

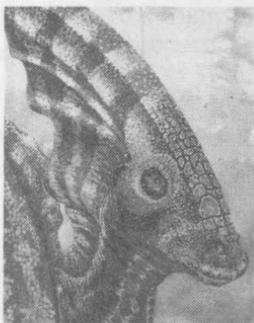
Digital paleontology: Producing the sound of the Parasaurolophus dinosaur

Sandia, museum take computer analysis into new realms to recreate voice from the Late Cretaceous

By Chris Miller

It's a roar from the past. The distant past. The Late Cretaceous to be exact.

Scientists at Sandia and the New Mexico Museum of Natural History and Science have collaborated to recreate the sound a dinosaur made 75 million years ago.



Parasaurolophus, oil painting by Rich Penney, Santa Fe paleo-artist

The low-frequency sound was produced by computer scientists and paleontologists using computed tomography (CT) scans and powerful computers.

The sound was trumpeted at a joint news conference in Albuquerque Dec. 5,

to the interest and delight of news media worldwide (see "Media blitz blares dino sound worldwide" on page 6).

The study of dinosaur vocalization began after the discovery in August 1995 in northwestern New Mexico of a rare Parasaurolophus skull fossil measuring about 4.5 feet long. The dinosaur had a bony tubular crest that extended back from the

top of its head. Many scientists have believed the crest, containing a labyrinth of air cavities and shaped something like a trombone, might have been used to produce distinctive sounds.

As expected, based on the structure of the crest, the dinosaur apparently emitted a resonating low-frequency rumbling sound that can change in pitch. Each Parasaurolophus probably had a voice that was distinctive enough to distinguish it not only from other dinosaurs, but also from other Parasaurolophuses.

Sound and socialization

The sound is an approximation of the possible tones that the dinosaur crest was capable of producing. Tom Williamson, curator of paleontology for the New Mexico Museum of Natural History and Science in Albuquerque, and Sandia computer scientist Carl Diegert (9215) had to use common sense and some imagination to reconstruct not only missing parts such as the beak and nostrils of the dinosaur, but also the soft tissues of the head and throat that were not fossilized — all of which would have contributed to the dinosaur's vocalizations.

Since it's uncertain whether the Parasaurolophus had vocal cords, a variation of sounds with and without vocal cords was simulated.

"The sound may have been somewhat bird-like, and it's probably not unreasonable to think

they did songs of some sort to call one another," Carl says. "Fossil records of the large bones in the dinosaur's ears compared to corresponding bones in human ears suggest they were able to hear lower frequencies than humans."

Williamson speculates that the dinosaur's ability to make distinctive sounds probably enhanced its tendency to socialize with other Parasaurolophuses.

The computer-modeling techniques used to create the dinosaur sound are the same ones Sandia uses to create complex, three-dimensional models for conducting computer simulations of problems that cannot be subjected to real-world tests. Sandia has used X-ray tomography similar to the CT scans taken on the dinosaur to develop advanced-imaging techniques for manufacturing design and testing.

The dinosaur imaging allowed Sandia scientists to expand their own computing skills in developing and applying those complicated

(Continued on page 6)

"... it's probably not unreasonable to think they did songs of some sort to call one another."

A holiday message from Paul Robinson

As we prepare for our annual holiday break, I want to thank all of you for your remarkable efforts over the past year and for the support you have given to this great laboratory of ours.



In the best Sandia tradition, during 1997 we collectively and individually performed "exceptional service in the national interest." As a result of your work in stockpile stewardship, nonproliferation, emerging national security threats, and infrastructure surety, the nation is secure, and our international efforts have helped to make the world a better place than it was a year ago.

The ingenious inventions of our researchers and technologists have advanced human knowledge and potential in ways that have led to many awards to the laboratories and publications in prestigious journals. The positive coverage of Sandia developments in the press and electronic media substantially increased, as well.

While we have always prided ourselves as being a world-class scientific engineering laboratory, during the past year we made great strides toward having a world-class administrative support system as well. Our implementation of PeopleSoft software, our growing use of electronic workflow processes, and other changes bring us more in line with best business practices in our financial, human resources, and procurement activities. I know that squeezing indirect costs has not been easy, but the effort is paying off.

During the past year Sandia, along with Lockheed Martin, maintained and expanded its reputation as one of the most community-oriented employers in Albuquerque and Livermore. I'm happy to report that our employees contributed record dollar amounts during the ECP campaign in Albuquerque and the LEAP campaign in California. In addition to generous financial support for a variety of worthy causes, you donated thousands upon thousands of hours to diverse community-based causes.

This holiday period, when we wish "good will to all people," is an excellent time to look back with satisfaction at the good deeds we have achieved.

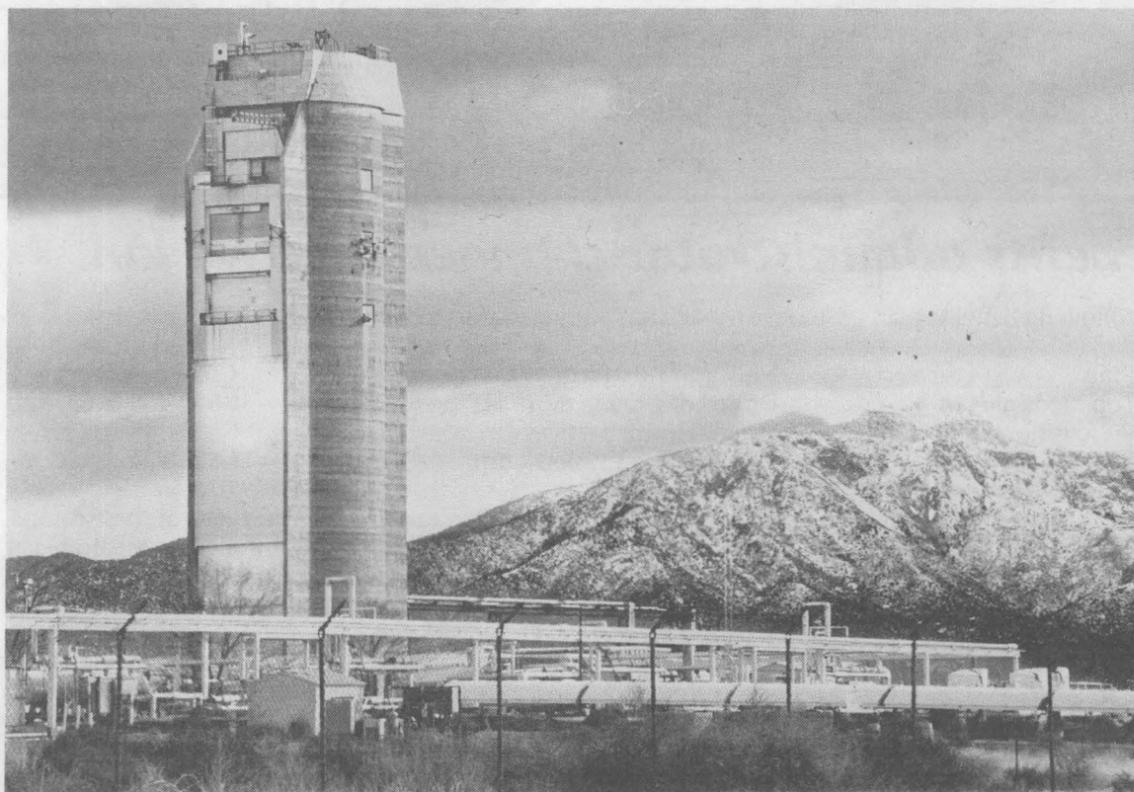
I hope that you and your families will have the happiest holidays ever.

C. Paul Robinson



Sandia National Laboratories LabNews

Vol. 49, No. 25 December 19, 1997



MOTHER NATURE'S GIFT — Lab News photographer Randy Montoya caught this serene winter scene on film after a mid-December snowstorm dusted the foothills of the Manzano Mountains southeast of Albuquerque. In the foreground, heliostats surrounding Sandia's Solar Tower focus what little sunlight the day offered onto the tower's midsection.



4 Sandia employees' holiday giving falls like snow on neighbors in need

8 Blue-chip NASA visitors get red-carpet briefing on Labs capabilities, potential interactions

This & That

Next issue is Jan. 16 - Because Sandia is closed Dec. 25-Jan. 4, the next *Lab News* won't be published until Friday, Jan. 16. The deadline for submitting news and classified ads is noon on Friday, Jan. 9.

Last Church brother checks it in - One of Sandia's longest running "brother acts" officially closes next week when Hugh Church retires (see his photo on page 8). Hugh retires with 40 years of service. Brother Ted retired in 1990 with 43 years of service, and brother Allen retired with almost 39 years in 1994. All three live in Albuquerque, and Allen still does some consulting work with the Labs.

Confusion reigns when it snows - The storm that dumped 4 inches or so on Albuquerque last Wednesday night and Thursday morning was a good example. Some radio and TV stations reported early Thursday that Sandia was on a two-hour work delay, and others didn't. There was, in fact, a two-hour delay.

The recommended way to find out is to call Sandia Line, on which delay announcements are posted - normally by 5:30 a.m. However, Sandia's later-than-normal decision to delay the Dec. 11 schedule didn't get on Sandia Line until about 6:15, adding further to the confusion - especially for people who called before then and heard the default "normal schedule" announcement. All Sandia groups involved promise an earlier update if nasty weather mandates a delay in the future.

If you don't have the number memorized, copy this and put it by your home phone: Call 845-6789; after the "autolady" answers, dial 9 for quick dial code, then 9999# and her elf will inform you. The message will be updated during the day in case we're dismissed early - which probably will be a mighty cold day in several places, if you get my snowdrift.

Media dino-mania - Interest in the cooperative Sandia and New Mexico Museum of Natural History and Science project to scientifically simulate the sound of a dinosaur has been tremendous. The Dec. 5 news conference at the Museum to "unveil" the sound attracted a big crowd, and the story has been reported in hundreds of publications, on all major US television and radio networks, and in many other media around the world. See Chris Miller's story beginning on page 1 about how Sandia's Carl Diegert (9215) did the simulation, and more about the incredible media interest.

