

While it may (as one politician puts it) “take a village to raise a child,” it will take the gleaming modern multi-story MESA buildings to replace that cramped but creative old CSRL.

Others participating in the token demolition effort, led by Executive VP Joe Woodard (0002), included MESA Project team leader Ron Jones (1741), Tim Frock (17412), and members of the MESA Project team.

Defense Support Program launches 23rd and final satellite

DSP-23 will send back mission and ‘space weather’ data for years to come

By Stephanie Holinka

Last November, the Defense Support Program launched the 23rd DSP satellite into orbit. DSP-23 is the last DSP satellite — the last of a long line of radiation hardening satellites. DSP-23 will send back mission and ‘space weather’ data for years to come.

The DSP satellites have been in operation for more than 17 years, continuously relaying useful information to users on the ground. All of the DSP satellites are still in orbit — although many are nonoperational. Paul Beck, retired Sandian and unofficial DSP historian, says, “The lifespan of these satellites has far outweighed their original requirements.”

DSP was part of the space-based early warning system (SBWWS) and replaced the older VELA system. DSP was intended to provide early warning for incoming intercontinental ballistic missiles and sea-launched ballistic missiles. The satellites also allowed national security groups to detect both endoatmospheric and exoatmospheric nuclear detonation events.

DSP’s “moment of glory” came during the Persian Gulf War during Operation Desert Storm. US Space Command (USSPACECOM) in Colorado Springs, Colo., used data from a constellation of DSP satellites to detect incoming Scud missiles, providing timely warnings to civilians and coalition forces. The warnings allowed Patriot missile battery commanders in Saudi Arabia and Iraq to stage timely responses.

Other RADSEC systems used visible light detectors to look for events and provided analog data. “RADEC 1 was a pretty crafty device.”

The Advanced Atmosphere Burst Locator (AABL) provided event locations. Other RADSEC sensors provided time and waveform information. One innovation in the system tester on the ground introduced a modern hard drive for the system software, replacing a bus-sized platter that held just 5 megabytes, but was sufficient to hold the entire operating system.

RADSEC systems include a variety of environmental detectors whose reliability and sensitivity have provided voluminous data to scientists in a variety of disciplines. Environmental data were provided to the US Air Force Weather Service for dissemination to interested groups.

This last launch was the most stressful for everyone, says Dennis Lierz (5715). Except for a single deployment from the space shuttle Atlantis in 1991, the DSP satellites have been deployed using Titan series boosters.

For this last DSP, the program had run out of Titans. That meant a delay as the team waited for a new booster to deploy the final satellite. The designated booster was the new Delta IV Heavy, built by the United Launch Alliance. DSP was the first mission capable of delivering the new booster, which meant the satellite launch would be subject to any schedule delays as the new system was qualified. A demo launch of the new booster identified multiple technical issues, leading many to wonder if this last satellite would ever get off the ground.

Dennis spent most of the last two and a half years at Cape Canaveral as the technical liaison between Sandia’s Los Alamos National Laboratory, the other satellite contractors, the launch vehicle contractor, and the Air Force customer. The satellite finally arrived in Cape Canaveral in May 2005 after its long journey from Northrop Grumman Space Technologies in Los Angeles. It was with great relief that he saw the last successful launch.

Paul Beck says he has the names of more than 400 Sandians who have worked on the DSP project since its inception in the early 1970s. “Many scientists and engineers have spent the majority of their Sandia careers on the project,” Paul says. Though a few people are still working to close down the remote sites, most of the remaining Sandians have been reassigned. Many others are retired.

This last launch does not mean that the project ends. DSP’s work has been going on for nearly 40 years and will continue for years to come. Ground crews at Sandia and other locations will monitor the satellites for the remainder of their mission lives. Rick says that Sandia’s responsibility for these systems is “cradle to grave,” and the most recent DSP is still an infant.
Mileposts

New Mexico photos by Michelle Fleming
California photos by Randy Montoya

Martha Trujillo
Gregory Vanter
Marjorie Kirkel
Dwayne Knirk
Kathy Silva

20 11100
20 1742
15 5253
15 12341
15 2020

Recent Retirees

Tamara Orth
Carol Arnedo
Michael Swanson

30 4220
25 5255
25 5339

Alfred Foster
David Remnigger
Jeff Tingley
Kirk Dunaway

51 5431
41 1735
37 2452
15 5821

Karen Dunaway
Dennis Berry
Ernest Padilla

30 6800
30 5821
2995

Up, Up, and Away — The Sandia Peak Tramway was used by Sandia for a special terrain measurement project.

50 years ago . . . Sandia Corporation’s 1,700 engineers and scientists were among thousands of technical people across the nation being honored during National Engineers Week, proclaimed by President Eisenhower for Feb. 16 to Feb. 22.

