Sandia played 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 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 the experimental model,” Readdy adds.

(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

(Continued on page 12)
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 computing systems last month, called one day with an update on an individual integrated information services was making (see story on page 1).

Somehow, the subject of odd or incorrect signs came up and Charles laughedly 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: “Been any 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 All-Read room 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, makes the 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 (he’s 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 in despair even direr thoughts, Ken picked up 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 five or four 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 for 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 Crucos. Who can tell the difference?

Howard Kercheval (844-7842, MS 0163, hkerch@sandia.gov)

NOVA Awards go to two satellite efforts

Two of this year’s Employee Recognition Award winners (page 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 (5755), 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 been undergoing 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 Wintlescher (76)..................July 22
Frank J. Shingola (92)..................July 23
Norman C. Widnhofer (73)..........July 28
Frank N. Gurule (81)..................July 28

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 4040 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 Weapons Program Direction’s Leadership Team.

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 components 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 8000), 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 Hed) will become organization 30, reporting directly to Joan and Paul. Also, a new Corporate Investigation Department, organization 29, is being created, with VP Pae VanDevender (1000) serving as acting manager.

Recent Patents

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

Carolyn Mateke (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 Connections to Microfluidic Devices.

Carol Ashby (11500), David Follstaedt (1111), Arthur Fischer (1123), Kent Choquette, and Weng Chow (1123); Semiconductor Laser with Multiple Lasing Wavelengths.

Tina Nennoff (6245) and May Nymann (6118); Noble-Based Oxide-Based Molecular Sieves.

Carol Ashby (11500), David Follstaedt (1111), Christine Mitchell (1126), and Jun-Han: Cantilever Epitaxial Process.
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 Nielsen, the California site practicum coordinator. “They also represent excellent pipeline candidates for employment.”

This summer’s CSGF conference was attended 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 Everett Beckner, Deputy Administrator for Defense Programs, NNSA.

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 Everett Beckner, Dominique Foley Wilson (3554), and Anna Chalamidas (35542).

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.

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 con-
cerns directly to the Washington, D.C., office of
Sen. Charles Grassley. This prompted a series of
letters about Sandia’s security—or, more specifi-
cally, 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 defi-
cient. 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 sev-
eral 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 discipli-
nary actions, and they discussed their expectation
that the independent investigation Paul had com-
menced (led by former federal attorney Chris
Gonzales) 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 manage-
ment actions that created the appearance of retali-
ation, 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 Con-
trol Div. 5000. The disciplinary actions ranged
from retirement in lieu of termination to demo-
tion 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 investiga-
tive 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 manage-
m ent review teams, and external assessments,
many of which continue. Joan Woodard and Jim
Larson discuss many of these below.

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 visi-
ble and subtle, are taking place around them.

More important, the interview, we hope, will
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 San-
dia, 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 secu-

ity and the overall security profile of the Labora-
tory. 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 an unbiased 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 situa-
tion 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 vulnera-
ble 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
here, and looking to see if perhaps there’s a pat-
ttern 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 trend-
ning 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 Inde-
pendent 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 assess-
ments 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 con-
cerned 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 valu-
able to us that our concerned employees came forward. We are
thankful for their input.”

“...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
Cousales help guard a Kirtland Air Force Base gate.
Security issues

(Continued from preceding page)

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 impediment of an investigation. On the issue of retaliation, the approach was to take a look at case law and 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 Laboratory’s 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 into 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 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 integrated security center that had all of the functions associated with the security program of the Laboratory. We reorganized 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’ve initiated a 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, particularly?
(Continued on next page)
Security issues

(Continued from preceding page)

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.

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.

We got down to 136 a couple of years ago and there are always some isolated, specific instances of dissatisfaction with the changes. We don't change 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, if it is a personnel conflict, for example, the 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 are 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.

Jim: That commissioned the Bay report, we also have been some recent inquiries by DOE/NNSA and direction to us, no, not at this point.

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 are 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.

Jim: That commissioned the Bay report, we also have been some recent inquiries by DOE/NNSA and direction to us, no, not at this point.

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. We hope to instill in everybody a higher level of concern and feeling of personal obligation for security than we have now.

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...
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 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.

The medal was presented 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, multimaterials environment of the Advanced Materials Lab on the UNM campus.

Jeff joined Sandia in 1979. He earned a PhD in ceramic science and engineering from Rutgers University and has received 24 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 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 investigator for contributions to the statistical mechanics of materials surfaces.

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Security issues

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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 asked 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, perhaps we haven’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 asked 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:** Have you 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. They were 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 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 outside 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 MRS Medal 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 in 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 nation’s secrets, and I was responsible to be custodian 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 handle 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 time to time. And I’d walk 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 our 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 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 undersides 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 Hassan (9115) were contacted by NASA to help establish the questions to be answered and develop the experimental plan.

Sandia participants supporting the Columbia accident investigation

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

Aero (Thermal): Don Potter (9115), Ray Hagans (9116), Wilen Brodersen (MDL91)

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

Material Characterization: Jill Glass (1843), Tom Buckheit (9113), 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 (1541)

Management/Oversight: Tom Bickel (9100), Carl Peterson (9100), Art Ratzel (9131)

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.

