

EXPLAINING THE PROCESS — Kenneth Gwinn, right, points to an image of a Sandia computer model/analysis of foam impacting the leading edge of the space shuttle to David Crawford, left, and Kurt Metzinger, sitting. (Photo by Randy Montoya)

Sandia plays key role in Columbia accident analysis

Confirming event was impact experiment conducted using a scenario modeled by Sandia for NASA

By Michael Padilla

Sandia played a key role in helping NASA determine the cause of the space shuttle *Columbia* disaster. Sandia researchers' analyses and experimental studies supported the position that foam debris shed from the fuel tank and impacting the orbiter wing during launch was the most probable cause of the wing damage that led to the breakup of the *Columbia*.

"Sandia's expertise in the areas of impact testing and modeling, material testing, non-continuum aerodynamics, and thermal analysis has been invaluable to our investigation teams," writes William Readdy, NASA associate administrator for space flight, in an Aug. 12 letter to Sandia. "The cooperative effort and sharing of ideas, test methods, and analytical tools have been beneficial to both our organizations."

For five months, more than 30 Sandia researchers from both Sandia sites applied the Labs' computational and experimental engineering and material sciences resources to determine if the foam impact was in fact the cause of the fate of *Columbia*.

"Sandia played an important role in determining..."
(Continued on page 8)

200 Sandians fight and kill the computer worm Blaster

The virus SoBig.F still a problem

By Chris Burroughs

The Blaster worm is dead. At least at Sandia. Blaster, the nasty worm that on Aug. 11 infected some 1,500 PCs using Microsoft Windows at Sandia, was killed by a Blaster patch a couple of days after its presence became known. In the following days, the patch was deployed to the remaining thousands of Windows-based computers to prevent them from being infected.

The worm arrived one day before the patch was scheduled to be deployed to all Sandia computers running Windows 2000 or Windows XP.

"We have more than 19,000 active networked computers using Windows at Sandia and we were able to limit the number of computers infected to 1,500," says Art Hale, Director of Computing and Network Services Center 9300.

The impact was kept at a minimum due to...
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Sandia's recent security struggles have wrought headaches and headlines, but they are prompting positive changes, Labs' top execs say in interview

Editor's note: Without a doubt, Sandia is going through a difficult period. The public controversy surrounding the Labs' internal security has prompted scrutiny and some criticism from several quarters, including Congress, government watchdog groups, the news media, and Sandia's oversight agencies — the Department of Energy (DOE) and the National Nuclear Security Administration (NNSA).

Recently the *Lab News* sat down with Labs Executive VP and Deputy Director Joan Woodard and recently named manager of Protection Program Operations Jim Larson (4210) to solicit their thoughts on the Labs' security struggles and the changes that are taking place as a result. The interview begins on page 4.

But first, some background.

Many of the individual security problems Sandia's critics have focused on occurred more than three years ago. Major problems included a set of master keys that went missing from a security police post for nine days, then were anonymously returned; a surveillance tape that showed a few security police officers (SPOs) taking unauthorized breaks while on duty; and a van that exited through a tech area fence in the early morning hours and was later found at a local home improvement store.

More recently, a computer hard drive was destroyed even though its contents were considered part of an ongoing security investigation.

In summer and fall 2002 several things happened to focus attention on security matters.

First, Sandia received critical assessments of its security function from the NNSA's local site office.

Around the same time, two Sandia employees expressed concerns that Sandia was not taking security matters seriously enough and that Sandia's management had not adequately supported investigations of security problems.

This prompted Labs President C. Paul Robinson to commission an independent investigation by two former federal prosecutors to look into allegations that investigations had been impeded and that the investigators had been retaliated against. Paul also asked the local NNSA site office...
(Continued on page 4)

Veteran Sandia director Ron Detry has been named VP of the Labs' new Integrated Security Division 4000. Story on page 2.

Also: See the new organizational chart on page 13.



10 Sandia, Rockwell Collins sign ambitious new memorandum of understanding on R&D efforts

11 Virtual center tackles big problems in materials sciences as it observes 10th anniversary

What's what

Charles Shirley (9620), who was in the thick of the struggle against the Blaster worm that got into more than a thousand Sandia computers last month, called one day with an update on the progress Integrated Information Services was making (see story on page 1).

Somehow, the subject of odd or incorrect signs came up and Charles laughingly described a sign he had seen on a recent camping trip in Rocky Mountain National Park. Leaving the park, he noticed a sign that directed drivers: "Reentry vehicles use right lane."

Maybe there's been more progress in developing a "spaceplane" than we know.

And before we get away from the computer worm/virus plague, *Lab News* Editor Ken Frazier (12640) found nearly 300 bogus e-mail messages when he came to work one day late last week. Fuming about that, he recounted his morning up to that point.

Always fascinated with astronomy, Ken was up and down three or four times during the previous night to look through his telescope at Mars, which, as most of us are aware, was making its closest pass by Earth since our proto-nudist ancestors were pushing the technological boundaries of club-fashioning. And Ken's wife, Ruth — always interested in anything interesting — was also up to get a peek at Mars.

When Ken got up for good to get ready for work, he popped a piece of bread in the toaster and went to his office, where he discovered the cat had jumped onto the top of a file cabinet where he had organized the files for the next issue of *Skeptical Inquirer* magazine (he's been editing it for years). The files were scattered all over the floor. Who knows what the cat was thinking, but of course, with all that getting up and down and opening and closing doors to go look at Mars, it could have been more than a little agitated.

Muttering dire thoughts, Ken straightened the files and headed back to the kitchen. The toaster had not toasted his toast. Throwing up his hands and muttering even direr thoughts, he grabbed his stuff and went to work — where he discovered the e-mail pileup.

Listening to all this, I remembered one of the set pieces in the old country music variety show *Hee-Haw*, which had four or five of the regular cast members recounting awful things that had happened to them, then all wailing a refrain about gloom, despair, and agony that lamented: "if it weren't fer bad luck, I'd have no luck at all . . ."

Which about describes Ken Frazier's Wednesday night/Thursday morning last week.

A thought: With the increasing number of West Nile virus cases in New Mexico, maybe an entrepreneurial PR type could win the hard-pressed Rio Grande silvery minnows a little (pun? . . . what pun?) slack. Sell 'em as mosquito larvaegobbling heroes — like their mosquito minnow cousins in Las Cruces. Who can tell the difference?

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

Ron Detry named VP of new Integrated Security Division

A new vice presidency has been created to oversee security matters at Sandia and Ron Detry has been named to head it. The announcement was made Aug. 25.

Ron has been named vice president of the new Integrated Security Division 4000 and Labs Chief Security Officer. He had been serving as director of Nuclear Weapons Planning, Operations, and Integration Center 9800 and as chairman of the Nuclear Weapons Program Directors Leadership Team.



RON DETRY

Labs Executive VP and Deputy Director Joan Woodard announced the organizational change, saying it will "integrate the laboratory site safeguards and security with security R&D and technology expertise resident in the lab. We are very fortunate to be able to tap our lab expertise in advanced technology for security to meet the increasing security challenge."

President and Labs Director Paul Robinson said of the reorganization, "Recent events have caused us to examine the multidimensional nature of security and the role it plays in our laboratory. Our intent is to integrate all of the important security responsibilities into a cohesive whole to make sure that the security needs of our nuclear weapons efforts are met, as well as for the many other classified programs we have undertaken in recent years."

"The security responsibilities from physical security to cyber to highly classified and compartmented programs have grown up in many organizations, and the need to align and connect these responsibilities is now clear," Paul added. "What a pleasure it is when faced with such a daunting challenge to be able to pick from our ranks an individual who has the skills, the background, and the integrity to take this role."

Joan noted that as laboratory chief security officer, Ron will be "responsible for the integration of all elements relating to safeguards and security at Sandia, including security operations, computer security, import/export control, and special- and limited-access program security. Ron will speak for the laboratory in all aspects of security operations for the institution."

A mathematician by training, Ron has BS, MS, and PhD degrees from the Illinois Institute of Technology. He joined Sandia in 1969. He became director of Sandia's computing organization in 1983, and has served as director of a variety of other centers in Albuquerque and California since then.

Ron's division will have two centers: 4100 (currently Security Systems & Technology Center 5800), Ron Moya, acting director; and 4200 (currently Security Center 12200), Dennis Miyoshi, director. The center names will remain the same.

Joan said counterintelligence and corporate investigations will be independent of the new division and will report directly to executive management. Counterintelligence (now organization 5010, managed by Bruce Held) will become organization 30, reporting directly to Joan and Paul. Also, a new Corporate Investigation Department, organization 20, is being created, with VP Pace VanDevender (1000) serving as acting manager.

Recent Patents

Robert Moore (6849): *In Situ* Formation of Apatite for Sequestering Radionuclides.

Carolyn Matzke (1763), Carol Ashby (11500), and Leonardo Griego (1742): Formation of Interconnections to Microfluidic Devices.

Arthur Fischer (1123), Kent Choquette, and Weng Chow (1123): Semiconductor Laser with Multiple Lasing Wavelengths.

Tina Nenoff (6245) and May Nyman (6118): Niobate-Based Octahedral Molecular Sieves.

Carol Ashby (11500), David Follstaedt (1111), Christine Mitchell (1126), and Jung Han: Canted Epitaxial Process.

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Ken Frazier, Editor 505/844-6210

Bill Murphy, Writer 505/845-0845

Chris Burroughs, Writer 505/844-0948

Randy Montoya, Photographer 505/844-5605

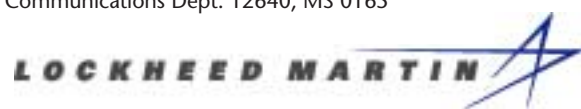
Nancy Garcia, California site contact 925/294-2932

Contributors: Janet Carpenter (844-7841), John German (844-5199), Neal Singer (845-7078), Larry Perrine (845-8511), Howard Kercheval (columnist, 844-7842), Will Keener (844-1690), Iris Aboytes (844-2282), Michael Padilla (284-5325), Rod Geer (844-6601), Michelle Fleming (Ads, Milepost photos, 844-4902).

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NOVA Awards go to two satellite efforts

Two of this year's Employee Recognition Award winners (*Lab News*, July 11) have been selected as Lockheed Martin NOVA winners: Bill Slosarik (6521) for Individual Leadership, and the EnRad Satellite Payload Team.

Bill and Dean Dixon (5735), representing the EnRad team, will be recognized at the NOVA award celebration at the Smithsonian Institution's National Air and Space Museum Oct. 24.

"I am particularly excited that Lockheed Martin saw fit to pick two of our nominees, rather than the usual one NOVA award winner," said Labs Director Paul Robinson. "These programs are both related to our satellite efforts, which have a tradition of doing outstanding work. I'm pleased to see one individual and one team award. Congratulations!"

Bill's ERA citation reads: "William Slosarik has demonstrated sustained exceptional leadership as the ICADS/GNT IIF software development manager in 2002."

The team's ERA citation reads: "For completion and delivery of the EnRad satellite."

Retiree deaths

E. Ronald Burke (age 94) July 13
Vences G. Chavez (81) July 14
Josef Wintersberger (73) July 22
Frank J. Shingola (92) July 23
Norman C. Widenhoefer (73) July 28
Frank N. Gurule (81) July 31

Computational fellowship adds value . . . for bright students *and* Sandia

By Nancy Garcia

When Aron Cummings began an electrical engineering graduate program after a summer internship at Sandia, he also headed toward a 2003 Computational Science Graduate Fellowship (CSGF) funded by the Department of Energy's Office of Science and Defense Programs.