More big news - Lots of commotion surrounded last week's National Transportation Safety Board (NTSB) hearings in Baltimore on the crash of TWA Flight 800, which has received considerable media coverage. Mel Baer (9112), who did computer modeling that helped simulate blast pressures inside the jet's center fuel tank, represented Sandia at the hearings. We'll detail his work in an early 1998 issue and provide perspectives from the handful of other Sandians who've been close to the action.

Born again - About six months ago, after several futile attempts to get off the mailing list of an outfit called the International Center for Quality and Productivity Improvement, I sent them a note saying Larry Perrine had died, so please take him off the mailing list. It worked for a while, but somehow I've been "born again." Aaaaaaaaaaaaah!

- Larry Perrine (845-8511, MS 0167, lgperri@sandia.gov)

Benefits administrator changes effective Jan. 1

The following Benefits plans will have new claims administrators beginning Jan. 1, 1998.

Plan	New administrator	Customer Service
Top Medical Plan	United of Omaha (Mutual)	1-800-488-0167
Prescription Drug Plan	Eckerd Health Services	1-888-249-5041
Vision Care Plan (active employees only)	Cole Managed Vision Corp.	1-800-334-7591

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Plan information from each of these companies, as well as ID cards for the Top Medical Plan and Prescription Drug Plan, is scheduled to be mailed to eligible employees in late December. Employees and retirees also should receive confirmation notices for 1998 coverages by mid January.

Sandia's conversion of Open Enrollment information into the new PeopleSoft system may cause brief delays in processing. If you have questions about the plans that must be answered before you receive the plan information, please call the appropriate customer service number listed above.

Take Note

Sandia is hosting open houses in honor of retirees Larry Lane (12326) in the Cafeteria (Bldg. 861) on Dec. 22, 2-4 p.m.; Mineko Shriver (7845) in the Cafeteria on Jan. 5, 2:30-4:30 p.m.; Jerry Silva (5749) in the Coronado Club Zia/Coronado Room on Jan. 7, 5-7 p.m.; Estelle MacKenzie (9300) in Bldg. 960, Rm. 113, on Jan. 7, 2:30-4 p.m.; and Paul Stokes (5331) in the CNSAC (Bldg. 810) conference center foyer on Jan. 13, 2-4 p.m. Refreshments will be served. Friends and acquaintances are invited.

Note to Sandians surveyed: Please respond to our reader questionnaire

If you are among the randomly selected Sandians (about 1 in 15) who received a *Lab News* reader questionnaire by mail or e-mail recently, please complete it and return it as soon as possible. Your opinions matter to us. We conduct a reader survey about once every two years, and it is the main way we know how well we're doing at providing timely, accurate, useful information to you. The results will be compiled after the holiday break and reported in the *Lab News* and *Sandia Daily News* as soon as possible.

Sandia distributes \$1 million-plus in royalty payments and license fees

By Bill Murphy

Sandia license income jumped again for FY97 to more than \$1.6 million, up from \$738,000 in FY96.

The authors and inventors of Sandia licensed properties (properties that are copyrighted or patented) were feted at royalty distribution banquets in California on Dec. 3 and in New Mexico on Dec. 5. A record 199 individuals shared in individual award distributions in FY97, up from 125 in FY96.

During the banquet those inventors and authors were presented checks totaling \$223,000, their share of the royalties generated by their works. (By site, \$188,000 in royalty receipts were distributed to New Mexico Sandians, \$35,000 to California Sandians.) According to the current distribution formula, authors and inventors receive 20 percent of the royalty receipts; 70 percent is distributed to the division that is responsible for the future applications of the technology. A pool of money is also set aside for contributors and for inventors and authors of classified works.

The \$1 million-plus in royalty distributions in FY97 represents more than a doubling of payments from FY96, when distributions totaled \$478,000.

Dramatic increases in out-years

Some Sandians think the license income could become a substantial source of discretionary funds in the foreseeable future.

During a meeting with NASA officials last week, VP for Laboratory Development Division 4000 Dan Hartley said he does not think it is unreasonable to project dramatic increases in royalty payments and license fees in the coming years.

"We can expect tens of millions [of dollars] in the out years," he said.

After individual distributions of \$223,000 were made and money was set aside for contributors and classified inventors, here's how the balance of payments was distributed among the divisions:

- 1000 - Physical Sciences & Components Division: \$297,543
- 2000 - Weapons Systems Division: \$44,066
- 4000 - Laboratory Development Division: \$23,416
- 5000 - National Security Programs Division: \$3,389
- 6000 - Energy, Environment, and Information Technology Division: \$23,829
- 8000 - California Laboratory: \$121,539
- 9000 - Systems, Science, and Technology Division: \$266,137

The average royalty distribution for individual authors or inventors was \$1,147. Of the 199 recipients, 101 received distributions of \$500 or less. One individual received more than \$25,000.

The royalty distribution system is intended to reward inventors and the divisions supporting invention and innovation. The divisions are encouraged to use discretionary income from royalty distributions to invest and increase the portfolio.

Research on novel radiation-detection CZT crystal presented at materials science meeting

By Nancy Garcia

Devising a way to cast a wider net to spot faint radiation sources with room-temperature detectors is a little like searching for a Hope diamond.

Both require latching upon large, nearly flawless crystals. In the case of room-temperature radiation detectors, gamma rays can be detected by crystals of a novel compound blended from cadmium, zinc, and telluride (CZT) — which in fact has a diamond-like structure. Larger crystals are more likely to catch stray radioactive particles that create an electronic signal upon impact, but they may contain more defects that degrade the material and reduce the quality of the signal.

So, Jason Heffelfinger (8715), a materials scientist with microscopy expertise, has been examining fine details of CZT crystal defects in electron micrographs. His work, being presented at the December Materials Research Society meeting in Boston, should help improve processing and fabrication, important to both commercial crystal growers and the Sandia research team that is developing CZT detectors to identify or monitor nuclear material.

"This is really one of the first microscopic pictures of what's going on within CZT crystals and detectors," says Ralph James, a distinguished member of technical staff in Materials Processing Dept. 8230. Ralph is co-chairing a symposium at the conference at which about 200 researchers are expected to hear some 140 presentations on CZT and other semiconductor sensors and imaging devices over the course of five days.

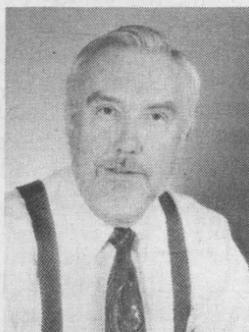
Understanding at the microscopic scale

"He's elucidated a much more thorough understanding of what's going on at the microscopic scale than we have had in the past, and he's determining relationships between the microstructure and detector performance," says Ralph.

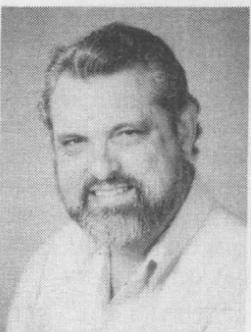
Recent Retirees



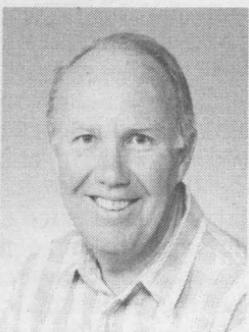
Roy Lee 29
8117



Don Nissen 30
11600



Robert Schmieder 25
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Rod Nissen 35
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"He's elucidated a much more thorough understanding of what's going on at the microscopic scale than we have had in the past."

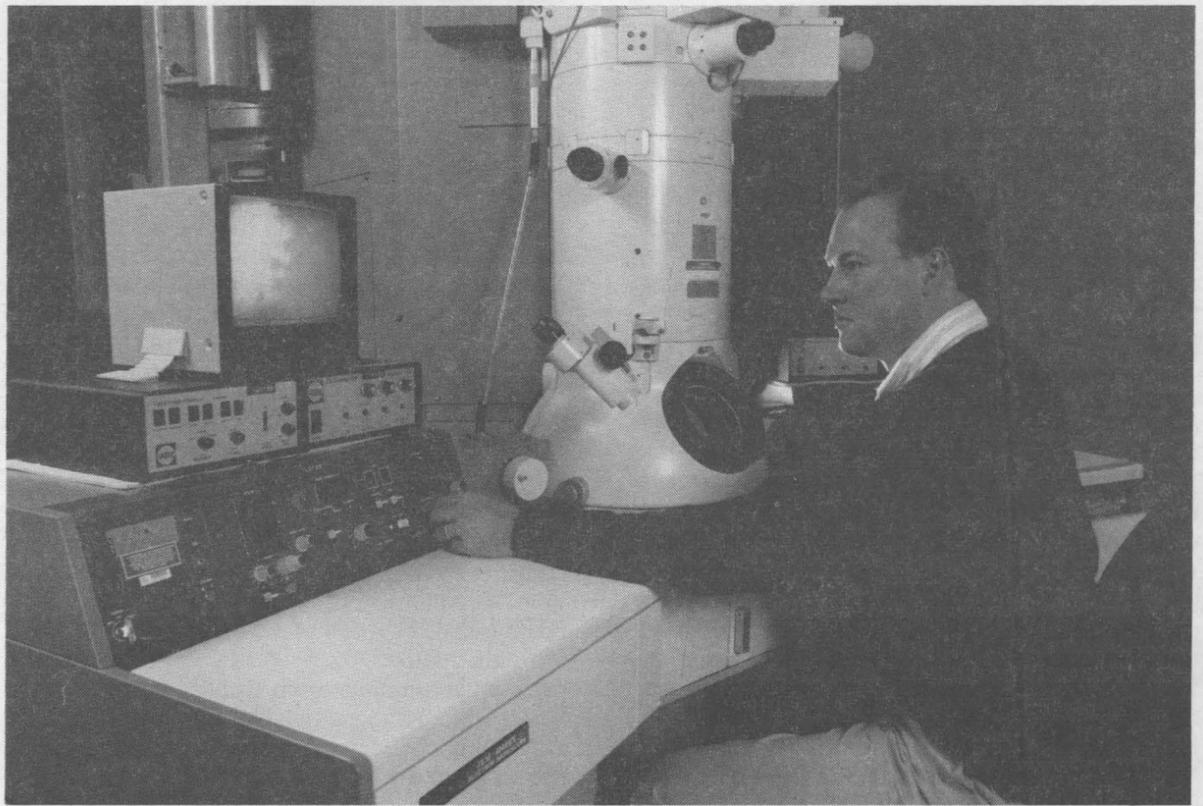


IMAGE CONSCIOUS — Jason Heffelfinger (8715) examines a material on a high-resolution transmission electron microscope. He's presenting new research on fine details of defects in CZT crystals, with the hope of improving their ability to detect gamma rays.