40 years ago . . . A new “bubble-top” recovery system for Sandia rocket test vehicles impacting on water has been developed. The heart of the new system is a spherical ram-air bag that is stitched around a hole cut in the center of an eight-foot-diameter parachute canopy. As the parachute is pulled earthward by the weight of the payload, air caught under the chute’s canopy is forced through the hole to inflate the pre-empted coated balloon-like bag. After impact on the water, the hole between the bag and the chute is sealed so the bag remains afloat.

Sandia used the Sandia Peak Tramway for a special terrain measurement project of Advanced Radar Development. The study was undertaken to determine characteristics of radio frequency return signals from uneven terrain. Strength of return signals varies with surface characteristics.

HOLDING THE BAG that houses the new recovery system on rocket flights, Don Johnson explains packing procedures.

5 years ago . . . Researchers at Sandia’s Z have increased the machine’s X-ray power output by nearly 10 times in the past two years. The most recent advance resulted in an output X-ray power of about 290 trillion watts — for billions of a second, about 80 times the entire world’s output of electricity.

Archimedes 3.0 is the latest and most advanced version of a Sandia-developed planning and visualization software tool that generates, optimizes, verifies, and examines sequences of mechanical assembly through a process called “tunneling.” Electrons “tunnel” from path to path through a barrier that, in classical physics, is impenetrable. The device, dubbed DELTT (Double Electron Layer Tunneling Transistor), offers promise of significant improvements in the speed of computers and in the accuracy of sensors.

ASSEMBLING THE CRANKCASE of the Pouliot Variable Displacement Engine prototype. The engine, invented by Harvey Pouliot, reduced Livermore’s Variable Displacement Engine (VDE) throttling and friction losses. Its unique feature is a mechanical linkage that enables the driver to change at will the length of the piston stroke and thus adjust the horsepower of the engine to meet the varying demands of the driving situation.

An experiment to test a special technique of preparing an oil shale bed for in situ retorting — underground combustion that transforms solid hydrocarbon into liquid oil — was conducted near Rock Springs, Wyoming. Both hydro-fracture techniques and explosive slurry were used to rubilize an underground oil shale formation.

20 years ago . . . For the first time, Sandia originated a live television conference and transmitted it, via satellites, to universities and industries across the country. Several members of Continuing Technical Education and Training Division, Motion Picture Video Services Division, and KOB-TV made the conference possible. KOB’s “NewsStar 4” remote broadcast unit took the TV signal, via cable, from the Technology Transfer Center control room and uplinked it to satellite G-Star 1 in geosynchronous orbit 22,300 miles above the Earth. From there, the signal was retransmitted over the entire US and could be picked up by organizations that had subscribed to the conference through the NTU/AMCEE network.

10 years ago . . . Researchers at Sandia’s Z have increased the machine’s X-ray power output by nearly 10 times in the past two years. The most recent advance resulted in an output X-ray power of about 290 trillion watts — for billions of a second, about 80 times the entire world’s output of electricity.

Sandia scientists developed the first reproducile quantum transistor by directly exploiting three-dimensional computer-aided design (CAD) models.

ASSEMBLING THE CRANKCASE of the Pouliot Variable Displacement Engine prototype.
Donating blood: Unselfish giving just takes a little time and a little effort

By Iris Aboytes

Four units of blood were needed in surgery recently at a hospital in a small northeastern part of the state. By the time David Cain (1733) accepted a summer internship at Sandia, he knew that he was going to do something for the community. During his summer months at Sandia, he worked in the health history interview that will cut inter-

By Iris Aboytes

February 15, 2008

‘Go to school’ mantra from coworkers brings David Cain to Sandia, where the world got big

By Iris Aboytes

When David Cain (1733) accepted a summer internship at Sandia, he knew that he was going to do something for the community. During his summer months at Sandia, he worked in the health history interview that will cut inter-

Feedback

How much will employees be contributing to the pension plans?

Q: In Tom Hunter’s all-hands meeting, he mentioned a projected corporate rise in special and mandated employee contributions. How will employees contribute to the pension plans? What will be the impact on employees who have already contributed to their retirement plans?

A: Although Sandia’s pension plans required mandatory employee contributions before July 1975, the company has been solely responsible for any required pension contributions since that time. The plans don’t currently require or allow employee contributions, and Sandia is not actively considering at this time a change in that policy.

The contributions due for any year are based on a valuation of the pension plans’ assets and liabilities performed by Sandia’s independent actuary. Our most recent projection indicates that Sandia will be required to make new contributions to its Retirement Income Plan beginning in FY11. By FY12, we estimate that in the most likely case Sandia could be required to make $113 million in pension contributions. However, any of these projections can change during the intervening years due to the inherent volatility in the capital markets. The actual contribution due for any given year won’t be known until then when the actuary completes the valuation of the plans’ assets and liabilities.

— Mark Biggs (10520)