The Washington State University student's mentor Robert Kinzel (8226) says he'd welcome him back when it is time to conduct his fellowship practicum. Since the fellowship's inception more than a decade ago, 31 fellows have completed practicums here. Four interns completed summer practicums this year at Sandia/New Mexico: David Schmidt, Michael Greminger, Sommer Gentry, and Kristine Cochran. (Their practicum coordinator, Marcus Martin (9235) was a CSGF fellow in 1999.)

Other potential Sandia candidates are encouraged to apply to the fellowship, which can be awarded either at the onset, or into, a graduate school career. The benefits include a \$28,000 stipend, travel allowances, computer, annual conference and national lab practicum.

The program, administered by Krell Institute, is for high-achieving/stellar-grade-point-average US citizens interested in applied computational science.

"The fellows come free to Sandia to work their summer practicum and can target their PhD research toward Sandia research," says Dept. 8964 Manager Paul Nielan, the California site practicum coordinator. "They also represent excellent pipeline candidates for employment."

This summer's CSGF conference was attended



CONVENING — At the Computational Science Graduate Fellowship conference held in July in Washington, D.C., Sandians mingled with students and with DOE representatives. Pictured here are Norma Hibbs (8524), Steve Wix (1734), Roberta Rivera (3554), Chris Moen (8728), DOE/NNSA Defense Programs Director of the Office of University Partnerships Beverly Berger, DOE/NNSA Deputy Administrator for Defense Programs Everet Beckner, Dominique Foley Wilson (3554), and Anna Chalamidas (35542).

by representatives of both Sandia sites, as well as Beverly Berger of the Defense Programs office of DOE's National Nuclear Security Administration (NNSA) and Everet Beckner, Deputy Administrator for Defense Programs, NNSA.

The conference, a requirement for nearly 100

fellows annually since the program's inception, is also an opportunity to meet potential employers. "Each lab's representative goes and tries to woo these students to their lab," says Norma Hibbs, who attended from Recruiting and University Partnerships Dept. 8524.

Managers with students who are potential candidates are encouraged to write letters of recommendation for them. For additional information, visit <http://www.krellinst.org/csgf/index.html>.

Sandia California News

Student interns shine at Sandia/California's annual summer symposium



WHICH SWITCH? — Kristin Granlund (8226) was among 75 interns to present work this summer at Sandia/California's Student Symposium. Kristin, working with mentor Christy Woodcock in the National Security Electrical Engineering Institute, came up with a way to test electromechanical switches using stepper motors and LabVIEW software. Surety Design Engineering Dept. 8226 would like smaller, more accurate switches, she explained, and because stepper motors are used for precise, accurate movement, she wrote control software in LabVIEW to drive the motors a few thousandths of an inch to measure the switches' mechanical properties. Kristin plans to have the process relatively automated by the time she returns to the University of Virginia this fall so different switches can be evaluated easily. A senior in electrical engineering who graduated from California High School in San Ramon, she has spent three summers as a Sandia intern.

Feedback

Project/task number policy for EEO/AA, ethics training clarified

Q: During this year's EEO/AA Briefing we were told to only charge 1.5 hours to the Corporate Training project/task number, yet the briefing was documented and posted as being 2 hours in length. What project task number am I to use for the remainder and is this ethical?

A: Each fiscal year, the list of courses chargeable to the corporate project/task number for mandatory training and the amount of time allotted for each course is communicated to all Sandia managers and incorporated in CPR 300.6.15, "Employee Time Charging." The annual EEO/AA Briefing is allotted .5 hour, and the mandatory Ethics Awareness Discussion is allotted one hour. Given the amount of time you indicated you were instructed to charge to the corporate training project/task number, I assume the session you attended included both the EEO/AA and the Ethics segments, in which case 1.5 hours is the total available time authorized for charging to Corporate Training. Managers are responsible for ensuring that the EEO/AA Briefing and Ethics Awareness Discussion are delivered, and to the extent their plans exceed the allotted time, they have discretion to identify an appropriate alternative project/task number for the additional time spent. As with any time charge, if you have questions regarding the correct project/task to use for the remaining 30 minutes of briefing/training, you should consult with your manager.

— BJ Jones (3500)

Security issues

(Continued from page 1)

to look into security issues.

Another employee expressed his similar concerns directly to the Washington, D.C., office of Sen. Charles Grassley. This prompted a series of letters about Sandia's security from Sen. Grassley to DOE Secretary Spencer Abraham beginning in September 2002. Two other Sandia employees were later summoned to Sen. Grassley's office to discuss, with the support of Sandia's management, the state of security at Sandia.

The results of the NNSA review requested by Paul, released in mid-March 2003, found that management of Sandia's security force was deficient. This prompted Paul and Joan to call a March 20 news conference, during which they revealed what they called "disturbing concerns about the management of Sandia's security force" [Lab News, April 4].

At the news conference they announced several changes, including separating the security police force from the organization responsible for Environment, Safety, and Health issues, naming Dennis Miyoshi to lead the new Security Center 12200, and appointing Jim Larson to oversee the operations of the Labs' security protective force (Pro Force), with Joe Sandoval (4213) as his deputy, among other changes.

They also announced several related disciplinary actions, and they discussed their expectation that the independent investigation Paul had commissioned, led by former US Attorney Norman Bay, might lead to additional disciplinary actions and improvements.

The Bay report was provided to Paul on June 4, 2003. Bay's investigation focused primarily on five security incidents and concluded that in one case an investigation was clearly impeded. Although no evidence of retaliation (as defined in case law) was present, there had been management actions that created the appearance of retaliation, according to the Bay report.

Paul soon announced several disciplinary actions resulting from Bay's findings. Some of the people disciplined were in security management. Others were in National Security and Arms Control Div. 5000. The disciplinary actions ranged from retirement in lieu of termination to demotion and time off without pay. In most cases the names of those disciplined were not released [Lab News, June 27].

Most recently, on Aug. 20, 2003, an investigative report on the CBS Evening News reviewed Sandia's more visible security woes.

The process that began the Bay investigation in summer 2002 has since spun off at least a dozen additional investigations, internal management review teams, and external assessments, many of which continue. Joan Woodard and Jim Larson discuss many of these below.



SANDIA'S PRO FORCE has grown from 130 a few years ago to approximately 170 uniformed officers today. Security Police Officer Mike Patton and Lieutenant Phil Gonzales help guard a Kirtland Air Force Base gate.

Sandia's reactions to its security struggles, now more than a year old, have been complex and, at times, confusing to employees and the public. We hope the following interview will help readers understand why many changes, both visible and subtle, are taking place around them.

More important, the interview, we hope, will

"These assessments, along with input from some concerned employees, and seeing similarities between the assessments and the issues brought to our attention, served to reinforce to us that it was time to take action. Let me add that it was extremely valuable to us that our concerned employees came forward. We are thankful for their input."



serve as a reminder that proper management of Sandia's security obligations is essential to the Labs' ability to provide exceptional service in the national interest.

Chris Miller and John German (both 12640) conducted the interview.

LN: With regard to the issue of security at Sandia, is this primarily a matter of its management, or does it reach beyond that?

Joan: The problems that were brought to us, starting in June of 2002, are broader than just the management of Sandia's security or the Pro Force. They touch many different dimensions of security and the overall security profile of the Laboratory. The issues include line management's responsibility for exercising careful management of their obligations in security when dealing with issues that are brought to them, and approaching each of those issues with the attitude that we need to look at them thoroughly, completely, and in as unbiased a way as possible. They also include issues associated with the discipline by which we conduct the Laboratories' operations, not just in the Pro Force but throughout the Labs in following the specifics of many of the security-related rules, whether it be password sharing or whether it be custodianship of keys or property. Now does this mean we have had a breach in security? No.

LN: What has prompted Sandia to place even greater emphasis on matters of security?

Joan: I think there are a couple of things that have contributed. One is that the world situation post 9/11 has caused all of us, whether it is in your personal life or in your work here at Sandia, to look at security differently. We have seen that America is vulnerable and that there is a real threat. The second piece is that in the past when individual issues and concerns came up, we didn't really think about how

they might be connected. We tended to look at them as isolated events. One could rationalize individual security incidents as not being a big deal. But because of the potential consequences, it is important for us to look at each and every problem thoroughly, and with a skeptical eye, thinking about what could really be going on

here, and looking to see if perhaps there's a pattern that indicates a broader trend or threat. Some of that is driven by our process, which is when an event occurs we do a thorough root-cause analysis, we generate lessons learned, and then we implement corrective actions. But we haven't carried out the kind of thorough trending to look at interrelationships.

LN: Have there been other external pressures to look more closely at our security?

Joan: We've had a number of inquiries, both formal and informal, that have highlighted issues and served to reinforce the importance of the actions we're taking. There have been NNSA reviews and there have been DOE Office of Independent Assessment reviews. The Government Accounting Office [the investigative branch of Congress] has been asked to conduct its own investigation. There is a DOE Inspector General review going on right now. In addition, we have had queries through the Department of Energy from Congress. A number of different things have served to reinforce to us that these are issues we need to take seriously, and we need to make sure we've done a thorough and complete job.

LN: When and how did all this begin?

Joan: The issues that we are dealing with now, whether in what I call the security culture of the Laboratory or whether in management of the Laboratories' security program, came to us through a number of events that happened right around the same timeframe — the winter/spring/summer of 2002. There were some assessments conducted by the local NNSA site office on security that highlighted a number of issues. But you could look back and say we didn't quite see those in the way we should have. These assessments, along with input from some concerned employees, and seeing similarities between the assessments and the issues brought to our attention, served to reinforce to us that it was time to take action. Let me add that it was extremely valuable to us that our concerned employees came forward. We are thankful for their input.

LN: So there were internal pressures as well?

Joan: Yes. The recognition in June 2002 that we had a problem led to the first major step, which was realizing that these issues required a thorough investigation. But because we were unable to use our internal resources for investigation, we took a fairly unique step for Sandia, which was to hire two very experienced former federal prosecutors to conduct an investigation. The result was a report that was issued on June 4,

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Security issues

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2003, commonly known now as the Bay report after former federal prosecutor Norman Bay, who led the investigation. The Bay report looked primarily at two things: The first was whether investigations being conducted within the Laboratory had been impeded or interfered with in any way; the second was whether there had been any retaliation against Sandia's investigators and whether that had hindered their ability to conduct the thorough and complete investigations that this Laboratory needs.

LN: What did the Bay report determine?

Joan: The report itself was over 200 pages plus exhibits and supporting documents. The investigation took many months to conduct because of the 50-plus interviews with more than 20 different people around the Laboratory. It looked at quite a large array of case issues. Within those there were five cases that Bay chose to investigate more thoroughly. The conclusion was that in one of those cases there had been obstruction and impedance of an investigation. On the issue of retaliation, the approach was to take a look at case law and to look at the definition of retaliation as it has been established in the courts. And that turns out to be a fairly rigorous, high-threshold definition. And so the Bay report's conclusion was that none of the actions legally constituted actions that met the definition of retaliation in the courts, but that there were actions that created the perception of retaliation. We took all of Bay's findings very seriously.

LN: How did Sandia respond to the Bay report?