Sandia California News

"To that extent it will be very well received."

"The idea is to improve the electrical properties of the material," Jason says. "Even if you capture a very small signal, you can still have to extract that signal through a very large piece of defective material."

Noise may be introduced by the presence of cracks or bubbles or along the boundary of two different grain orientations. These regions tend to be rich in tellurium precipitates, which separate out during cooling and act like a short-circuit path that degrades the material and disrupts the electrical signal.

The compound is made under high heat and pressure. It may take two months to grow an ingot of 10 kilograms, Jason says, and only about one-fourth or less of the ingot will be of good enough quality to detect radiation.

CZT has only been developed for roughly five years as a radiation-sensor material and has not yet been characterized in very fine detail, Jason says. With high-resolution microscopy, details can be discerned as small as about 1.4 to 1.7 angstroms. "We hope we can detail atomic structure," Jason says.

Challenges include isolating a defect in the first place and creating a thin sample, since CZT is much more brittle than silicon. In fact, it can be

damaged with an electron beam.

Transmission electron microscopy reveals structural information from thin-foil specimens. This approach (as well as scanning electron microscopy) can also reveal surface structure and chemical information by exciting X-rays characteristic of the probed material. Gaining information about composition by these means is known as X-ray energy-dispersive spectrometry (XEDS).

Jason also plans to probe the material by analyzing the residual gas in pipe-shaped voids. He wants to see if the voids contain argon or other gases present when the ingot is grown. This inquiry requires breaking the material in place under a vacuum.

Although defects may inhibit formation of large single crystals, a slightly tellurium-rich compound may also have better gamma-ray detection properties, he says.

Jason has conducted this basic materials research since coming to Sandia in January, with Doug Medlin (8715) and Bruce Brunett (8230).

Other Sandia CZT research is being presented by Ralph, Richard Anderson (8716), Dean Buchanauer (8716), Haim Hermon (8230), Nathan Hilton (8230), Jim Lund (8230), Michael Schieber (8230), and John Van Scyoc (8230).

Feedback

Headlights and base sticker placement

Q: There have been many reminders to turn off automobile headlights as we enter KAFB gates. Some of us have cars with daytime lights that cannot be turned off unless the car is stopped, turned off, or the emergency brake is applied. Sometimes, Air Force personnel stop some of us to request that we turn off our lights. It seems to me that applying the Sandia base sticker to the windshield is an acceptable answer to this problem. What is KAFB's and Sandia's official position on this?

A: I addressed the issues of base decal location and the dimming of lights on new vehicles with daytime running lights directly to the KAFB Security Forces commander. Lt. Col. Hertog explained

that KAFB local policy is to locate the vehicle pass in the lower left portion of the windshield, which makes it easier for guards to see during the nighttime. As for daytime running lights, there is no official policy, but she said most of her guards realize you cannot turn off daytime running lights and accept the fact that they will have to tolerate a little blinding light. Since not all new vehicles are equipped with daytime running lights, it is not easy for guards to distinguish vehicles so equipped unless they ask. Location of the decals in the lower left windshield should help this problem as you suggested.

— Ed Graham (7800)

Employee generosity falling like snow on less fortunate

Organizations pitching in for the community with food, blanket, and toiletry drives

By Janet Carpenter

Like great, soft flakes of gently falling snow, Sandia employee generosity is blanketing those less fortunate in the community this holiday season. Sandians are helping with holiday drives; collections for blankets, food, toiletries, and other necessities; adopting families; and giving the gift of music to children. Although there isn't space to list all of the holiday drives and collections at Sandia this year, here is a sampling of what Sandians are doing.

Preparing for this year's Employee Contribution Plan campaign for United Way, several employees in Systems, Science, and Technology Div. 9000 visited St. Martin's Hospitality Center for the homeless and near-homeless. Adele Caldwell (9001) asked the center director what one thing was needed immediately. The answer was blankets. Secretaries in Division 9000 set up boxes in Area 4 and collected 37 blankets, a coat, a set of sheets, and toiletries, which were delivered to St. Martin's two weeks ago. Employees who helped organize the project include Adele, Sandy Lightle (9000), Marge Hedges (9100), Evelyn Cortez (9200), Anita Vasey (9208), Estelle MacKenzie (9300), Jean Hunt (9300), Cindy Olson (9500), Marisa Aragon (9502), Leslie Rettinger (9600), Brenda Barajas-Romero (9700), and Carmela Andrade (4522).

In the past 40 years, Sandia has teamed with various community partners to provide impoverished children with more than 6,000 pairs of shoes. Last year 450 children in 18 schools were fitted with shoes thanks to Sandians' donations. The annual Shoes for Kids campaign is under way, and project leader Pam Catanach (12650) reports it'll collect \$10,000 this year, including \$2,000 from Lockheed Martin. The campaign has already raised \$7,000, and 400 pairs of shoes will be given to needy children before the end of the holiday season (see photos on next page).

The 10000, 12000, 15000, and 4000 Division

Diversity Council is providing gifts selected from a gift wish tree to needy people from La Familia Placement Services, Inc. (a nonprofit adoption, treatment, foster care, and counseling agency serving all populations), Cornucopia Adult Day Care Center (mentally and physically challenged adults and the frail elderly), and Parents Reaching Out (provides toiletry kits for out-of-town families who suddenly find themselves staying at the hospital with a sick or injured child).

Amy Tapia (12650) is heading the drive by Public Relations and Communications Center 12600 to collect gifts for mothers and children for the Women's Community Association, a shelter for families experiencing domestic violence.

Sandia's Women's Program Committee also coordinated contributions of items the Women's Community Association needs, including infants' and children's items, toiletries, cleaning products, food, linens, kitchen supplies, office supplies, school supplies, appliances, and furniture.

Lillian Pilon (7922) recently started a music program at Martineztown House of Neighborly Service. She arranged to have a piano donated and spends about one hour a week conducting the program, which produced a Christmas show Dec. 17.

Evangeline Clemena (9500) sent e-mail messages to managers and secretaries in Pulsed Power Sciences Center 9500 asking for help for a family from Cuidando Los Niños, which provides day care services for homeless families. Center employees have adopted a mother and two daughters and will provide a holiday meal, tree, gifts, and other things the family needs.

"To do something like this is worthwhile for everyone's sake," says Evangeline, "those who give and those who receive."

Secretarial Quality Process Council members went to La Amistad Senior Center for an arts and crafts project to help create holiday wreaths to wear or hang on the tree as decorations.

The Human Resources Div. 3000 Winterfest

Committee sponsored a holiday drive for the Namaste Child and Family Development Center, which provides services to children who have been abused or neglected. Namaste provided names of 87 children and lists of what they wished for this Christmas. Employees in Div. 3000 drew names and donated the gifts the children asked for. All 87 names were drawn and all wishes were granted.

"It was a wonderful feeling to be able to do this," says committee chairperson Bernadette Montañó (3000). "Everyone had a wonderful time, and parents involved their children in answering the wishes. We don't want this to be a one-time thing, and we plan to find ways to help all other times of the year."

"It's amazing how generous people are," says Gail Simon (4400). "Even before we started preparing this year's drive, people were asking when it started."

Gail and Melissa Barnette (4900) coordinated a drive for Information Services Center 4400 and Computing and Communication Services Center 4900 and interested occupants of Bldg. 880.

"We chose a senior couple and a mom with three kids from Martineztown House of Neighborly Service," says Gail. "We have stockings on the collection board, and people are filling them up."

The board was wrapped to resemble a holiday package. Tags were attached that included the selected families' wish lists.

"Several people got together and provided a bicycle for one child," says Gail. "The mother was afraid it was too much to wish for and was hesitant to request it."

Human Resources Div. 3000 employees adopted four families for the holidays, including a family of refugees from Cuba found through Catholic Social Services and a family from the Martineztown area plus two others.

"By adopting families for the holidays you can see that your neighbors, the people next door to you, are in need," says Gigi Reynolds (3335), Div. 3000 Experience Diversity team leader. "It's an up-close experience when you meet the families personally. I feel differently about the holidays this year because I really see that the season is all about giving."

Last year Al Lujan of Video Services Dept. 12610 contacted Sandia's Volunteers Program administrator Redd Eakin (12650) about finding a way to help someone during the holidays. His experience in adopting a family was so positive that he's doing it again this year. Al and his family are providing Christmas dinner, gifts, and clothing to a family of seven from the San Jose area.

"For us just throwing a can in a collection box was not enough, although that is important too," says Al. "We think a more personal touch is what's right for us." Al was able to work with Montgomery Ward and received a discount for the toys and clothes he is giving the family.

As part of celebrating its successes of the past year, Environment, Safety, and Health Center 7500 employees decided to collect food for the Road Runner Food Bank. A van-load has already been delivered and more is on the way, according to Juanita Sanchez (12660), who is immediate past chair of the board of directors of the Road Runner Food Bank.

If you would like to find an opportunity to help others during the holiday season, contact Redd Eakin (12650) at 284-5209 or Amy Tapia (12650) at 284-5207 for a copy of United Way of Central New Mexico's Holiday Sharing booklet. It lists agencies and organizations that need help, the populations they serve, what kinds of assistance they need, and who to contact.

Drive coordinators are also asked to contact Redd with the results of their campaigns.