Joan: In May, we had set up a plan to respond to the report and we got it on June 4. We recognized the report was going to tell us whether there were issues in two areas: the first having to do with personnel conduct or performance, and the second whether there were problems with our overall conduct of the Laboratories' responsibilities, policies, processes, and structure. We realized the personnel issues would have to be handled first and quickly. We set up an approach, using our existing processes for a disciplinary review committee to review the report, identify situations, and then follow through with disciplinary procedures as laid out in our corporate policies. That led us to take a number of disciplinary actions that dealt with individual conduct and a number of actions that dealt with individual performance issues. We announced the first of these disciplinary actions on June 24, and several more disciplinary actions have been taken since.

LN: How many disciplinary actions were there, and who was disciplined?

Joan: As for performance, there were disciplinary actions for two vice presidents, a director, and one level II manager. In terms of conduct, discipline involved a vice president, two directors, one level II manager, one manager, and one staff member. The disciplines have ranged from retirement in lieu of termination to counseling by management.

LN: Are there plans for any more disciplinary actions?

Joan: We have conducted all the disciplinary actions based on our first look at the Bay report. There are some secondary effects, where there are some additional situations and cases not directly investigated by Bay that we now are looking at because of the report. So there may be additional disciplinary actions that come up based on what we find.

LN: Paul Robinson announced some management changes in security during the March 20 news conference. The Bay



MISSION-READY — Jim Larson (second from left), Manager of Protection Program Operations Dept. 4210, discusses security tactics over a 3-D model of Tech Area 3 with members of the Pro Force leadership team. From left are Capt. Bill Boling, Manager of Protective Force Operations Dept. 4211; Jim; Capt. Allan Swanson, Team Captain for Pro Force Operations Support Dept. 4212; Joe Sandoval, Manager of Safeguards and Security Planning and Physical Security Dept. 4213; and Security Police Officer III Michael Benavidez (4211). (Photos by Randy Montoya)

report had not yet been issued. What prompted those changes?

Joan: At that time we had gotten feedback from an NNSA team that had been commissioned around December/January by the local Sandia Site Office to take a look at Laboratory security issues. Results of this report and our internal research told us that the way we had structured Safeguards and Security as a part of an integrated center with Environment, Safety, and Health had, on the one hand, created some efficiencies, but on the other hand had significantly reduced, in terms of visibility and priority, the security responsibility of the Laboratory. We needed to take some immediate actions to change that. In March we started the process by separating out security, which took some months, in an effort to create a single inte-

grated security center that had all of the functions associated with the security program of the Laboratory. We reassigned the center to have it directly report to Paul and me, as organization 12200 [now part of Div. 4000; see page 2]. The creation of that center was the first step, but we made it clear at that point that it was an interim step until we figured out what was the right way to organize security in the Laboratory's overall structure. And now more recently we made an additional change with the creation of a new Special Security Division, organization 4000, led by Vice President Ron Detry. [This change was announced Aug. 25; see page 2.] As Paul has already stated, the intent is to integrate all of the important security responsibilities into a cohesive whole. And, based on other input, corporate investigations and counterintelligence will be independent of this new division and will report directly to Sandia's executive management.

LN: What changes have occurred within the Pro Force?

Jim Larson: The first changes began when Paul and Joan filled management vacancies in the Pro Force with myself and Joe Sandoval. We then began re-aligning the security functions and operating procedures within the Pro Force. Recently further alignments have grouped the Pro Force, physical security, and electronic security functions under one level II manager and personnel security, classification, performance assurance, and safeguards and security training and reporting functions under another level II manager.

LN: What were the problems within the guard force and what contributed to them?

Jim: One of the problems we are addressing is the need to build greater accountability throughout the entire organization. This is a root-cause problem and has been identified in various audits. In addition, too much time and effort was spent in the past preparing for audits rather than focusing on sustaining a mission-ready posture of providing security for this Laboratory. Consequently we'd run the cyclical process of preparing for an audit, then responding to its findings, then getting ready for the next audit, with limited strategic thinking.

LN: Was excessive overtime, particu-

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SANDIA'S PRO FORCE has taken on additional duties since 9/11. Security Police Officer Fred Gonzales checks the identification of motorists entering the Eubank Gate to Kirtland Air Force Base.

Security issues

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larly after 9/11, a contributing factor?

Jim: Yes. A tired employee can be a problem in any job. Working with the union, we have had very good success in reducing excessive hours through rescheduling and management training. It's a real problem because some people have grown to rely on overtime as base pay and there was usually as much overtime available as people wanted because there were not enough people to meet the staffing requirements. We've been working with the Sandia Site Office to set a reasonable target of hours worked.

became aware of many investigation topics that were pending or hadn't been completely closed. We have a backlog of those. Having a list of pending non-closed investigations is not OK, and so we as an institution have begun to look through all of them. There were some investigation topics in the Bay report where Bay looked at a topic, the master keys, for example, but he did not answer the question of what really happened to them. What he looked at was whether the investigation was impeded or whether there was retaliation. So we have decided to tackle all the unfinished investigations and not give up until we can say we have exhausted all leads and taken all appropriate actions. Yes, there are and there always will be investigations going on at the Laboratory because, unfortunately, there will always be bad

way to respond. As for our organizational structure, primarily the issues had to do with the question of independence. When you've got any kind of investigation or oversight-like function, it's a good basic management principle to have independence. But in fact, even before the Detry team's work, we had moved the Labs' investigative function to report directly to the Executive Staff Director and for further refining of that structure to really maintain the independence.

LN: Will the work of the Detry team result in real and visible changes?

Joan: Yes, it already has. First, there are some new policies that are being defined. We didn't have in place a good policy description defining management's responsibility and what actions a manager should take when an employee comes forward with something that requires an investigation. We now have that. Second, we recognize that changing culture is a long-term issue that will require management training. The first such training was the most recent quarterly Large Staff meeting [directors and above], where Paul and I talked at some length about the issues that we're currently working through as a Laboratory. The next is the Sept. 22 training of Large Staff. We want to make sure management handles issues in such a way that folks will continue to bring concerns forward and not feel they might get punished if they surface bad news. We need to assure our employees that we will support their courage in coming forward with any and all concerns. We will talk about this awareness at the Sept. 22 training and then again at the Fall Leadership Forum in November. The Detry team will come back with some further recommendations for training that we will incorporate into our existing management training systems.

LN: How will this training reach all Sandians?

Joan: We want managers to continuously remind all Sandians that when they see something that is suspicious or that concerns them they should bring that forward. We owe employees the training to know what to look for and how to report it. I hope we will instill in everybody a higher level of concern and feeling of personal obligation for security than we have now.

LN: Are other committees also looking at security matters?

Joan: In addition to the Detry team we have the Board of Directors, which has set up a special subcommittee to look at security. This subcommittee is chaired by one of our board members and involves a number of advisors with backgrounds in all aspects of security, Pro Force management, counterintelligence, and the like. We expect a fairly healthy and broad critique of the Lab and our approach to and our performance in security, as well as some direct advice on how we need to be proceeding with each step.

Also, still pending is a long list of issues and investigation topics that we really need to get on with. There might be something there that when

(Continued on next page)



"We want to make sure management handles issues in such a way that folks will continue to bring concerns forward and not feel they might get punished if they surface bad news. We need to assure our employees that we will support their courage in coming forward with any and all concerns."

LN: Haven't you also hired more supervisors?

Joan: We are in the process of hiring more lieutenants and captains, yes. A problem was we always promoted from within so we rarely got the benefit of fresh perspectives. We're fortunate that we've been able to capitalize on the closing of the Rocky Flats plant. They had many highly qualified personnel and we were able to recruit a bunch of them. We will have hired a captain from Los Alamos, two captains from Rocky Flats, four lieutenants from Rocky Flats, and there were three internal promotions, and roughly 20 new security police officers.

LN: So is the Pro Force growing in actual numbers?

Joan: We got down to 136 a couple of years ago and are back up right now to about 170, counting uniformed supervisors.

LN: How is morale?

Joan: In general I would say the morale is good and I am proud to be associated with the officers. They are doing a very good job. We're changing some of the ways business has been done in the past and that is causing some pains. But my sense is that the morale is good. However, there are always some isolated, specific instances of dissatisfaction with the changes. We're all under a lot of pressure right now as Sandia prepares to bring the Sandia Pulse Reactor back in operation and that adds to everyone's uneasiness.

LN: Has there been any suggestion or pressure to contract out the Pro Force?

Joan: There have been comments, but nothing I would characterize as pressure. I do hear this question from the Pro Force themselves. There have been some recent inquiries by DOE/NNSA across the nuclear weapons complex to look at that question. But in terms of specific inquiries and direction to us, no, not at this point.

LN: Has Sandia fully addressed all the security incidents that have been surfaced as a result of all the investigations going on?

Joan: No. As a result of starting the process that commissioned the Bay report, we also

things that happen, whether it is somebody's purse that disappears from their desk or a computer that is suddenly missing.

LN: What is the process for identifying policy and process issues from the Bay report?

Joan: I commissioned a group led by Ron Detry [now VP 4000], which started in June 2003 by taking a close look at the Bay report. They came back Aug. 1 with a high-level look at the issues. I have further commissioned them, based on that, to provide actionable taskings and to prioritize those. By the way, in their initial report they identified three kinds of issues. They were the areas of culture, operations, and structure. The cultural issues are various. One issue is that oftentimes at Sandia rules are not rules, they're just suggestions, and we need to change that. The second is a tendency with management to either take very quick action or not take any action at all. If it is a personnel conflict, for example, the tendency, in general, is to let it sit for a while, hoping it will age and get better, which is not the



EXECUTIVE VP Joan Woodard and Labs President C. Paul Robinson answer questions from Albuquerque Journal reporter John Fleck following a March 20 news conference in which the Labs' security issues were disclosed.

Jeff Brinker to receive Materials Research Society Medal

Jeff Brinker, Senior Scientist in Sandia's Chemical Synthesis and Nanomaterials Department (1846), has been awarded the 2003 Materials Research Society Medal.

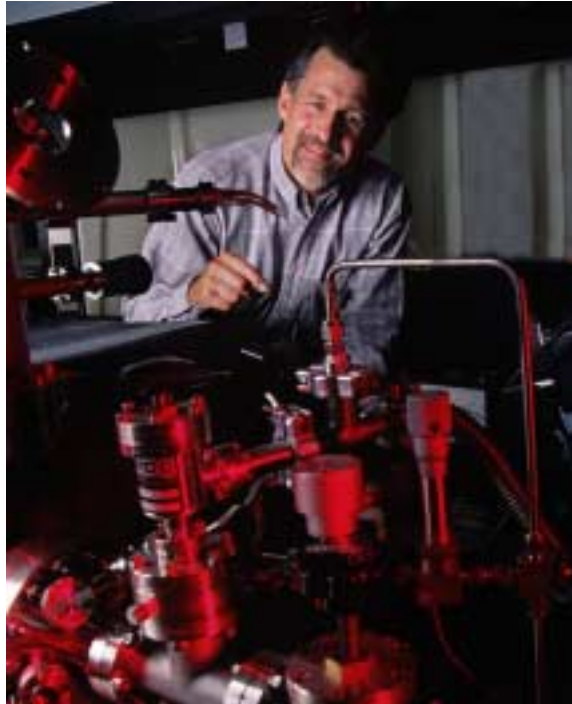
The MRS Medal is intended to offer public and professional recognition of an exceptional recent achievement in materials research. The

The medal is awarded for a specific outstanding recent discovery or advancement expected to have a major impact on the progress of any materials-related field.

medal is awarded for a specific outstanding recent discovery or advancement expected to have a major impact on the progress of any materials-related field.

Jeff's award recognizes the self-assembly work that has been performed to create porous and composite nanostructures. The citation will read "for pioneering the application of principles of sol-gel chemistry to the self-assembly of functional nanoscale materials."

The MRS Medal award consists of a \$3,000 cash prize, an engraved and mounted medal, and a citation certificate. The medal will be presented



SENIOR SCIENTIST Jeff Brinker in his laboratory.
(Photo by Randy Montoya)

at the MRS fall meeting in Boston Dec. 1-5.

"I am extremely honored to be the recipient of this medal," Jeff says, "because it recognizes the excellent work performed by Sandia staff working

side by side with University of New Mexico students and postdocs, high school students, and visiting scientists within the multi-institutional, multicultural environment of the Advanced Materials Lab on the UNM campus."

Jeff says he has been fortunate to receive sustained funding from the DOE Basic Energy Sciences program, the UNM Center for Micro-Engineered Materials, and the US Air Force, which he regards as critical to making significant advances in materials research.

Jeff joined Sandia in 1979. He earned a PhD in ceramic science and engineering from Rutgers University and has received many awards for his work. Jeff recently received the E.O. Lawrence Award for outstanding contributions in fields of science and engineering related to atomic energy. Other awards include the NOVA and R&D 100 Awards, the American Chemical Society's Ralph K. Iler Award in the Chemistry of Colloidal Materials, and five DOE Basic Energy Sciences Awards.

He recently was elected into the National Academy of Engineering (NAE). Election to NAE is one of the highest professional distinctions that can be accorded to an engineer.

Jeff is co-director of the Center for Micro-Engineered Materials at UNM.

Norman Bartelt, a member of the Thin Film and Interface Science Department (8721) at Sandia/California, received the medal in 2001 for his contributions to the statistical mechanics of materials surfaces. — Michael Padilla

Security issues

(Continued from preceding page)

you connect the dots you can see a pattern that perhaps we hadn't really looked at with the right kind of skeptical eyes. We need to take that on and work it very quickly. So, I started a Special Management Team made up of six of our top directors, and they are looking at this whole array of investigation topics and concerns that are still pending. I've challenged them to look at those issues thoroughly, to use our skilled and capable corporate investigation capability, and in fact to hire outside investigation services if warranted. I've tasked Pace VanDevender [VP-1000] in his role as continuing management for our corporate investigations to take a look at companies that offer those kinds of services.

LN: Are there any changes planned with regard to our waste, fraud, and abuse investigation function?

Joan: Our waste, fraud, and abuse investigators will continue to play a vital function. In fact, we're looking to hire externally an experienced manager to oversee corporate investigations. That individual will have the task to determine whether we are structured properly, whether we have the right resources, and he or she will look at all the challenges associated with having a very high quality corporate investigation capability. Over the last few years the investigators have often been frustrated because they weren't able to get management's attention and support, or they felt management did nothing with the information they had uncovered. The people who brought forward charges have been upset because they saw no action. The people who were accused have felt upset because they felt violated in some way. It's just been a pattern of frustration for everyone involved. This dilemma recently surfaced in a situation where an individual who was retiring wrote a note and pointed out that what had happened in the course of an investigation was not right. This caused us to form a team, headed by Sandia Ombuds Wendell Jones [Org. 11] with the help of [retired Executive VP] John Crawford, to bring together people representing all of the different functions of investigation plus representatives of the line organizations that have been the recipient of investigation services to look at what should be the principles

by which we do investigations at Sandia. They issued a report [available at <http://www-irn.sandia.gov/organization/div2/studies.htm>] a few weeks ago and some of those principles are being incorporated into a new corporate policy statement on investigations. It clarifies under what situations management needs to call in whom. It also spells out how the scope of the investigation is defined and documented all the way through. [These policy statements are available at <http://www-irn.sandia.gov/policy/ethicpol.htm> and <http://www-irn.sandia.gov/policy/leadership/investigations.htm>.]

LN: You have outlined several internal mechanisms now in place, but what external mechanisms are being applied?

Joan: We are in the midst of some reviews and inquiries by both the Department of Energy Office of Independent Oversight and Performance Assurance, as well as the Department of Energy Inspector General. We're working corrective actions on them. They are to return again at the end of September to take an additional look at security-related issues. The IG has taken a look at a number of issues associated with the Bay Report and other topics. And the NNSA Sandia Site Office is taking a look at their surveillance process. They have done some 25 surveillances [on-site assessments] this fiscal year at the Lab. Dennis Miyoshi and Jim Larson are working with the site office to pull this all together, to do a good and thorough analysis and develop what we're calling a get-well plan. We're working very diligently to have that get-well plan in early September.

LN: What is your assessment then of the concerns brought up by several Sandians about security and internal investigations at Sandia? Were those concerns justified?

Joan: Yes, they were justified in bringing their concerns forward. We want and need to hear concerns. And much of what they brought to our attention had substance to it. The topics clearly warranted detailed probing and review and gathering of facts. That has been a great contribution to our being able to move on and deal with the issues and to be able to handle the kinds of problems that we know are there. Through all of this, I've gained a good appreciation for the challenge and the very competent capability we have on our corporate investigations team. Our folks are knowledgeable, they have been recognized by people from the out-

side who have looked at their work, and it has reinforced to me the importance of giving strong management support for our corporate investigations because it's an essential element of having a well-managed institution. Again, let me add that I want to thank all the employees who have come forward. They have shown courage to come forth and bring their concerns and issues to management.

LN: Could the issues surrounding security have an impact on the M&O contract that Lockheed Martin has with the DOE to manage Sandia?

Joan: There's always the potential that until the ink is dry something could happen to affect the contract. Right now we have been working very hard in negotiations with the NNSA representatives and have negotiated 99 percent of the terms and language of the contract. The notice has gone to Congress, which is required before the contract signing, to let them know of the Secretary of Energy's intention to sign the contract for another five years. And we are waiting for the process to reach closure.

LN: Joan, is there anything that you personally have learned from all this?

Joan: When I came to work at Sandia in 1974, I wasn't allowed to come inside the tech area, not even for a job interview, until I had my Q clearance. And so when I got my clearance, it was a big deal. I knew that I was being given access to the nation's secrets, and with it came responsibility as well as burden. I remember also the first time I was given classified documents and it was clear that my name went into the system as having custody of them. And that further reinforced it. I remember we used to have black rotary phones and you'd pick up the phone and right there underneath the handset on the cradle was a sticker that said "Security, think before you speak." There was just a constant reminder and it was second nature because it hit you as so striking from the moment you walked through the gate with your badge. Things are different today. We need to instill in people the idea that they bear a burden of responsibility as a Q-cleared person with access to the nation's secrets. The moment a person comes here and begins to work with classified information they should have those indelible memories of what a big responsibility that is. Security is a big deal and it should always be on the minds of every Sandian.

Columbia

(Continued from page 1)

ing the cause of the disaster," says Engineering Sciences Director Tom Bickel (9100), programmatic lead for Sandia's efforts. "Sandia helped guide the investigation and served as an expert advisor to NASA."

Simulations and material testing work performed by Sandia staff, along with corroborating work by NASA engineers and contractors, guided large-scale testing done at Southwest Research Institute (SwRI) in San Antonio, Texas. Testing there was performed on full-scale mock-ups of parts of the wing using flight hardware from the

Some other examples of Sandia's service in the national interest

Sandia has been instrumental in assisting in determining the cause of various national issues including:

- Determining the cause of the 1989 turret explosion that killed 47 men aboard the USS *Iowa*.
- Supporting and helping guide the National Transportation Safety Board to confirm that the TWA 800 accident of July 1997 most likely was the result of an unintended ignition of the fuel-air mixture in a fuel tank.
- Working in solving the Unabomber case in 1996 by assisting FBI and ATF agents during the search of the Unabomber's residence in Montana.

remaining orbiter inventory and museum displays. Foam impacts on different locations of the orbiter wing leading edge and thermal protection system (TPS) tiles on the wing underside were studied to assess and demonstrate the potential damage that could have resulted during launch.

Dramatic test: 16-inch hole

Testing showed that firing foam projectiles at various locations on the wing reinforced carbon composite (RCC) leading edge panels could produce damage ranging from localized cracking of the RCC to full breakage. The most dramatic test at SwRI produced a 16-inch diameter hole in the lower half of a leading edge panel of the orbiter. Such damage was acknowledged to be catastrophic, since the hole would allow high-temperature gases to enter the left wing and melt the aluminum wing structure during reentry.

"The confirming event of the investigation was the experiment conducted using the scenario modeled by Sandia," says Tom.

Since the tests, the *Columbia* Accident Investigation Board (CAIB) has acknowledged the RCC leading edge foam impact scenario to be the most likely cause of the *Columbia* disaster. The CAIB released its initial report last week (Aug. 26) and is scheduled to issue its full report by the end of this year.

Just two days after the Feb. 1, 2003, *Columbia* disaster, Sandia was contacted to see how Sandia could help with the investigation. Two days after that, Tom Bickel, Carl Peterson (9100) and Basil

(Continued on next page)

Sandia participants supporting the *Columbia* accident investigation

Aero (CFD): Michail Gallis (9113), Ed Piekos (9113), Jeff Payne (9115), Chris Roy (9115), Basil Hassan (9115), Bill Oberkampf (9133)