Industry Week chooses Z machine, protonic chip among 25 Technologies of the Year

One of Sandia's largest projects — the Z machine — and one of its smallest — the protonic chip, more formally known as proton-based nonvolatile semiconductor memory — were among 25 Technology of the Year Awards for 1997 announced by the trade publication *Industry Week* in its Dec. 11 edition.

Z (*Lab News*, Aug. 1, 1997; Dec. 6, 1996) produces far more powerful X-rays than any laboratory accelerator in the world. The protonic chip (*Lab News*, April 25), which also won an R&D 100 award (*Lab News*, July 4), replaces skittish electrons with stable protons to retain unsaved information on a computer when the power unexpectedly goes off.

Other contest winners included IBM, Intel, General Electric, and Audi. Oak Ridge — the only other national laboratory selected — won an award for combining artificial and natural light to reduce energy costs.

The 1997 winners will receive their awards — 10-inch crystal disks mounted on a crystal base — at a conference called Managing for Innovation, sponsored by the magazine, at the Sheraton Chicago Hotel and Towers in Chicago on March 30, says associate editor Tim Stevens.

"We're delighted with the recognition afforded us by *Industry Week*," says Jeff Quintenz, acting director of Pulsed Power Sciences Center 9500. "Being recognized as one of the top 25 technology winners of the year makes us proud of the people who have put together these outstanding results. We

couldn't be more happy with our people than we are." Work at Z is funded by DOE.

Bill Warren, leader of the protonic chip effort and currently on loan to the Defense Advanced Research Projects Agency (DARPA) as a program manager, said, "We're elated at the award *Industry Week* has bestowed on us. I think the reason we won was the strong teaming we had between not only the microelectronic and materials center at Sandia, but also among the Air Force's Phillips Laboratory, AMMPEC, and France Telecom. So we could look not only at the physics and science but also satisfy the technology transition." AMMPEC stands for Advanced Materials and Manufacturing Processes for Economic Competitiveness.

The protonic work is funded by Sandia's Laboratory Directed Research and Development program, which funds speculative defense-related research, and DARPA.

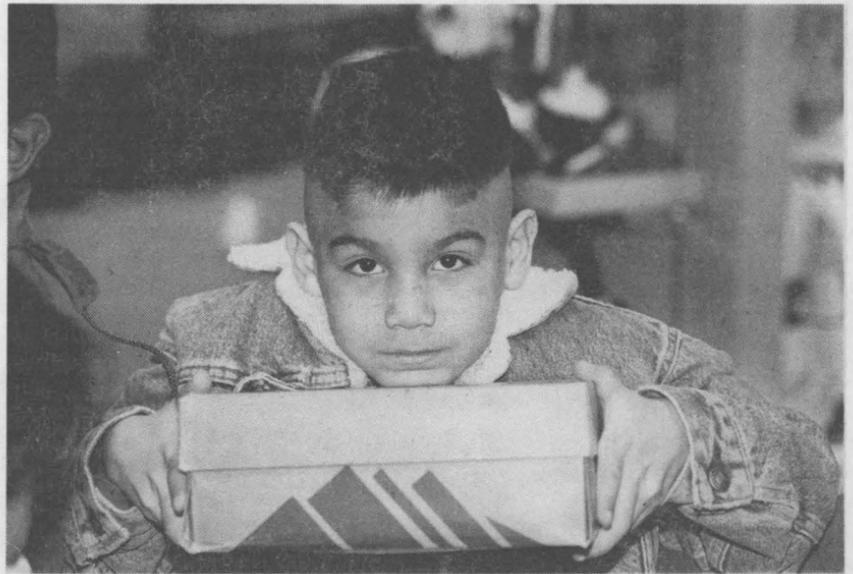
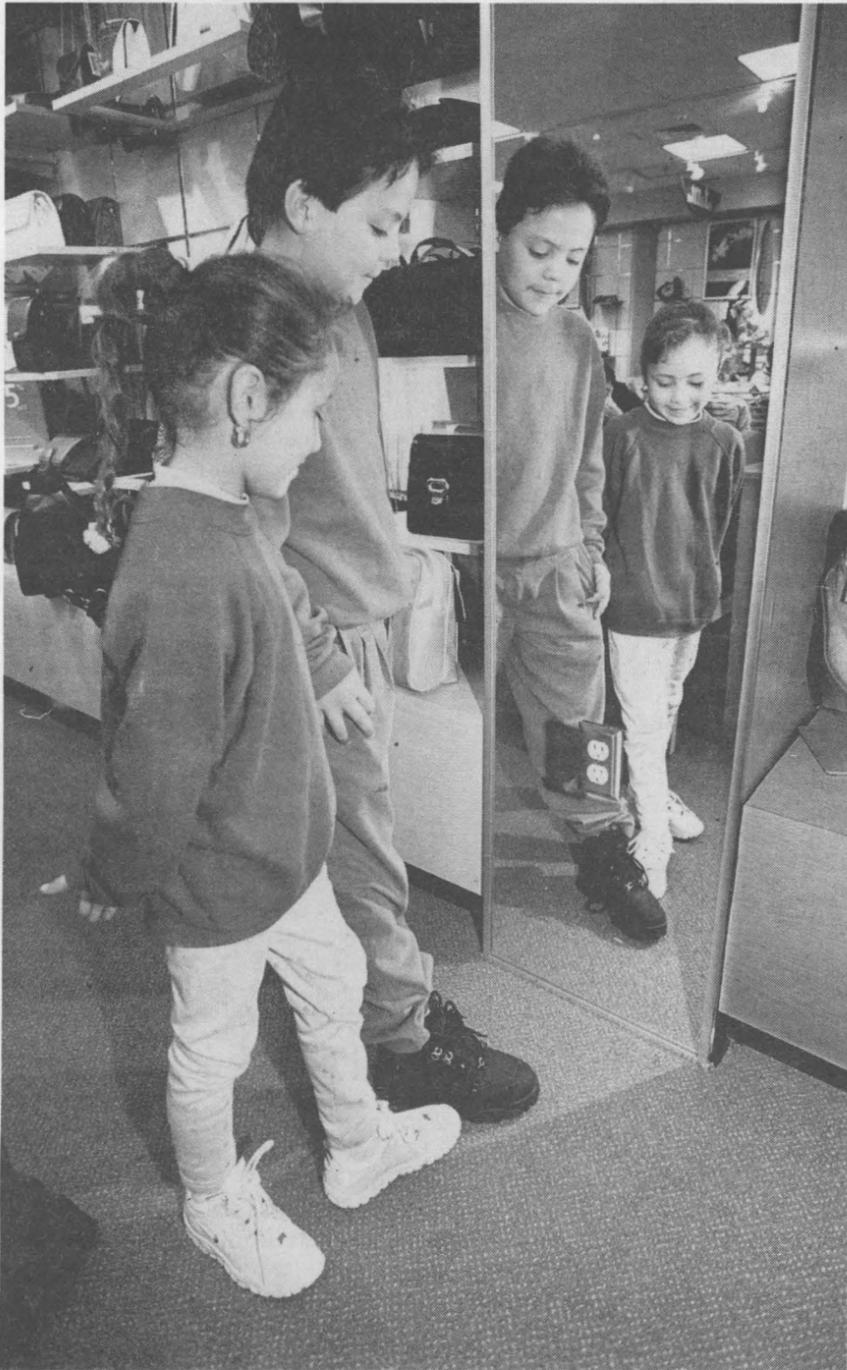
The magazine promises descriptions of each winning technology in future issues.

Technology of the Year awards have been presented by the magazine since 1993 — five a year until 1996, when the number was upped to 25 "to enable us to celebrate more technologies" and broaden the contest's appeal, says Stevens. Winners are selected by the editors, who have been covering technical matters for their entire careers.

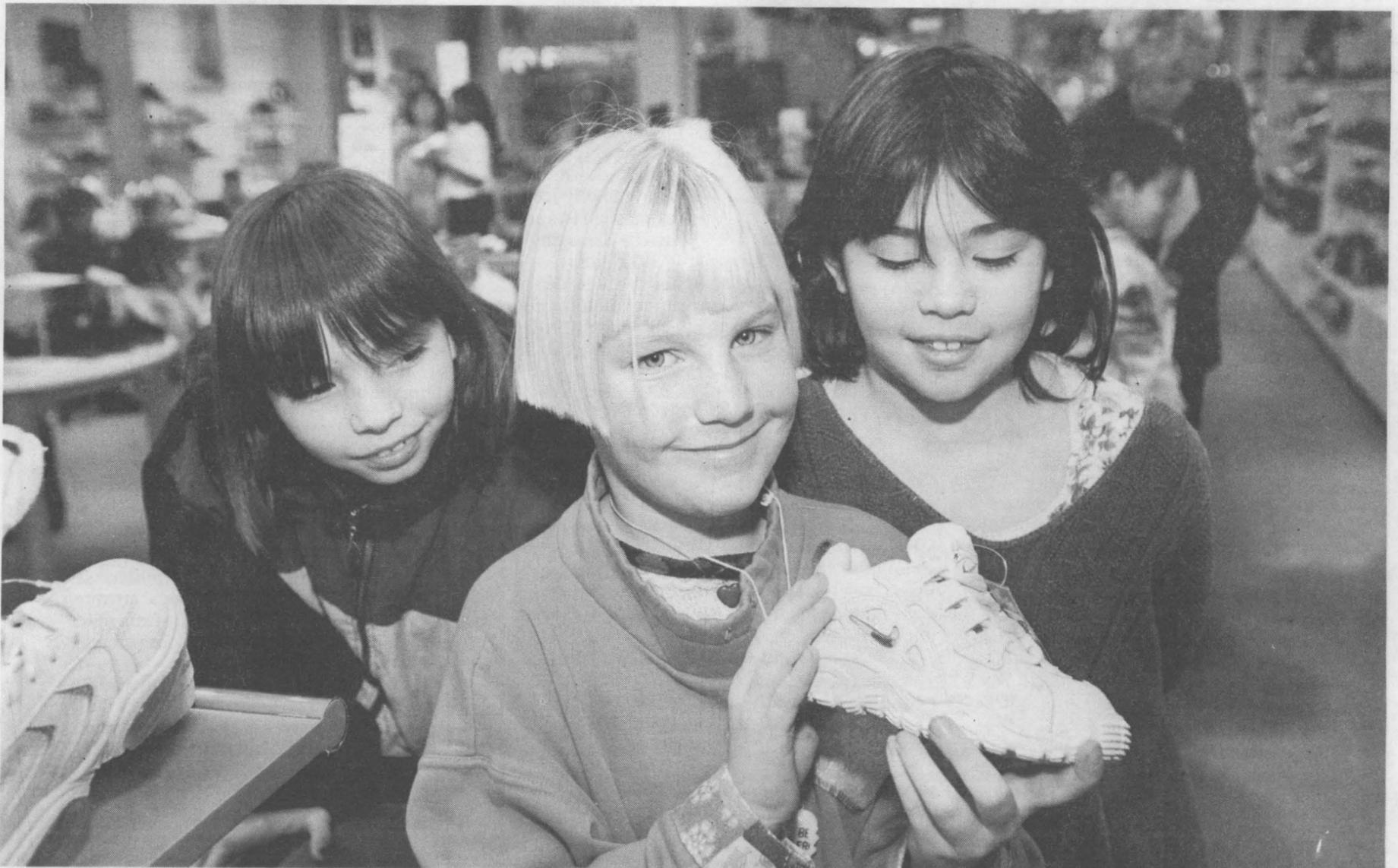
"They let the entries speak for themselves," he said.

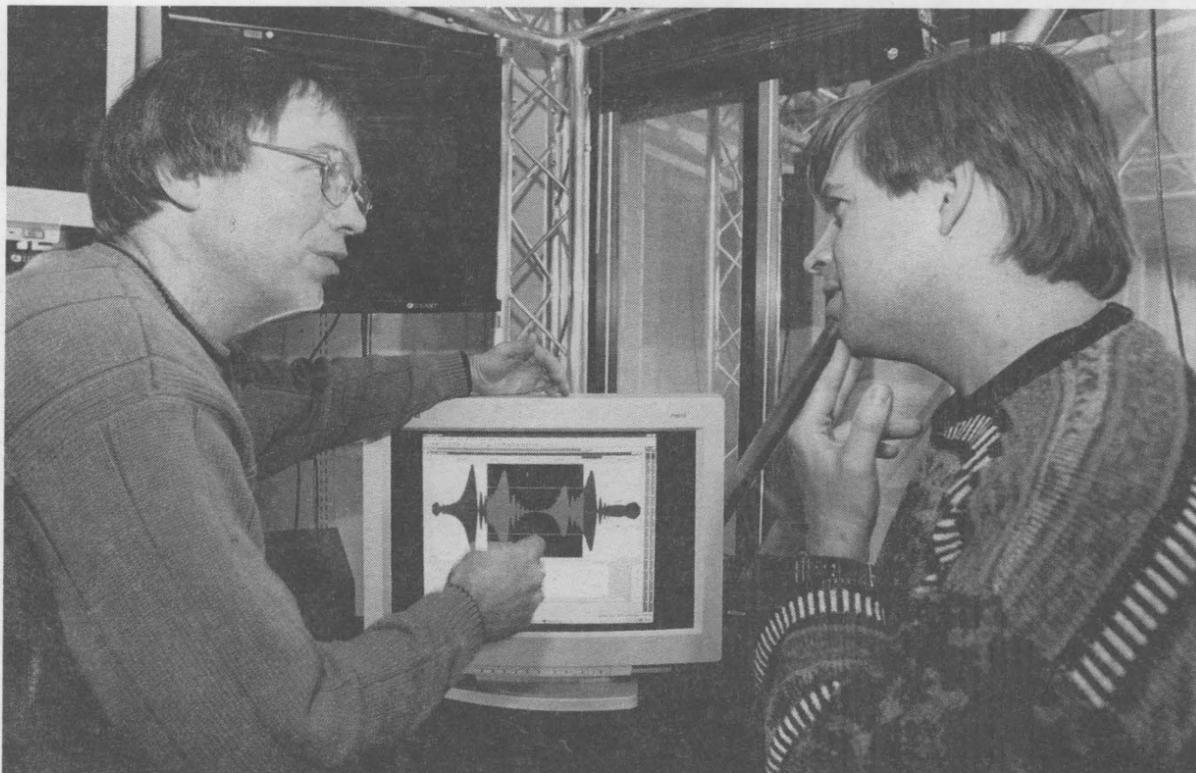
—Neal Singer

'Shoes for Kids' warms hearts and toes



Photos by Randy Montoya





ANCIENT SOUND — Sandia computer scientist Carl Diegert (9215), left, and New Mexico Museum of Natural History and Science paleontologist Tom Williamson put finishing touches on the sound of the *Parasaurolophus* dinosaur. (Photos by Randy Montoya)

Parasaurolophus

(Continued from page 1)

codes. The basic science work is funded by DOE's Office of Computer Technology and Research under the auspices of the Mathematics, Information, and Computer Science (MICS) program.

Parasaurolophus, one of the dinosaurs that appeared in the films *Jurassic Park* and *The Lost World*, lived during the Late Cretaceous Period, about 75 million years ago. The crest of the *Parasaurolophus* was unearthed near Farmington

on public land administered by the Bureau of Land Management. The well-preserved skull includes a nearly complete crest, lacking only the segment below the eyes, making it the second-most complete skull of a *Parasaurolophus* known.

From CT scans to sound

A three-dimensional computer model of the crest was created by first performing a CT scan of it at St. Joseph Medial Center in Albuquerque. A series of about 350 cross sections were taken of the skull and crest at 3 mm intervals. The results showed a much more complicated internal structure than had been known previously.

"Not only are there more tubes than the simple, trombone-like loops described in previous studies, but there are new chambers within the crest," Williamson says.

The use of digital paleontology, Williamson says, permitted a thorough analysis of the inside of the crest without having to physically cut through it, and thereby damaging it.

The cross sections were loaded in numerical form into a computer in order to reconstruct an



PALEO-NEWS — Sandia computer scientist Carl Diegert (9215) explains to news media how he used computers to analyze the crest of the *Parasaurolophus* dinosaur in order to simulate the sound it was capable of making. Seen here are representatives of the *Albuquerque Journal*, the local ABC and CBS affiliates, and *TIME* magazine.

Media blitz blares dino sound worldwide

Sandia's work with the New Mexico Museum of Natural History and Science recreating the sound of the *Parasaurolophus* dinosaur has intrigued news media worldwide. Here are some of the major media that have run a story on the dinosaur sound project.

CBS News, ABC News, Today Show (NBC), Dateline NBC, CNN, BBC (television and radio), The Discovery Channel, German television (two different networks), National Public Radio, French National Television, Italian Television, and the Canadian Broadcasting System (television and radio).

Also, Science Update, AAAS-Radio (American Association for the Advancement of Science), *The New York Times*, *Newsday*, *San Francisco Chronicle*, *Los Angeles Times*, Agence France Press, Associated Press, Reuters News

Service, *Der Spiegel* (German news magazine), *Sunday Times* (London), *Daily Republic* (Portugal), and *Time Magazine for Kids*.

Also, ScienceNow (*Science* magazine's web site), *High Performance Computing and Communications Week*, *Focus* (Italian science magazine), *GeoTimes* (magazine), *Scientific Computing and Automation*, *Earth* magazine, and *Wired News*.

There's no telling how many newspapers and television stations have carried the story, because it went on the Associated Press wire, Reuters, and Associated Press television. Also, many stations pick up feeds from CNN, which broadcast the story.

Employee Communications and Media Relations Dept. 12640 facilitated these media interactions.

Entirely new field for computing

"The most important thing about Carl's [Diegert's] work [on dinosaur sounds] is that it opens an entirely new field for the application of computing, which is critical to our mission and to real-world engineering in general," says George Davidson, Manager of Computer Architectures Dept. 9215.

George says the same 3-D imaging techniques can be used to analyze and predict the structural integrity of mounting brackets on aging airplanes, the internal structures of aging weapons, and the accurate reconstruction of the forces and mechanical failures associated with the crash of an airplane carrying nuclear weapons.

"The general capability that Carl's research is developing offers an early look at a new engineering use of computers, which will one day be a broadly applied engineering tool," George says.

An added benefit of the project, Carl notes, is the widespread visibility it gives to high-performance computing and its growing importance as an engineering tool.

"So much of our work at Sandia is classified and we therefore can't talk about it," Carl says. "This is a project that's appealing and we can talk about it, and, therefore, it can serve as a recruiting tool for getting more young people interested in thinking about a career in computing."

undistorted crest. Carl and Williamson studied the images and instructed the computer how to read the density variations in order to sort out what was bone and what was the sandstone and clay that fills and encases the fossil.

Once the size and shape of the air passages were determined with the aid of powerful computers and unique software, it was possible to determine the natural frequency of the sound waves the dinosaur pumped out, much the same as the size and shape of a musical instrument governs its pitch and tone. High-performance computers were used to do the initial image processing, analysis, and actual sound creation, including a Compaq Computer professional workstation, an Intergraph Corporation TDZ workstation, and a Silicon Graphics infinite reality workstation.

"A very complex shape such as the dinosaur crest takes lots and lots of numbers to describe the shape in the computer," Carl says. "It's only recently computers have become powerful enough to allow that to happen."

Once the 3-D model was completed, the computer was able to simulate blowing air through the crest to amplify the tones it was capable of making.

More information about the project and the sound itself are posted on Sandia's External Web site at <http://www.sandia.gov/media/dinosaur.htm>

Jan. 8 is deadline for Employee Recognition Award nominations

A reminder to all employees: The deadline to nominate deserving Sandians for Employee Recognition Awards is Jan. 8.

As Executive VP John Crawford has said, "Here's your chance to call special attention to Sandians who have gone the extra mile and whose work or contributions you believe have been exceptional."

Nomination forms (essentially you offer a less-than 250-word statement) are available on Sandia's Internal Web home page or at <http://www-irn.sandia.gov/era/98era.htm>. You can also get them in California from your division office and in New Mexico from your division office, HR representative, and HR customer service manager.