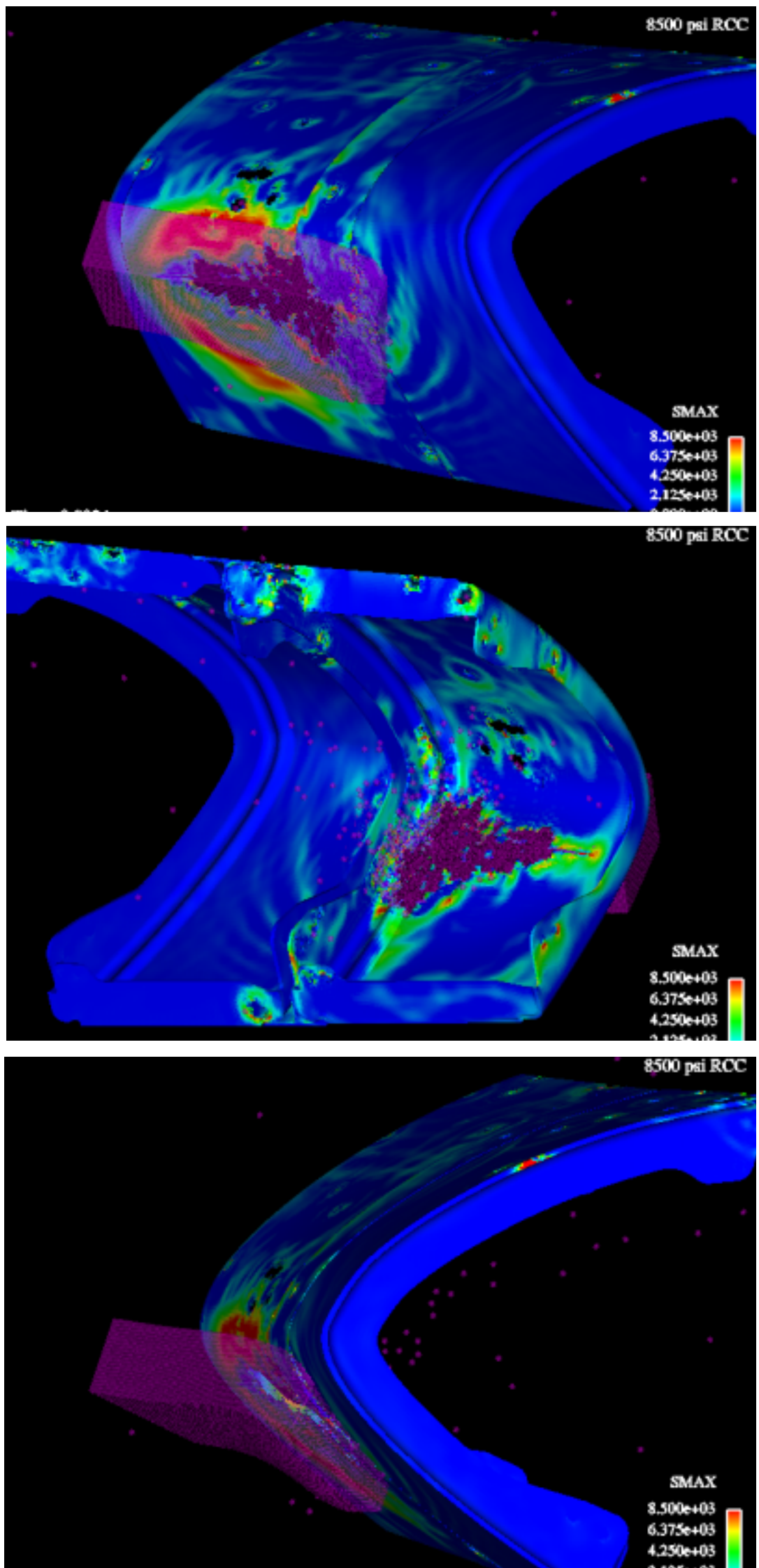
Aero (Thermal): Don Potter (9115), Dave Kuntz (9115), Roy Hogan (9116), Wilson Brooks (15419)

Impact Analyses: Dave Crawford (9116), Brian Dodson (9116), Gene Hertel (9116), Kenneth Gwinn (9126), Kurt Metzinger (9126), Rod May (9126), Robert Kerr (9226)

Material Characterization: Jill Glass (1843), Tom Buckheit (1843), Ron Loehmann (1843), R. Hardy (6117), Moo Lee (6117), Ken Wilson (8703), Wei-Yang Lu (8725), Bonnie Antoun (8725), John Korellis (8725), Simon Scheffel (8725), John Gieske (9122), Steve Younghouse (9122), Roger Zimmerman (15415)

Management/Oversight: Tom Bickel (9100), Carl Peterson (9100), Art Ratzel (9750)

Sandia's impact analysis model



THE IMAGES SHOWN HERE are from a Sandia computer model/analysis of Southwest Research Institute test of foam at 775 feet/sec impact of a 1.9 lb piece of foam (5.5 x 11.5 x 21.7 inch foam chunk). Element removal is included in the analyses (or the ability to remove an element after it has reached its capacity, as the hole in the figures show), and foam is breaching the panel. All plots are at 2.4 milliseconds of analysis time, or 0.0024 sec.

The top image is a view from "outside" the wing, or in front of the wing leading edge, showing a hole being punched by foam impact. The middle image is a view from "inside" the wing area, or a view opposite the impact side.

The bottom image is another look from "outside" the wing, in a perspective that shows the foam coming at you, as it slides down the leading edge.

Columbia

(Continued from preceding page)

Hassan (9115), senior aero staff and management from Engineering Sciences Center 9100, went to Johnson Space Center to determine how the Labs could assist in the investigation.

"We joined a group of engineers from other agencies that were asked to assist with the investigation," Tom says. "Sandia's expertise in material and engineering science was a perfect fit in the investigation."

In the weeks after the accident, Basil and Carl shared being onsite full-time at NASA Johnson Space Center. They worked with NASA, Boeing, and Lockheed Martin managers and engineers from across the country to develop credible scenarios that might have led to the accident. The bulk of this work was tied to unraveling telemetry data available from the final minutes before the orbiter breakup and analyzing the locations of orbiter debris recovered across Texas following breakup. Basil and Carl also served as intermediaries to get information on the orbiter back to Sandia engineers for incorporation into the Sandia analyses.

"Because of the small amount of available information, we had a hard time getting our arms around the problem," says Basil. "After the first month the CAIB announced it wanted answers by the end of May, which seemed like very little time for an investigation of this magnitude."

In the first several months after the accident, Sandia staff worked closely with NASA engineers to perform scoping analyses to assess the credibility of postulated damage to the Columbia that could have occurred prior to reentry and could have resulted in orbiter breakup during reentry. While the foam impact was considered a potential cause, the location of the impact, size and mass of the foam, and its impact velocity remained unknowns.

The initial Sandia studies focused on assessing potential aerodynamic effects and impact damage as well as trying to unravel telemetry data that indicated severe heating in the vicinity of the orbiter left wing landing gear. Along with the NASA engineers and industry contractors, Sandia analysts focused on attempting to duplicate the response of many of the sensors.

"The difficult part of that was not knowing where to start," Basil says. "More than one possible scenario could lead to the same result. All we could do was try to eliminate as many scenarios as possible and then focus on the ones that seemed the most plausible."

Sandia's prediction

Fortunately, NASA located the onboard Columbia flight recorder in late March. This recorder contained a wealth of additional temperature information and other flight data that helped NASA to eliminate several accident scenarios and speed up piecing together the puzzle. From this data, it was determined that the most probable damage location was the leading edge of the left wing. This became the focus of Sandia's participation in the study that continued heavily through July.

Serving as an independent investigative arm for NASA, Sandia staff initially evaluated a number of

possible foam impact accident scenarios using the Labs' computational capabilities. ASCI computer platforms and codes were extensively used in this work.

Initially, Sandia provided scoping analyses for foam impacting the RCC and the tiles on the underside of the wing. These computations were the first such analyses provided to NASA management. Sandia researchers indicated that foam impacting the wing underside would not have caused much damage, but impacts to the RCC could have caused severe damage to the orbiter.

"After our prediction that the foam would penetrate the RCC, we faced a very skeptical community," Tom says. "We had to convince ourselves and our colleagues that we were correct through the use of materials testing and many confirmatory simulations."

This skepticism remained until tests were conducted of foam impacting a mock-up of the orbiter's leading edge.

Areas of concentration

Sandia's work focused on two major areas: aerothermodynamics and impact analysis. In the aerothermodynamics area, Sandia brought significant expertise in computational fluid mechanics, rarefied gas dynamics, and material thermal response.

The researchers used a variety of internal and external computer codes to help in the analysis, including computational fluid dynamics (CFD) analyses for the orbiter at various altitudes along the trajectory, heat transfer predictions, calculations of plumes that simulated hot gas entering the wing, and material-response calculations of possible damaged wing leading edge and tile materials. The efforts of Michail Gallis (9113, noncontinuum CFD), Jeff Payne (9115, continuum CFD), and Don Potter (9115, plasma modeling) were especially critical to NASA efforts to interpret telemetry data from the final minutes leading to orbiter breakup.

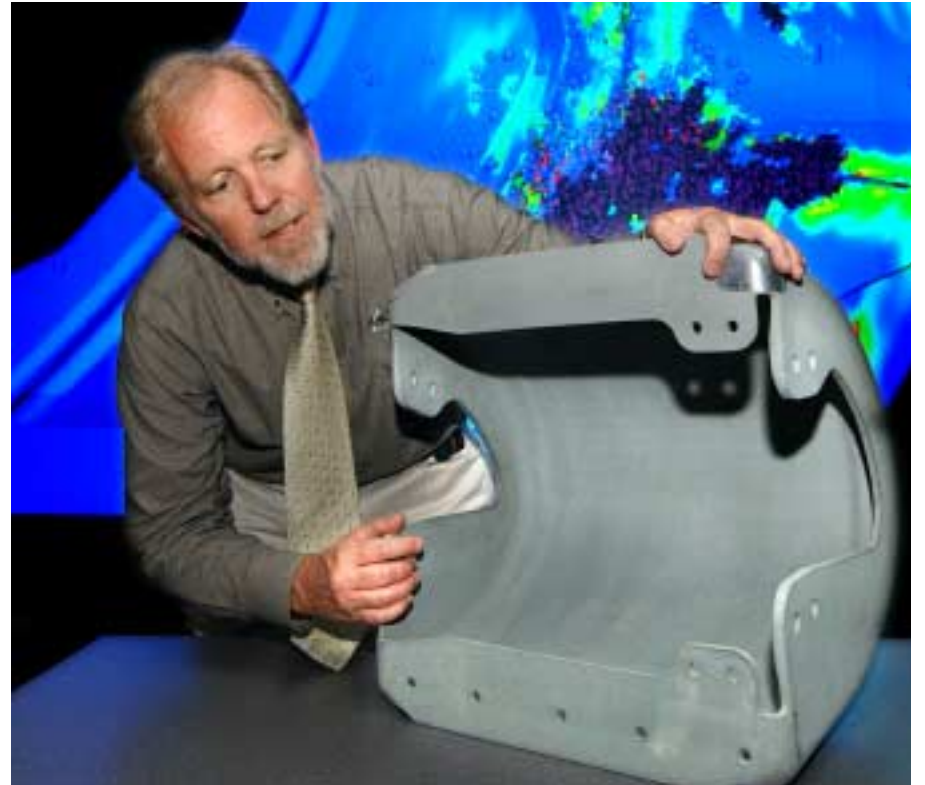
Engineers in Sandia's structural mechanics groups performed simulations of foam impacting the orbiter. As part of this effort, they developed and refined material response models for the RCC, TPS tile, and foam materials using NASA-provided data and Sandia-measured properties.

Serving as Sandia's technical oversight, Art Ratzel (9750) says the impact analysis study became the major focus of Sandia's efforts in the investigation after the first two months of scoping work.

"Our impact analyses centered on various aspects including foam mass, angle of the impact, and velocity," says Art. "We used our computational tools to interpret numerous scenarios and fed back this information to NASA to support the SwRI test design and diagnostics placement."

Various impact analyses were conducted on the leading edge RCC and TPS tile materials. Kenneth Gwinn and Kurt Metzinger (both 9126) worked both problems using Pronto/SPH, and David Crawford (9116) used CTH for the impact into the tile. Because of the physics of the problem, Pronto/SPH was better for the RCC leading edge impacts and CTH worked better for the tile impacts. After preliminary analyses it was determined that the potential for extensive damage that could have led to the wing failure was much greater for the RCC than for the tile, given the impact conditions provided by NASA. This led Sandia to do more detailed analyses of the RCC impact.

In addition, Sandia experimentalists played a major role in the investigation through their material characterization efforts. Wei-Yang Lu, Bonnie Antoun, and John Korellis from the Sandia/



A CLOSER LOOK — Tom Bickel checks out the leading edge of a space shuttle wing. (Photo by Randy Montoya)

California Materials and Engineering Sciences Center (8700) led studies on the RCC, thermal protection system (TPS) tiles, and foam impacting materials that provided data needed to populate the material response models critical to the computational studies. Moo Lee and supporting 6100 staff also supported this work using different experimental techniques that provided confirmation of foam and TPS tile material response. NASA relied extensively on this work; NASA provided Sandia with all of the RCC materials that could be made available for testing during the initial stages of the investigation. Sandia's RCC test data was disseminated to NASA and contractor groups supporting the accident investigation, as well as to the CAIB team. It became the baseline RCC material property data used in all of the impact analyses conducted for the investigation.