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

MISCELLANEOUS

SKI MACHINE, PreCore, \$250; weight bench w/knee extender, 400 lbs. of weights, \$200. Montoya, 299-0624.

BARBIE STUFF: Fold-up house, \$15; camper van, \$15; assorted dolls & accessories; assorted preschool toys. Sobolik, 292-3959.

GUITAR, '64 Acoustic, w/solid spruce top, looks & plays great, \$200. Carson, 858-1460.

TWO 3500-LB. AXLES, complete w/hubs, tires & wheels, U-bolts, \$300 for both axles. Russell, 323-2894, ask for Danny.

MACINTOSH SE COMPUTER, 1MB RAM, 20MB disk, Powerpoint & MS-Word, \$100 OBO. Hale, 275-7870.

LARGE-CAPACITY WASHER & GAS DRYER Sears Kenmore, good condition, \$100/both. Ford, 294-6133.

3-PANEL TINTED GLASS SLIDING DOOR, 9-ft. wide; tinted arched window, w/antique-brass frame, 4' 9"H x 8'W (w/o arch 3' 8" H), \$100 ea. Chamblee, 294-1312, after 5:30 p.m.

PRO-FORM CROSS TRAINER, Smart Card, keeps track of workout, rarely used, paid \$850, asking \$500 OBO. Lujan, 299-2218.

BOYS' NORDICA 127 SKI BOOTS, size 5/6, like new, \$20; waffle iron, like new, \$20. Anderson, 897-2772.

EPSON EX 1000 DOT-MATRIX PRINTER, works great, \$100 OBO; will throw in 486/50 computer & color monitor for \$300. Schofield, 292-7220.

CARDIO GLIDE, almost new, \$80; blonde bedroom suite, w/mattress, bookcase headboard, more, \$300 OBO. Ghanbari, 883-3819.

TIRE CHAINS (CABLES), Shur Grip #SZ 315, fits some P165/P175 tires, never used, \$25. Howe, 866-6059.

CHRISTMAS FRUIT BASKETS, \$15 small, \$20 medium, & \$35 large, delivered Dec. 19, display in Bldg. 802 lobby, proceeds benefit the Bosnian Youth Soccer Team, coming to Albuquerque in May 1998. Hardesty, 293-7980.

GE RANGE HOOD, 36", \$25; pair of Wintermark snow tires, 5K miles, P215/75R-15, \$75. Bencoe, 294-3768.

TWIN COMFORTER, dust ruffle, shams, sheets, decorative pillows, curtains, floral/striped, pink/mauve/green, \$50. Herreid, 881-4572.

TRUNDLE/DAY BED, wooden "headboard," galaxy print on both twin mattresses, good condition, great for kids, \$200. Torres, 352-9342.

MONITORS: Radius/Sony GDM 1950, 20-in., 1024 x 768, \$495; Apple/Sony, 16-in., 832 x 624, \$325; Apple/Sony 13-in. RGB, 640 x 480, \$150; all great shape. Cohn, 275-8080.

POLARTEC 200 SKIWEAR, new, all sizes, colors & styles, great holiday gifts, good prices. Spraggins, 256-7406.

NORDICTRACK PRO SKI MACHINE, like new, \$465 OBO. Fisher, 293-2864.

CAMERA, autofocus SLR, 35mm Sigma SA300, built-in flash, infrared remote, 2 lenses (28-70/2.8, 70-210/4-5.6), \$695. Heffelfinger, 280-4879.

SOFA, LOVESEAT & CHAIR, \$500; 486 Packard Bell PC, w/monitor & printer, \$500; Aerobic Rider, Stairmaster, \$125 ea.; rowing machine, \$20, steel desk, \$100. Slack, 299-2314.

486 DX2/80 PC, 8MB RAM, 770MB HD, 4X CD-ROM, Windows95, SVGA monitor, keyboard, speakers, \$550 OBO. Peters, 293-6356.

LAS VEGAS BLACKJACK TABLE, great condition, \$125; pool table, needs work, \$30; kitchen table, \$40. Rule, 884-8762.

STUDDER SNOW TIRES, P205/75R14, mounted on Ford rims, \$50/pair. Whitley, 293-2807.

MICROWAVE, \$50; 20-cu.-ft. refrigerator, \$150; oak entertainment center, \$350; oak china hutch, \$350; Bose speakers, \$500. Gunther, 237-2198.

SUBARU SKI RACKS, for '89-'92 Subaru, 2 sets, both for \$90 or \$50 set. Baremore, 296-9267.

BROYHILL BUNK BEDS, full bedroom set, (8 pieces), \$1,200; oak, queen headboard, \$400; entertainment center, \$75. Pineau, 294-2482.

TWO DISPATCH PHONES, telescope, new \$250, asking \$150. Garcia, 343-8207.

KING-SIZE BED, w/frame, mattress, box spring, headboard, \$200; queen-size waterbed mattress, waveless. Lanoue, 877-7902.

DRUMSET, 5-pc., Ludwig, w/Zildjian hi-hat & crashride, \$750; Remo rototoms, \$250. Layne, 857-0989.

AMPLIFIER: Crate 80W, dual-channel, verb, 12-in. Celestion speaker, foot switch, \$175 OBO; DOD distortion delay, \$50 OBO. Manginell, 296-7961.

LOADED MACINTOSH POWERPC PROCESSOR, 75 MHz, 8MB DRAM, internal CD-ROM & modem, terminal, laser printer; 3 yrs. old, \$3,000 OBO. Middleton, 260-4644.

QMS PS815 POSTSCRIPT LASER PRINTER, Appletalk, serial, parallel interfaces, 2.0MB RAM, 45 typefaces, 8ppm, 300-dpi. \$375. Schkade, 292-5126.

SWEDISH BLUE-ENAMELED STEEL BUNKBEDS (separate beds, 1 high w/attached student desk, 1 low), very good condition, \$175. Phillips, 898-2565.

CRIB AND MATTRESS, Cosco, natural wood, excellent condition, \$95; collapsible plastic high chair, Century, \$20. Johnson, 255-8834.

SPODE CHRISTMAS DISHES: 8 dinner plates, \$5 ea.; 8 cups & saucers, \$3/set. McKenna, 899-4218.

TREADMILL (ERGOMETER), DP FIT FOR LIFE, pulse meter, pulse target indicator, hardly used, \$175. Montano, 821-1235.

CRAFTSMAN TABLE SAW, 10-in., \$100; king-size waterbed frame (oak), \$100. Ward, 296-2207.

WOODEN DESK, 7 drawers, oak/maple, \$30; wooden dresser, 3 drawers, \$15; both about 5'W x 2'D x 3'H. Ruby, 821-0982.

SYLVANIA CONSOLE COLOR TV, 26-in., \$150; entertainment center for 27-in. TV, 5 shelves, 2 storage areas, \$100. Scott, 294-4240.

FUTON, couch/full-size bed, oak, Southwest cover, like new, \$400. Gomez, 332-7502.

WINTER BOOTS, size 10, Cabela's Mountain Hunter model, new \$200, like new, Gore-tex lined w/thinsulate, made in Italy, \$80. Vigil, 271-1328.

COLOR TV, 19-in., two, excellent condition, Magnavox & Zenith, \$25/ea. Bass, 856-2407.

SWIVEL ROCKER, w/hassock, mauve, excellent condition, \$60; wooden rocker, w/pads, very good condition, \$40. Evans, 292-2367.

OFFICE MAX MERCHANDISE CREDIT, for \$88, will sell for \$70. Wagner, 823-9323.

NINTENDO, 7 games, 3 controllers, \$60; Sega Genesis, 7 games, 2 controllers, \$100; both in original box. Saladin, 881-2219.

MARE, 20 yrs. old, 15-16 hands, perfect for beginning young riders, very gentle, excellent health, includes saddle, bridle, \$650. Dahly, 281-2440.

HUTCH, beveled glass, table, 8 chairs, must see to appreciate, \$1,000; youth bed, race-car designed, \$50 OBO. Carrillo, 296-7461.

MAPLE DINING ROOM SET, Ethan Allen, dropleaf table, w/2 leaves, 8 chairs, double hutch, \$1,000. Beeson, 821-8393.

CROSS-COUNTRY SKI-BINDING PLATES, Voile, provide lateral stability, fit man's sizes 7 to 10-1/2, never been used, \$11. Koenig, 294-2264.

COMPUTER DESK, w/hutch & peninsula, \$100; large dog kennel crate, \$40; satellite dish, 6-ft., free, you haul. Morris, 292-5112.

RUGS, NAVAJO, quality, over 55% off original price, Yei-Bi-Chai, \$350; Pinon, \$250; Ganado, \$250; Crystal, \$375. Locher, 323-0722.

MULTIMEDIA SYSTEM, 120-MHz, 16-in. IBM SVGA monitor, HP laser printer, scanner, more, over \$1,000 of current software, asking \$775. Simmons, 281-3590.

FOUR WHEEL RIMS, steel, for Acura Integra, mounted w/used snow tires. \$100. Smith, 243-0714.

MAGNAVOX CONSOLE COLOR TV, w/remote, 25-in., \$175 OBO. Brewer, 293-7192.

ACOUSTIC GUITAR, case, \$150; study desks, \$75 ea.; metal desk, 30 x 60, \$50; aquarium/accessories, \$35; dresser, \$50. Dobias, 856-7841.

KENMORE WASHER (gold), \$135; TEAC CD player, \$40; Image Writer II, \$50; adj. bed frame, \$25. Ramey, 275-1059.

SOFA, Homestead House, blue/white patchwork design, like new, \$375 OBO. Harris, 299-4559.

DEADLINE: Friday noon before week of publication unless changed by holiday. MAIL to Dept. 12640, MS 0165, FAX to 844-0645, or bring to Bldg. 811 lobby. You may also send ads by e-mail to Nancy Campanozzi (nrcampa@sandia.gov). Call Nancy at 844-7522 with questions. Because of space constraints, ads will be printed on a first-come basis.