Future flights

Sandia has helped provide NASA with an understanding of the analyses required to perform these types of tests concerning tile and foam. The work will help NASA if a situation arises wherein it needs to assess damage to the leading edge areas and the underside tile areas. The work should also assist NASA with return-to-flight issues to determine what sort of impact the current areas can withstand and to design mitigation methods to prevent impacts that could cause damage.

Final thoughts

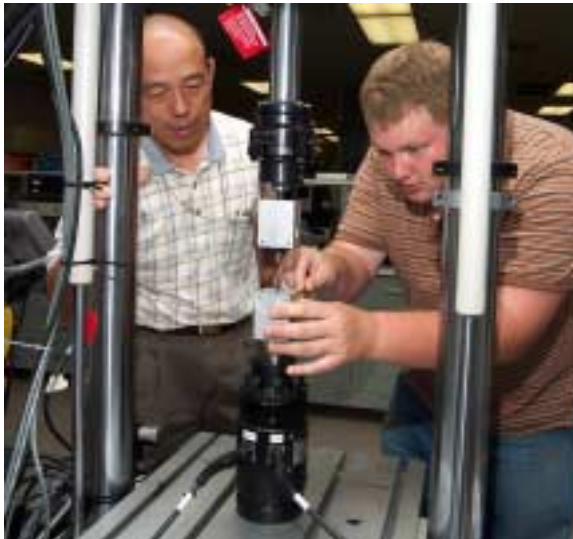
Art Ratzel and Tom Bickel reflected upon the work performed in support of the Columbia accident investigation.

"In looking back over the past several months, it is clear that this team approached supporting the Columbia investigation with the same commitment to provide exceptional service that Sandians have provided in supporting our National Security mission and nationally critical studies such as the Unabomber work, the TWA-800 accident, and the USS Iowa accident.

"The team assembled represented but a fraction of the Sandia staff that early-on offered their time and technical expertise to help NASA. The infrastructure and technical capabilities resident at Sandia made possible our successful support.

"The NASA engineers with whom we worked side-by-side must also be acknowledged. Under the toughest of times and overwhelming scrutiny from the media and outside investigative teams, the NASA team remained open to our needs and suggestions, and overall demonstrated excellence in engineering.

"The terrible events that resulted in our partnership cannot be forgotten, but hopefully the path forward for NASA will include future collaborations with Sandia that will benefit our national space program."



MATERIAL CHARACTERIZATION — Wei-Yang Lu and Simon Scheffel set up a test of an RCC sample in a material testing system machine. (Photo by

MOU between Sandia and avionics leader Rockwell Collins enhances ability to deliver national security solutions

By Bill Murphy

Sandia and avionics and electronics industry leader Rockwell Collins have signed a memorandum of understanding (MOU) that represents a new maturing and flowering of a relationship that goes back to the mid-1990s.

The MOU, which officials from Sandia and Rockwell Collins signed on Aug. 25, anticipates increased cooperation between the two organizations in technology R&D, manufacturing, and business development.

The MOU is statement of principles rather than a specific program of work; joint R&D efforts between the signatories will be organized under a companion umbrella CRADA (cooperative research and development agreement), similar to umbrella agreements that Sandia has in place with a number of strategic private-sector partners.

"We believe this relationship has the potential to leverage our complementary capabilities to bring technology to the market faster," says Dr. Barry Abzug, Rockwell Collins senior vice president of corporate development. "We look forward to collaborating with Sandia on key national security challenges."

Rockwell Collins is a "leader in lean," says Jerry Langheim (15500), Director of Industrial Relations in the Military Technology and Applications SMU (formerly the Emerging Threats SBU). "They are world leaders, absolutely, in high-consequence, high-mix, low-volume advanced manufacturing processes," says Jerry.

Rockwell Collins has adopted the principles of "lean electronics," a company-wide initiative to enhance customer value through the elimination of waste in process. The company has been recognized by leading experts for its applica-

"Rockwell Collins has incredible expertise in exactly the right areas to serve as a strategic Sandia partner."



DONE DEAL — Sandia Science and Technology VP Pace VanDevender, right, and Rockwell Collins Senior VP for Corporate Development Barry Abzug ink a formal memorandum of understanding that commits the two organizations to enhanced cooperation in R&D efforts. (Photos by Bill Doty)

tion of "lean" principles beyond the manufacturing environment.

Jerry says Sandia has developed a strong record of strategic successes in its partnership agreements with large corporations such as Boeing, Goodyear, General Electric, and Lockheed Martin.

"With this MOU," he says, "we're expanding the Shared Vision concept (*Lab News*, Aug. 22) to show how strategic partnering with medium-sized corporations can advance our mission."

Sandy Sanzero, Manager of Emerging Threats Dept. 1316 and a key liaison between Sandia and Rockwell Collins, emphasizes that the expanding relationship with Rockwell Collins is all about mission, a mission grounded in developing and delivering national security solutions.

"Sandia is a mission-driven organization," Sandy notes, "while Rockwell Collins is market-driven. Both of us share a vital interest in national security issues. Through this relationship, we can advance each others' fundamental purpose."

David Williams (1400), another key point of contact with Rockwell Collins, notes that the electronics pioneer — heritage company Collins Radio was started in 1933 — has "incredible expertise in exactly the right areas"

to serve as a strategic Sandia partner.

According to the language of the MOU, Rockwell Collins and Sandia "will collaborate in areas of mutual interest and value in ways that require minimal changes to existing process and investment strategies for both parties. As the relationship matures, the parties intend to explore whether process and strategy should evolve . . . in order to take better advantage of what each party offers the other, and to move toward a shared desire to reduce the risk in bringing new technologies and products forward to respective customers and markets. . . [the two signatories] will commit the time and effort to learn each other's capabilities to activities, such as selective participation in the other's planning and review events on a regular basis. . . . The parties will seek to align and collaborate in selected technology roadmaps and development efforts where both parties could benefit areas consistent with each party's existing business/mission plans."

David notes that Rockwell Collins is a premier provider of both military and commercial aircraft avionics. "In fact," he says, "there's hardly an aircraft flying anywhere in the



THIS IS MESA — Using a scale model for reference, MDL's Carol Sumpter describes plans for MESA to Rockwell Collins VP Barry Abzug, right, and others in a delegation that toured Sandia facilities following the MOU signing ceremony.

world without Rockwell Collins avionics on board."

Says Al Romig, Sandia VP for National Security and Arms Control and formerly Sandia's chief technology officer, "This relationship will enhance the Labs' ability to meet the ever changing national security needs."

Jim Tegnelia, VP of DoD Programs Div. 15000 and head of Sandia's Military Technology and Applications SMU, says, "Rockwell Collins, through its agile manufacturing capabilities, will help us deliver cutting-edge technology to our warriors in the field faster and more effectively than we ever have before."

Div. 14000 VP Lenny Martinez, who heads up Sandia's manufacturing capabilities, says "Rockwell Collins is very highly regarded as a premier manufacturer of high-consequence electronics." Lenny notes that because of its substantial military business, Rockwell Collins is able to run classified and unclassified manufacturing lines simultaneously. "That's a vitally important consideration for us," he says.

Div. 1000 VP Pace VanDevender, chief of Sandia's Science, Technology, and Engineering Foundation SMU, says, "Clearly, Rockwell Collins places an extremely high value on advanced research and development in the pursuit of transformational technology solutions, as does Sandia. The cooperation between their science and technology organization and ours will be of great benefit to the nation."



MICROELECTRONICS DEVELOPMENT LABORATORY Technical Operations staff member Carol Sumpter explains capabilities of the MDL's clean room manufacturing environment to Rockwell Collins VP Barry Abzug, left, and other members of a Sandia/Rockwell Collins delegation that toured lab facilities following the signing of the new MOU between the organizations.

Virtual center tackles big problems in materials sciences

Center of Excellence for the Synthesis and Processing of Advanced Materials is 10 years old and going strong

By Chris Burroughs

Some of the most challenging problems in materials sciences are being tackled by a center that has no office and no staff. And yet it turns a decade this year.

It's a virtual center — the DOE Center of Excellence for the Synthesis and Processing of Advanced Materials (CSP). It was established by DOE's Division of Materials Sciences and Engineering, Office of Basic Energy Sciences (BES), and DOE's laboratories in recognition of the enabling role of materials synthesis and processing in modern technology. Ten years after its founding, George Samara, Level II Manager of Nanostructures and Device Sciences (1120) and Manager of Sandia/New Mexico's BES Materials Sciences Program, continues to manage and coordinate the center's activities.

Members of CSP include investigators from the 12 DOE national laboratories, universities, and the private sector. It pulls together people doing complementary research to tackle problems larger than their individual research.

The need for more emphasis on materials syn-

thesis and processing was highlighted in a 1989 national report that looked into the field of materials and concluded that the US had fallen behind in this area. In the early 1990s Congress appropriated \$5 million. Subsequently, BES' Division of Materials Sciences and Engineering (DMS&E) put out a call to the DOE laboratories to make proposals for such a center. Sandia submitted the winning proposal. However, before the center could be implemented, it became clear that the funding was not assured beyond the first year, and the decision was made not to proceed with the center.

Sandia was then asked to work with the DOE laboratories to identify synthesis and processing activities within the existing programs at the labs that could be strengthened by the \$5 million. George, former Center 1100 Director Fred Vook, and representatives from all the labs participated in the ensuing deliberations.

"In doing so, it became clear that there is so much complementary talent across the labs that the idea of us working together became very attractive," George says.

The dilemma was that there was no money beyond that first appropriation, and the concept of the labs working together was not generally popular.

From protective to cooperative

"The labs had always been extremely competitive and protective of their interests," George says. "But the more we talked the closer we came together, and the concept of a virtual center even without additional funding emerged."

CSP has existed in its present form since late 1993. Representatives from all the participating labs working together with BES management, and benefiting from the advice of a Technology Steering Group (TSG), establish the direction and technical activities of the center. The center's premise is simple: by bringing together complementary talents and capabilities of the participating institutions in selected areas of materials science, it is possible to tackle larger problems than the labs can individually address and thereby add value to the BES program. The output that is expected for any CSP project is more than the sum of what the individual partners might produce without interacting with each other.

The technical emphasis of CSP is on multilaboratory projects (eight at any one time) that draw on the strengths of member institutions. Each project is put together from complementary pieces taken from existing core programs at the labs. The CSP effort might be regarded as the glue that connects



GEORGE SAMARA (1120) and Tom Friedman (1112) discuss progress on nanostructured carbon films. (Photo by Randy Montoya)

Sandians involved in CSP projects

Several Sandians are involved in CSP projects.

Tom Friedman (1112) and John Carlisle of Argonne National Lab coordinate CSP's project on Carbon-Based Nanostructured Materials.

Kevin Zavadil (1832) coordinates the Science of Localized Corrosion Project.

Duane Dimos (1801) coordinates the Nanoscale Phenomena in Perovskite Thin Films project with Orlando Auciello of Argonne.

Several other Sandians from Centers 1100 and 1800 participate in CSP research.