Ad Rules

1. Limit 18 words, including last name and home phone (We will edit longer ads).
2. Include organization and full name with the ad submission.
3. No phone-ins.
4. Use 8 1/2" by 11-inch paper.
5. Type or print ad; use accepted abbreviations.
6. One ad per issue.
7. We will not run the same ad more than twice.
8. No "for rent" ads except for employees on temporary assignment.
9. No commercial ads.
10. For active and retired Sandians and DOE employees.
11. Housing listed for sale is available without regard to race, creed, color, or national origin.
12. "Work Wanted" ads limited to student-aged children of employees.

NORDICTRACK PRO SKI MACHINE, like new, \$465 OBO. Fisher, 293-2864.

SATELLITE TV RECEIVER STS-SR100, w/Videocipher II descrambler & smart remote programmable controller, aluminum, 8-ft. dish, \$400. Fay, 292-6402.

KITCHEN SINK, faucet fixtures, stainless steel, \$50. Nenoff, 260-0943.

AUTOMOBILE WHEEL, 15 in., RH, fits '93-'96 T-Bird, \$100. DiPrima, 275-3479.

Next deadline Jan. 9
The next issue of the *Lab News* will be published on Jan. 16. The deadline for classified ads is noon, Friday, Jan. 9.

SIMMONS KING-SIZE MATTRESS, box spring, frame, \$200; Epson FX-85 printer, stand, box of paper, \$25. Ezell, 821-1768.

ORGAN, Lowery Heritage, w/bench, automatic orchestra control, dark wood, original books, \$525 OBO. Schuch, 344-4622.

MURRAY POOL TABLE, regulation, 3/4-in. slate top, good felt, w/6 cues, balls & rack, wall storage rack & chalk. Aeschliman, 281-1227.

MAN'S LEATHER WESTERN COAT, Pioneerwear, cream-pile lining, size 40, worn only few times, \$150 OBO. Zirzow, 281-9896.

BEDROOM SET, Drexel, walnut, triple dresser w/mirror, full bed w/mattress & headboard, night table, excellent quality & condition, \$600. Stoever, 296-3717.

GAS TAPPAN RANGE, older, 36-in., white, works well, \$75. Brion, 266-0791.

TAILGATE, 5th-wheel style, for '88-'98 Chev., all aluminum, lowered, construction complete w/hardware, \$235. Snelling, 294-5751.

TORTOISE-SHELL FEMALE CAT, 2-1/2 yrs. old, spayed, declawed, very smart & lovable, free to good home. Terrazas, 291-0905.

GAS RANGE, 30-in., almond, clean, \$100; Cardas quadlink 5-C speaker cable, 4m, \$295. Miller, 281-3655.

CRIB/YOUTH BED, Childcraft, 5-drawer unit, \$200 OBO. Sandoval, 275-0904.

TRANSPORTATION

'95 SUBARU IMPREZA OUTBACK, PS, PB, AT, AC, AM/FM/tape, 28,600 miles, \$14,000. Kozolski, 281-8506, after 2 p.m.

'90 CHEV. PICKUP, 4x4, 143K miles, 6-cyl., 5-spd. manual, AC, stereo, camper shell, well-maintained, 18-20 mpg, \$5,900. Hays, 836-2099.

'87 CHEV. CELEBRITY EUROSPORT, runs great, excellent interior, never in accident, priced with or without stereo. Rogulich, 298-5261.

'71 VW BUG, ugly but runs, needs work, \$750 firm. Mills, 262-0554.

'94 FORD EXPLORER, Eddie Bauer, 4x4, fully loaded, 50K miles, under warranty, book \$18,174, asking \$15,000. Bragg, 275-3172.

'93 CAPRICE CLASSIC, V8, fully loaded, \$7,300. Martin, 343-9719.

'82 CHEV. PICKUP, 3/4-ton body, good condition, interior needs work, \$2,250 OBO. Boyd, 291-8327.

'96 TRANS AM, fully loaded, leather, T-tops, CD, extended warranty, Viper alarm, \$19,500 OBO. Sanchez, 836-2827.

'92 CAMARO RS, V8, T-top, 66K miles, CD, new tires, AC, cruise, tilt, beautiful, clean & sporty, book \$13,000, asking \$9,700 OBO. Castillo, 294-0766.

'95 NISSAN PICKUP, 4x4, AC, ABS, 5-spd., AM/FM cassette, 26K miles, chrome wheels, beautiful, great condition, \$13,950. Quillmann, 858-0363.

'93 MITSUBISHI MONTERO, 4x4, AT, tint, PW, PS, 74K original miles, excellent condition, \$13,500 OBO. Otero, 839-7436.

'93 FORD RANGER XLT, extended cab, 85K miles, good condition, lots of extras, CD, standard, \$8,400. Underwood, 864-6071, evenings.

'87 COLT VISTA, 4WD, 5-spd., AC, new tires, seats 7, good condition, needs transmission work, \$2,900 book, \$1,500 OBO. Clark, 281-1243.

'93 TOYOTA PREVIA LE, 4WD, ABS, 4 captain's chairs, 2-yr. warranty, rear AC, excellent condition. Skroch, 988-4471.

'85 F150, 92K miles, 6cyl., 4WD, 4-spd., shell/short bed, premium wheels, good rubber/manuals, \$3,000. Krivitzky, 897-9104, evenings.

'74 CHEV. MONTE CARLO, 16K miles on (350) rebuilt engine, mechanically sound, \$3,500 OBO. Romero, 299-6283.

'94 SATURN SL2, 4-dr., 5-spd. manual, AC, AM/FM cassette, new tires, 65K miles, \$6,900. Simons, 296-0974.

'93 SIDEKICK (SUZUKI), 5-spd., AC, PW, 46K miles, excellent condition, original owner, \$9,800. Jones, 856-1837.

'83 MAZDA GLC, hatchback, AT, approx. 140K miles, \$500. Lewis, 268-5025.

'76 BLAZER, 4x4, rebuilt engine/transmission, new tires, extras, has U-joint or bearing noise in rear end, \$1,650. Ludwick, 296-6447.

'89 VOLVO 740GL, excellent condition, loaded, AT, AC, sunroof, clean, well maintained, runs great, \$5,900. Sanchez, 890-1282.

'88 ACURA LEGEND, 56K miles, 4-dr., cruise, stereo, power everything, new tires, dark blue, \$9,300. Roth, 248-1940.

'90 CADILLAC SEVILLE, loaded, excellent condition, well maintained, new tires, looks great, low 44K miles, \$9,900. Hart, 292-5110.

'95 SATURN SL1, white, maintenance records available, \$8,000. Walsh, 865-8263, ask for John.

'73 VW SUPER BEETLE, many new parts, 31-mpg, \$1,500 OBO or trade for tent trailer. Anderson, 281-6975.

'82 FERRARI 400L, rare 5-spd., V12, fast/powerful, 45K miles, cold AC, ABQ emissions permanent exemption, all original, great running, motivated, make offer. Salyer, 823-1342.

'88 TOYOTA CAMRY DLX, 4-dr., 5-spd., AC, good condition, 140K miles, well maintained, \$3,200. Plomp, 792-0176.

'87 MITSUBISHI MONTERO, 4WD, 128K miles, excellent condition, AT, PS, PW, AC, tilt, \$3,500. May, 299-5548.

'93 NISSAN SENTRA, AT, AC, AM/FM cassette, great little car, very reliable, priced near wholesale. Garcia, 293-3937.

'91 PLYMOUTH SUNDANCE, 4-dr., AC, AT, 86K miles, red, very good condition, \$4,500 OBO. Cady, 342-1619, ask for Carl.

'97 CHRYSLER SEBRING LXI LIMITED EDITION, 6,500 miles, 2.5L V6, Indy red, loaded, moving, must sell. \$20,000 OBO. McConnell, 293-7641.

'96 HONDA ACCORD LX WAGON, AT, alarm, tinted windows, 37K miles, original owner. Wade, 890-6323.

'93 DODGE COLT, 2-dr., white, 5-spd., AC, AM/FM, 40+mpg, 8,300 miles, excellent condition, 1 owner, \$3,800 OBO. Leeman, 281-7949.

'60 FIAT 1100 SEDAN, complete, original, 4-spd., column shift, suicide doors, not running, easy restore, \$450 OBO. Roberts, 866-5422.

'88 CAMRY LE ALL-TRAC, original owner, 5-spd., PS, PB, maintenance records, good tires, 122K miles, \$5,200. Quinn, 296-7743.

'93 FORD EXPLORER XLT, V6, 4x4, AT, loaded, hitch, 74K miles, excellent, \$12,995 OBO. Buck, 856-1870.

RECREATIONAL

OMNISOFT DOWNHILL SKIES, 190cm w/Solomon bindings, \$35. Dobranich, 298-4547.

MOUNTAIN BIKE, kid's specialized Shock Rock, w/front suspension, great shape, \$125. Andrews, 858-0569.

THULE BIKE ROOF RACKS, new, never used, \$75 OBO. Avila, 275-9572.

CAMPER, Mitchell Fish Hut, good condition, \$750; 1 aluminum camper shell, LWD, \$150. Eisenberger, 877-7041.

REAL ESTATE

3-BDR. HOME, terrific schools district, near JuanTabo/Spain, 5508 Zambra NE, \$125,000. Giles, 296-8543.

3-BDR. PATIO HOME, 1-3/4 baths, on golf course, 45 minutes from Albuquerque, in Belen, lots of amenities, \$90,000. Mancel, 896-4737, ask for Nancee.

4-BDR. HOME, 1-3/4 baths, hardwood floors, gas fireplace, very close to Sandia base, \$95,000. Otero, 836-4215.

3-BDR. MOBILE HOME, near-new, 1,800 sq. ft. double-wide, 2-baths, LR, DR, den, take over payments, must be moved. Fisher, 384-4253.

2-BDR. TOWNHOME, Academy/Eubank area, El Paseo, updated, high ceilings, fireplace, flagstone patio, garage, \$99,900. Clausen, 858-8330.

2-3 BDR. HOME, Near Heights, hardwood floors, 2 full baths, extra large lot, 1,650 sq. ft., less than 10 minutes from base, \$119,900. Gentry, 341-2516.