Goal of CSP

A key goal of the DOE Center of Excellence for the Synthesis and Processing of Advanced Materials (CSP) has been to tackle challenging science problems that represent bottlenecks to the advancement of technology.

One example of an early project that met this criterion was the problem of aluminum metal forming.

"The DOE is interested in lighter, more fuel-efficient cars," George Samara, CPS manager, says. "One way to reduce the weight of cars is to use more aluminum instead of steel. But a bottleneck is that aluminum is difficult to form and mold into desired shapes." The project "Metal Forming" developed better understanding of the deformation mechanisms in aluminum and improved its formability by alloying with other elements.

A more recent project was High Efficiency Photovoltaics. This project defined the structure and materials needs for a 40 percent efficient solar cell and studied the physics of prototypical materials.

"CSP is now viewed as a model of integration within the DOE and of collaboration among the participating institutions and has been emulated by forming similar centers," George says. "Over the past 10 years we've made significant advances in the science and tools for materials research, developed new materials and processes, and changed the way we approach materials challenges."

Center members

Members of the DOE Center of Excellence for the Synthesis and Processing of Advanced materials include: Ames Laboratory, Argonne National Laboratory, Brookhaven National Laboratory, Idaho National Engineering and Environmental Laboratory, University of Illinois Frederick Seitz Materials Research Laboratory, Lawrence Berkeley National Laboratory, Lawrence Livermore National Laboratory, Los Alamos National Laboratory, National Renewable Energy Laboratory, Oak Ridge National Laboratory, Pacific Northwest National Laboratory, and Sandia. The center also includes appropriate university grant research and some industry participation.

Current projects

The eight current CSP projects are:

- Isolated and Collective Phenomena in Nanocomposite Magnets
- Controlled Defect Structures in Rare-Earth Ba-Cu-O Cuprate Superconductors
- The Science of Localized Corrosion
- Smart Structures Based on Electroactive Polymers
- Nanoscale Phenomena in Perovskite Thin Films
- Granular Flow and Kinetics
- Synthesis and Processing of Carbon-Based Nanostructured Materials
- Experimental and Computational Lubrication at the Nanoscale

these individual laboratory core efforts and holds them together. The projects are selected according to their scientific excellence, clear relationship to energy technologies, involvement of several laboratories, existing or potential partnership with DOE technologies-funded programs, and existing or potential "in-kind" partnerships with industry.

Projects can last up to five years

Current projects range from "The Science of Localized Corrosion" to the understanding and control of "Lubrication at the Nanoscale."

Each successful project lasts up to five years and then is "graduated." A new project is then selected by a competitive process to take its place. Projects are coordinated by representatives from participating laboratories. For example, Kevin Zavadil (1832) coordinates "The Science of Localized Corrosion" project.

George notes that while the center may be virtual, the projects are not. People working on them get together typically twice a year at meetings or workshops to talk through problems and issues and ensure coordination. Also, all the project leads meet once a year with labs' representatives, BES management and staff, and the TSG to review center progress and future directions.

Workshops, review meetings, and students and postdocs working on center projects require additional costs. That's where "glue" money comes in. The term was coined by Iran Thomas, former director of DMS&E, now deceased. The money, generally ranging from \$10,000 up to \$50,000 per project participant and about \$300,000 total per project, is intended to "glue" together the participants in a given project.

"Even this glue is not new money," says George. "It is derived from a small tax imposed by BES on core programs at the labs."

Virus fighters

(Continued from page 1)

fast action by about 200 Sandia computer support personnel at both the New Mexico and California sites.

The worm, which made computers unusable by causing the machines to constantly reboot, spread internationally.

"Part of what lessened the impact of the Blaster worm was Sandia's quick response," Art says. "On the first evening of the infection, we immediately sent the security patch to the 2,800 Windows computers capable of receiving it. The installation process was mandatory. After a five-minute countdown, the installation would run

"On the first evening of the infection, we immediately sent the security patch to the 2,800 Windows computers capable of receiving it. The installation process was mandatory. After a five-minute countdown, the installation would run whether or not the user gave it permission."

whether or not the user gave it permission."

Other early responses included:

- E-mailing owners of about 2,000 computers without Systems Management Server (SMS) — the method of delivering the patch — giving them instructions for downloading the necessary updates.

- Updating AntiVirus clients with new antivirus definitions as soon as they became available.

- Modifying network login scripts to inhibit the activity of Blaster on computers that logged in and automatically ran the scripts.

- Blocking the ports used by Blaster to scan for and attack vulnerable computers.

While Sandia has a firewall that has protected Sandians from many computer attacks over the years, not all attacks occur via routes the firewall can control.

Art believes the worm entered the Sandia network offsite through a computer that was connected remotely.

But while Blaster is dead at Sandia, Sandia

Worm vs. virus: What's the difference?

What's the difference between a worm and a virus? Both have the same goal, to attack and infect other computers. The difference is in how they operate; think push vs. pull.

A worm is a program written specifically to attack other systems. The worm pushes itself into the system via a known operating system or application vulnerability and installs itself on the system as a separate program. Once installed it begins to attack other computers.

Most worms are very small (Blaster is only about 7,000 bytes). Their small size makes them efficient even on slow dial-up connections.

A virus relies upon a mechanism that can pull the virus code from an external source. Common methods of virus infection are e-mail, removable media, and file sharing mech-

anisms. E-mail is the most common example of pulling in a virus: A message is sent with an attachment that contains a virus. In a few cases simply receiving the e-mail is sufficient for it to infect the system.

In most cases the virus cannot infect the system unless the e-mail recipient opens the attachment. Virus writers try to overcome that limitation with enticing subject lines like "Take a look at this website!" or "Information about your order." Once opened the virus proceeds to take over the system and convert it into an attack platform. Besides attacking other systems, a worm or a virus can damage systems, and they have been known to leak information by mailing out documents from infected systems. Keeping your system up-to-date with anti-virus software will help prevent a successful attack by a worm or a virus.



computer personnel found themselves fighting another computer virus, SoBig.F, that hit the Labs and other companies and home computers, less than a week after the worm made its ugly appearance. Sobig.F attacks Windows users via e-mail and file-sharing networks. It also deposits a "Trojan horse," or hacker back door, that can be used to turn victims' PCs into senders of spam e-mail. The e-mail message carrying Sobig.F many times includes the subject line "Re:Details, and Re:application." If a recipient clicks on the attach-

ment, the computer will be infected. The virus will then send itself out to names found in the person's address book and will use one of these names to create a return address.

Between Aug. 18 and Aug. 27 three members from the e-mail team at Sandia, Kelly Rogers, Robert Pastorek, and Carolyn Kumashiro (all 9329) scanned and killed 170,000 of the bogus e-mails. The anti-virus software installed on the desktop computers is disabling any that still slip through.

"This spam e-mail may continue for quite a while," Art says. "We're doing our best to identify it and stop it before it gets to the user."

What you can do to protect your computer

Art Hale says there are several things Sandians can do to protect themselves from worms and viruses. They include:

- If you think you have a worm or virus, contact the Corporate Computing Help Desk at 845-2243 immediately.
- Make sure the anti-virus software on your computer is turned on and is up to date.
- Be sure to have the Systems Management Server (SMS) on your desktop so that new security patches can be installed.
- If you receive an unexpected or suspicious e-mail, don't open it.

Michael Coltrin, Bob Kee co-author 850-page text on chemically reacting flow

Former Sandian Bob Kee (now at the Colorado School of Mines) and Sandian Michael Coltrin of Chemical Processing Sciences Dept. 1126 recently published a new graduate-level textbook titled *Chemically Reacting Flow: Theory and Practice*. It is published by Wiley.

The book is designed for graduate students in chemical and mechanical engineering. Detailed information is at <http://www.wiley.com/Wiley-CDA/WileyTitle/productCd-0471261793.html>

"It is a culmination of more than 20 years of collaboration between Bob and me on chemically reacting flow simulations," Mike says. "We worked approximately five years on this 850-page book. The third co-author on the book is Peter Glarborg, from the Technical University of Denmark, whose expertise is combustion chemistry."

Mike says the book provides all of the theoretical underpinnings leading to the popular Chemkin software developed by Bob, Mike, and many others at Sandia for simulation of combustion, chemical vapor deposition, plasma processing, and many other applications. The Chemkin software is now a commercial product of Reaction Design of San Diego, through a licensing agreement.

Feedback

Why didn't we deploy the Microsoft patch way back in July?

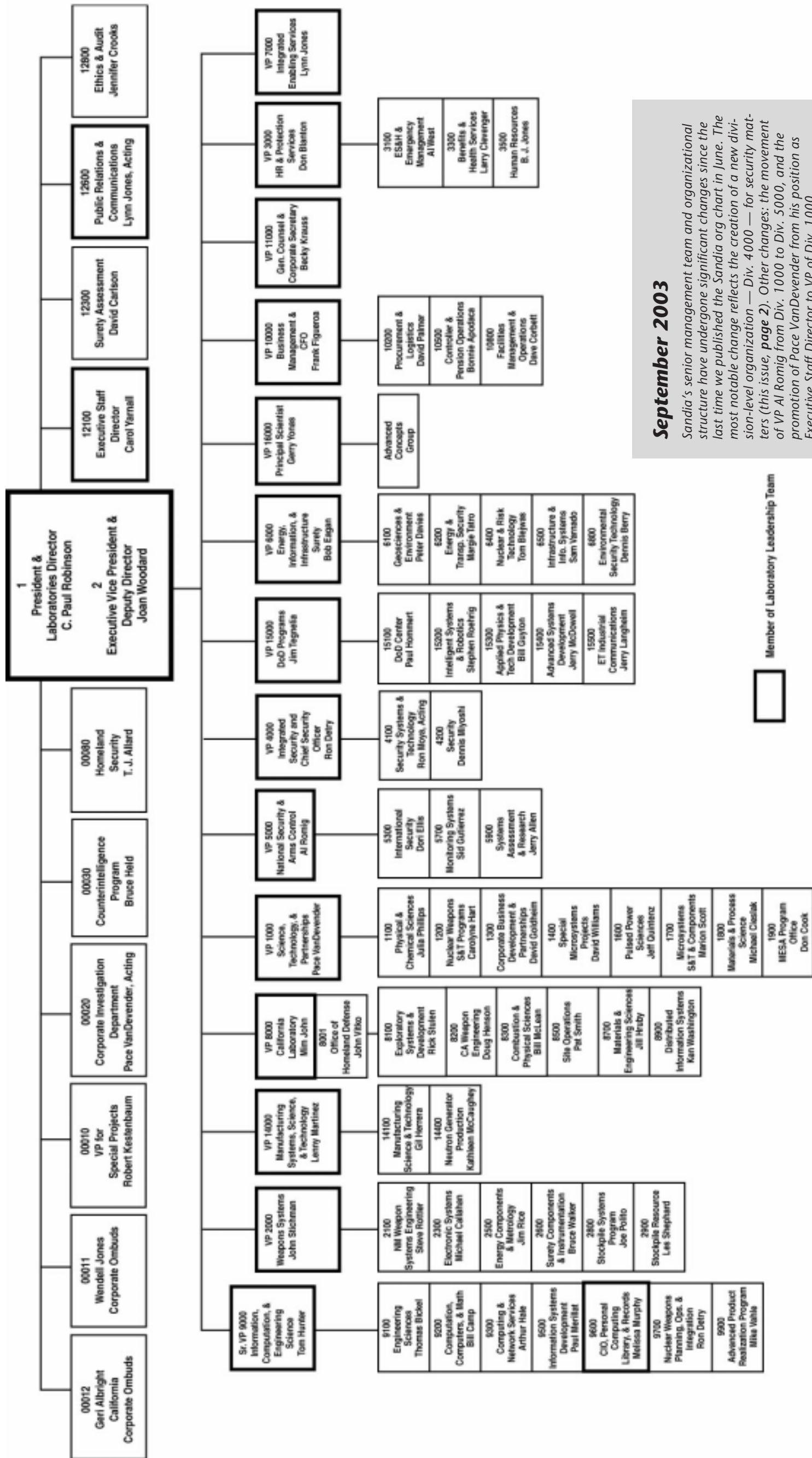
Q: If Microsoft had a Blaster worm patch a month ago, why did Sandia NOT take advantage of it? I would think that the cost of fixing the worm would be large and not to have taken advantage of the known solution before the problem is not understandable.