3-BDR. HOME, NE Heights, 1,800 sq. ft., 1-3/4 baths, solar, security, 2 AC units, RV parking, backyard access, motivated, \$125,000 OBO. Rainey, 294-8642.

WANTED

COPY OF *Nuclear Weapons Databook, U.S. Nuclear Forces and Capabilities*, Vol. 1, will purchase. Reed, 268-7484.

YOUR SOUTHWEST AIRLINES FREE ROUND-TRIP TICKET, with at least a 3-month expiration date, \$200. Cooper, 281-0950.

ROOMMATE, to share 3-bedroom condo, nice area, \$350/mo. Kaplan, 323-2434, ask for Cindy.

DONATIONS NEEDED for Native American missions, monitors, computers, copiers, overhead projectors, everything gratefully appreciated. Freeman, 268-6235.

DRAFTING TABLE, must be 60-in. wide, minimum. Boebert, 823-1046, evenings.

AMPLIFIER, Fender, super reverb., black face, will pay top dollar, must be functional. Cerutti, 323-5305.

TREADMILL, will pay reasonable price. Lesperance, 281-4921.

CASSETTE RECORDER, w/left & right mike inputs & VU meters. Skogmo, 294-0133.

WIDE-ANGLE LENS, 28mm, Pentax SLR, 35mm, old. Underhill, 294-5774.

DRIVER, for elderly couple, located vicinity Guadalupe Trail/Montano, scheduled short trips, errands, medical appointments. Stump, 344-9340.

LOST & FOUND

FOUND: Wire-frame prescription glasses, black "Serengeti" case; blue-rimmed prescription sunglasses, brown case; gold hoop earring; all turned in at Bldg. 823 Lobby. Jaramillo, 845-8677.

FOUND: Blue baseball cap, in water tower parking lot. Morris, 844-9923.

LOST: Pen in burgundy leather case, w/Smith's & Furr's cards attached, significant personal value. Zaorski, 281-9194.

LOST: Keys for house & automobiles, in vicinity of Bldg. 807, seven keys on metal key ring. Smiel, 844-8441.

Blue-chip NASA delegation hears two days of 'impressive' briefings on Labs' capabilities

Sessions aim to foster joint Sandia-NASA projects

By Bill Murphy

An initiative to encourage more cooperative research and development efforts between Sandia and NASA got a big boost last week. A blue-chip delegation of scientists and administrators from NASA facilities across the country spent two days at the Labs learning about Sandia's capabilities in a wide range of technical disciplines. Although there have been NASA-Sandia interactions in the past, this meeting was the most in-depth, comprehensive briefing to date.

At the close of the first day's briefing, Edward Stone, Director of the Jet Propulsion Laboratory, presented Executive VP John Crawford a plaque expressing appreciation for Sandia's work on the Mars Pathfinder airbag. The Pathfinder mission, managed by JPL, landed the Sojourner rover on the Martian surface and returned photos and data for several months. The airbag, which enabled a "soft" landing on Mars, was a critical component of the Pathfinder mission. As NASA Administrator Dan Goldin said at the time: "The first four minutes [of the landing] were on [Sandia]" (*Lab News*, July 18).

The NASA delegation visiting Sandia last week included JPL Director Stone and several of his key lieutenants. High-ranking technical leaders from Ames Research Center, Stennis Space Center, Goddard Space Flight Center, Marshall Space Flight Center, Johnson Space Center, Langley Research Center, NASA headquarters, and the Air Force Research Laboratory at Kirtland Air Force Base, also attended.

'An unparalleled opportunity'

Bob Blewer, Manager of Industry/University Partnerships Dept. 1305, coordinated the NASA visit. He said the visit represents "an unparalleled opportunity" for Sandia.

"The hope is to get some joint projects going," Bob said. "Based on what I've seen and heard, I think that's going to happen." Bob said it is "in everyone's interest to find areas where the Labs and NASA can work together."

Gary DuBro, a NASA HQ representative based at the Air Force Research Laboratory, agreed. Gary worked with Bob and VPs Dan Hartley (4000) and Bob Eagan (1000) to set up the NASA visit. After the presentations, an upbeat DuBro said he is "very confident" that some joint projects will emerge out of the interactions.

"I'm talking about long-term strategic alliances; that's the way I think we ought to be looking at this," he said. "When we identify areas where our program needs and our missions are complementary, it just makes sense to work together; we get twice as much result for our money."

Gary noted that NASA's interest in working with Sandia comes from the very highest levels. NASA Administrator Dan Goldin and Sandia President C. Paul Robinson had dinner during a recent visit by Paul to Washington. Since then, the momentum for partnering, which had been building slowly and mostly on an ad hoc basis by a handful of committed individuals, has gained steam.

Formal briefings, informal confabs

During their two-day stay, the NASA delegation heard more than 20 briefings on subjects of Sandia technical expertise. Each 20- to 30-minute briefing addressed a subject of likely mutual



PRE-LAUNCH BRIEFING — Don Rigali, Director of Aerospace Systems Development Center 2400, briefs NASA visitors on Sandia's capabilities. Space agency officials heard more than 20 technical briefings during a two-day visit to the Labs. Seated in the front row are, from left, Gerald Barna, Lewis Research Center; Michael Sanders, Jet Propulsion Laboratory; and Col. Brian Duffy, Johnson Space Center. (Photo by Randy Montoya)

Sandia/NASA interest. The briefing agenda read like a primer on Sandia's integrated, system-based technical competence.

"When you see all the briefings laid out together, you really get a sense, an appreciation, of just how broad and deep Sandia's expertise runs," Bob Blewer said.

Subjects of briefings included: robotics, manipulators, intelligent machines and semi-autonomous technology; radiation-hardened high-reliability microelectronics/ component development; systems on a chip/micronavigator; microelectromechanical systems; synthetic aperture radar; scannerless terrain mapper technology; deep penetrators/seismic sensors and high-impact packaging; space subsystems; space communication; nuclear propulsion/space power; chemical microsensors; advanced materials R&D; advanced manufacturing technology; high-integrity, high-reliability software; advanced information-processing technology; combustion R&D; information mining and technology mapping; knowledge management; advanced information-processing technology; and smart agent based modeling.

These were the subjects of formal briefings. As Bob Blewer noted, the subjects generated such interest that Sandians and NASA counterparts often paired off during the two days to talk in more detail about areas of mutual technical interest.

At the close of day two of the briefings, Dan Hartley, VP of Laboratory Development Div. 4000, offered a short course — call it "Doing business with Sandia 101" — explaining to the NASA team the various ways that formal and informal relationships can be structured. He charted the

Coronado Club

Dec. 31 — New Year's 1997 at the Coronado Club. Entertainment by Bobby Buttram and the Trainmen. Members: \$30/couple, \$15/single. Guests: \$40/couple, \$20 single. Reservations required. Limited seating available.

various stages of a business relationship: vendor, critical supplier, partner, principal partner, and strategic ally.

"I hope we're working somewhere in the upper end of this chart, eventually. It does take some time," Dan said.

Dan noted that in addition to lab-to-lab agreements of various degrees of formality, there are cases of congressionally mandated collaborations. Such collaborations between DOE/DP labs and DoD have resulted in about \$36 million annually to Sandia since 1986. Similar opportunities may exist between DOE and NASA, he said, in areas such as supercomputer modeling of humans in space, nuclear power and nuclear propulsion, solar energy in space, and microelectronics in space.

"These are all areas where there is a high level of joint interest," he said.

NASA representative DuBro told the group the next step is to proceed with reciprocal technical briefings. A Sandia entourage is to visit JPL in January or February and Goddard Space Flight Center in March or April to learn more about NASA's specific needs and capabilities.

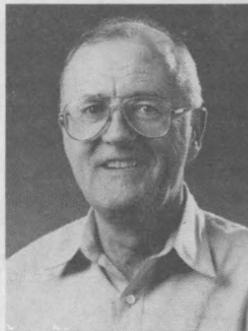
"When we get those under our belt, I think we'll be ready to get specific," he said.

"Mr. Goldin has a term: 'Faster. Better. Cheaper.' I think this approach is a way to do that."

Col. Brian Duffy from Johnson Space Center closed the wrap-up session by thanking all the Sandians involved, from Bob Blewer and the staff who coordinated the technical briefings to Bobbie Burpo and Julie Butler from Protocol Dept. 12670, who handled the logistics arrangements.

"If I could summarize the last day and a half with one word, I would say 'impressive,'" Duffy said. "The range of topics presented here was fabulous. The people you have here are an incredible group."

Recent Retirees



Hugh Church 40
6233



Don Stone 34
3650

When snow falls don't you do so also

Snow and subfreezing temperatures brought ice-covered roads and a two-hour delay for Sandia and Kirtland AFB the morning of Dec. 11. It also brought home the realization — if anyone wasn't yet aware — that winter weather is here, and along with the beauty of the snow comes the hazards of icy sidewalks and outside stairways.

Ken Miles and his safety colleagues in ES&H Teams and Industrial Hygiene Dept. 7524 urge you not just to be careful yourself but, if you see a hazardous condition, to bring it to proper attention or do something about it.

Kerry Sturgis of Compliance and Metrics Dept. 7511 did some analysis, and he reports that the number of employees who formally reported having slipped and fallen at work rose dramatically last year. There were six such falls in 1995 and four in 1996, but 21 in 1997.

Ice and snow can change things dramatically for the worse. Kerry found that in the wintry week of Jan. 13-17, Sandia had 12 recorded ice- and snow-related falls. On Jan. 16, a day that has come to be known as "Black Thursday," there were six in one day. And these are just the recorded incidents.

Getting all the walkways and driveways around Sandia cleared when snow and ice hit is difficult. Many organizations at Sandia are involved, and priority is given to main roads, entrance gates, hand-capped access areas, sidewalks in the tech areas, and building entrances.

With some advance planning, organizations and employees can contribute to their safety until the walkways can be serviced. You can get bags of "Ice Melt" by calling Bob Surran at 845-3096 or Alex Padilla at 845-0090. The bags will be delivered, but you may need to provide your own scoops.