A: Sandia's SRN is designed to enclose many relatively soft systems behind a strong policy-based security perimeter that includes firewalls and monitoring. This provides a delaying mechanism and generally enables virus definitions that quarantine infections to keep anything that does get into the network from spreading. Pushing new anti-virus definitions to machines is much quicker and less intrusive than pushing full-scale operating system upgrades or security patches. Sandia has been slower to adopt comprehensive central management of desktop computers than many companies have, largely because of the judgment that a laboratory environment requires more computing diversity than does a factory, bank, or

other commercial enterprise. This diversity, and the number of computers impacted (more than 10,000), has made us unwilling to install patches without sufficient time for testing and "bug removal." Without such testing we might install "fixes" that would introduce other vulnerabilities or stop some functions from working for some people. Another concern over the past many years has been that independent-minded Sandians wouldn't tolerate someone making changes to "their" computer. Although we have moved somewhat from this conservative position of forcing changes slowly, our experience with W32.Blaster.Worm will undoubtedly move us to respond more quickly and accept the inherent risks of patching. In this particular case, you may be interested to know that Blaster hit us after we had completed our tests on the security patch and just one day before we were scheduled to begin sending the patch to Windows NT, 2000, and XP machines.

— Don Schroeder (9630)

Sandia National Laboratories



September 2003

Sandia's senior management team and organizational structure have undergone significant changes since the last time we published the Sandia org chart in June. The most notable change reflects the creation of a new division-level organization — Div. 4000 — for security matters (this issue, page 2). Other changes: the movement of VP Al Romig from Div. 1000 to Div. 5000, and the promotion of Pace VanDevender from his position as Executive Staff Director to VP of Div. 1000.



Mileposts

New Mexico photos by Michelle Fleming
California photos by Bud Pelletier



Jerry McCorkle
40 15421



Lloyd Bonzon
35 2554



W. Franklin Mason
35 9320



John Gronager
25 5913



Ken Osburn
25 9515



Mario Ramirez
25 10842



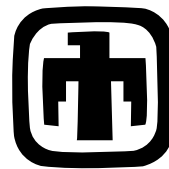
Mary Trump
25 10848



Chuck Kearns
20 10266



John Maenchen
20 1645



Recent Retirees



Jim Harris
40 1733



Jim Hanlon
38 1733



Wade Adkins
35 2991



Ralph Goekler
31 5715

Close encounter of the Mars kind



MARS SHINES BRIGHTLY in the southeastern sky above Albuquerque as *Lab News* Editor Ken Frazier views it through his eight-inch telescope. Ken took the time exposure, using a time delay, Sunday night (Aug. 31), the last day of a month that brought Mars closer to Earth — 34,646,418 miles, center to center, on Aug. 27 — than at any time in nearly the last 60,000 years. The close approach of Mars and its brightness in the southern sky (magnitude -2.9) has set off a new wave of interest in the Red Planet. Mars comes almost this close every 15 to 17 years, whenever it passes closest to Earth (opposition) within a few weeks of the date it is also nearest the Sun (perihelion). This year opposition and Mars perihelion (which was on Aug. 30) were very close in time. Calculations show Mars has not been so close to Earth since 57,617 B.C. and will not again be closer until Aug. 28, 2287. Several new spacecraft missions are already on their way to explore Mars.

Manager promotion

New Mexico

Whitney Wolf from DMTS, Technical Services Program Dept. 10820, to Manager, Space and Real Estate Management Dept. 10854.

Whitney joined Sandia in 1990 as a member of the newly formed Quality Improvement Department teaching and consulting on various TQM [Total Quality Management] and quality tools. In 1997, she joined Facilities Center 10800 and helped to bring numerous improvements to the delivery of Facilities services.

Whitney has a BS in electrical engineering from the University of New Mexico and is a certified quality engineer.



WHITNEY WOLF



Creating a school: Don Luis y el Centro de Enseñanza Moderna

Sandia retiree/consultant Juan Ramirez establishes an elementary school in Mexico; Sandians help colleague

By Iris Aboytes

From nuclear scientist to elementary school founder, Sandia retiree/consultant Juan Ramirez (9720), has made the transition in a grand manner. In Chetumal, Quintana Roo, Mexico, he co-founded "*Centro de Enseñanza Moderna*" (CEM) or center of modern education.

The city of about 250,000 people is a predominantly agricultural coastal area on the Yucatan peninsula that includes subsistence farming, sugar cane plantations, and the harvesting of valuable woods from the forest.

Using the inheritance from his father, Don Luis Ramirez (in Spanish the title *Don* or *Doña* are signs of respect), Juan and his cousin Irma Montalvo Perez, a schoolteacher, established the school about five years ago, a year after his father's death. It was a modest beginning. Irma had previously started a school in a rented house with little support and only eight students. Today they have more than 300. Irma had taken Don Luis (her uncle) to visit her little school when Don Luis was last hospitalized. He was excited to see the beginning of what is now the CEM.

The merger of Juan and Irma's interests and efforts has resulted in the present-day *Centro de Enseñanza Moderna*. It provides quality, affordable, bilingual education to the young families of Chetumal. These families form the heart of a slowly emerging middle class in Mexico. The public schools are usually under-funded and overcrowded and the private schools tend to be very expensive and directed toward the more affluent.

In the months that followed Don Luis' death, Juan thought often of what his father had said to him when he was 16 years old: "When it is all over, I would like to think that my life made a difference for the good and the world is a better place because I have lived."

Juan thought about his inheritance and about the various ways to honor his father's life. Don Luis had only gone up to fourth grade. But it was this proud and independent man who read the classics and introduced Juan to classical music and instilled in him a love of learning. "Why not build a school?" Here, close to a place that was once home.

The 'great equalizer'

Don Luis moved his family to Florida when Juan was a teenager to give his children an opportunity for a better life. When his children were all grown and on their own Don Luis and Doña Anita went back home. Don Luis had accomplished what he set out to do. All his family became American citizens, and three of his four sons earned PhD's. Says Juan, "My dad considered education the 'great equalizer.'"

His 83-year-old mother, Doña Anita, thought it was a great idea. "Today she sees the CEM as a celebration of my father's values and interests," says Juan. "She sees it as a special celebration of the life the two of them led. She has embraced our school and formed a special connection to the children."

His family was prepared to support whatever he did. They stood proudly as they all attended the dedication of the new school buildings. "My children, Lisa [a Sandian in Org. 3333] and Diego [studying to be a Delta Airlines pilot], are happy I have found something motivating and rewarding to keep me occupied for the next couple of decades," says Juan.

Juan's decision was made; he would build the

school. But he wasn't a businessman. From where would the capital required come? His share of the inheritance would not go far in building the CEM. The decision made, the question still was where he would get the additional money. Juan decided to get a mortgage on his home. So with the inheritance and that mortgage money, the building began.

Today what was the tiny one-room school now has two new buildings, 12 classrooms, a computing center, 30 staff members, and the original little house now used for offices.

So the initial building blocks were laid. Juan was committed. His only stipulation to himself was that this be the best school possible. After all, that had been how he had lived his life as a Sandia scientist. The whole process seemed overwhelming, but he was determined.

CEM targets families who would have to struggle to send their children to private school.

"You cannot take the child and not take the family," says Juan. "To ensure the environment is conducive to learning, we take the family."

Because Juan wants the students to be thoroughly prepared for the future, the bilingual school hires English teachers. Each classroom is limited to 25 students to ensure a close interaction between the teacher and the students.

Sandia Computing Center

Juan's Sandia friends heard about the school and asked how they could be a part of this effort. At first, friends and associates began to contribute on their own. Many more Sandians have contributed since CEM was designated a tax-deductible organization. Those funds led to the construction and dedication of the Sandia Computing Center in the school last February. The center has 14 new computers and hundreds of children eager to learn about computing and the Internet.

On the exterior front of the computing center a plaque identifies it as: "Sandia Computing Center, Donated by friends at Sandia National Laboratories, Albuquerque, New Mexico."

"I am deeply moved by the generosity of my fellow Sandians," says Juan. "It is impossible to overstate the impact that their generosity has had on the children and families of *Centro de Enseñanza Moderna*."

"The greatness of the Sandia donors is seen through the eyes of the school children," says Irma.

"It is great to believe in yourself, but it is really something when somebody that you do not know believes in you," says Juan. "That is what Sandians have given to the children through their generosity."

The school has students from pre-school to sixth grade. Plans are in the works for junior high and eventually a high school. For now, most graduates from sixth grade leave to attend state-funded schools. *Tio* (uncle) Juan, as the students call him, is left to worry and hope that the education students have received at CEM provides a



IT STARTED as a one-room schoolhouse, but today *el Centro de Enseñanza Moderna*, established by Sandia retiree Juan Ramirez in Chetumal, Quintana Roo, Mexico, is a modern facility with a computer lab funded in part through donations by Juan's Sandia colleagues.

strong enough basis to sustain their desire for learning in the coming years.

Asked about the impact he has made in the community, Juan says, "It is Irma who is the hero in this story. While I've gone back and forth, she has had to face all of the daily problems associated with running

the CEM. It has been her vision, dedication, professionalism, and sheer energy that have provided the critical drive to the successes we've achieved. I am extremely proud to be her partner."

Together Juan and Irma are educating kids and giving families new options and new hopes they never had before. Their vision has become a dream come true.

Smiles are the best reward

Juan's rewards are the smiles on the children's faces and the wisdom from the local people. "I have learned and grown more than I could have imagined," says Juan. "It is very similar to the commingling and human interaction that defines Sandia."

He has obviously found a place in the children's hearts. To *la niña* Lupita, Juan is and will always be "*mi abuelito*" — my grandpa. Lupita is the daughter of the CEM dance teacher.

"She was practically born and raised at our school," says Juan. "The teachers and Irma used to take turns holding her when she was as baby to allow her mother time to teach her classes. Now, not only is the CEM her 'other home' but she acts like she is an owner. She does not hesitate to come to the administration offices and ask to see her abuelito."

To the children of *Centro de Enseñanza Moderna*, he is *Tio* Juan, their *gran caballero* — great gentleman.



JUAN RAMIREZ and a young friend in Chetumal, Mexico.



DONA ANITA RAMIREZ, the mother of Juan Ramirez, gave her blessing to Juan's school.



DON LUIS RAMIREZ, father of Sandia retiree Juan Ramirez, always said education is "the great equalizer." Juan, heeding his father's words and honoring his memory, established *el Centro de Enseñanza Moderna* in their hometown of Chetumal, Mexico.