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 shows), 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.

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 computer 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. Additional analyses 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," says Basil. "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 computer 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," says Tom. "We had to convince ourselves and our colleagues that we were correct through the use of materials testing and many confirmatory simulations and analysis." 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, radiative 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 damage to 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 Swf 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 on 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 edges impact 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 lead 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/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 used in the computational analysis. Moo Lee and supporting 6100 staff also supported this work using different experimental techniques for the RCC 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 9700 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 area and the underside tile areas. The work should also be helpful in addressing 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 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 United States accident. Pronto/SPH, and the US government accident. The team assembled represented 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 support. The terrible events resulting 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."
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 a 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 SMU). “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 application of “lean” principles beyond the manufacturing environment.

Jerrysays Sandia has developed a strong record of strategic successes in its partnerships 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 world without Rockwell Collins avionics on board.”

“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 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.”
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) — 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 Nanostuctures 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 synthesis and processing in modern technology. Ten years ago, the DOE made significant advances in materials sciences. It established a virtual center with a broad mandate: by bringing together complementary talents and resources, it is possible to tackle larger problems than 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 current 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 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 partnerships 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.”

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 Pervoskite Thin Films
- Granular Flow and Kinetics
- Synthesis and Processing of Carbon-Based Nanomaterials
- Experimental and Computational Lubrication at the Nanoscale

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 materials sciences.

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 car 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 among 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.”

Sandians involved in CSP projects

Several Sandians are involved in CSP projects.

George Samara involves in CSP projects.

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

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

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

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.
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 repeatedly 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 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 offline through a computer that was connected remotely. But while Blaster is dead at Sandia, Sandia 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 security patches can be installed.
• If you receive an unexpected or suspicious e-mail, don’t open it.

Virus fighters

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 mechanisms. 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 infected systems. Keeping your system up-to-date with anti-virus software will help prevent a successful attack by a worm or a virus.

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

Former Sandian Bob Bee (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.


“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 Glenborg, 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 less and not 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 delay for the attacker to set up and to have taken advantage of the quantity of worm infections to keep anyone 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.

— Dan 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.
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. 26, 2287. Several new spacecraft missions are already on their way to explore Mars.

**Close encounter of the Mars kind**
**REAL ESTATE**

**2-DORH, TOWNHOME, 2 baths, 1,500 sq. ft., $150,000. Ficarelli, 294-2177.**

**2-DORH, TOWNHOME, 1-1/2 baths, 2,200 sq. ft., $275,000. Ficarelli, 294-2177.**

**brick home, 2 baths, on acre, Moriarty area, near quiet lake, $45,000. Rael, 884-4778.**

**2-DORH, TOWNHOME, gas fire place, large windows, close to all amenities, $175,000. Ficarelli, 294-2177.**

**WANTED**

**ROOMS, large master bed, full bath, separate entrance, near UNM, $500. Forsythe, 291-0665.**

**Apartment, $500. Garrett, 797-9192.**

**house, 2 bedrooms, 2 bathrooms, in good condition, $150,000. Kranz, 790-1034.**

**beach house, 2 bedrooms, 1 bath, $350,000. Beswick, 899-9618.**

**bed and breakfast, 7 rooms, 1 bath, $85,000. Schrader, 859-0543.**

**garage apartment, 1 bedroom, 1 bath, $150,000. Schrader, 859-0543.**

**Rental, 1 bedroom, $1000. Schrader, 859-0543.**

**2 BEDROOM, apartment, $1200. Schrader, 859-0543.**

**house, 3 bedrooms, 2 baths, $225,000. Schrader, 859-0543.**

**home, 5 bedrooms, 2 baths, in great condition, $275,000. Schrader, 859-0543.**

**house, 3 bedrooms, 1 bath, $150,000. Schrader, 859-0543.**

**2-bedroom duplex, $1250. Schrader, 859-0543.**

**house, 3 bedrooms, 2 baths, in great condition, $250,000. Schrader, 859-0543.**

**3 bedroom, 2 bath, $250,000. Schrader, 859-0543.**

**highway frontage, $125,000. Schrader, 859-0543.**

**house, 4 bedrooms, 2 baths, in great condition, $200,000. Schrader, 859-0543.**

**house, 3 bedrooms, 2 baths, $185,000. Schrader, 859-0543.**

**2-bedroom, 1 bath, $160,000. Schrader, 859-0543.**

**house, 4 bedrooms, 2 baths, in great condition, $200,000. Schrader, 859-0543.**

**house, 3 bedrooms, 2 baths, $200,000. Schrader, 859-0543.**

**house, 3 bedrooms, 2 baths, in great condition, $200,000. Schrader, 859-0543.**

**3 Bedroom, 2 Bath, $220,000. Schrader, 859-0543.**

**2 bedroom, 1 bath, $175,000. Schrader, 859-0543.**

**house, 3 bedrooms, 2 baths, in great condition, $200,000. Schrader, 859-0543.**

**house, 3 bedrooms, 2 baths, in great condition, $200,000. Schrader, 859-0543.**

**house, 3 bedrooms, 2 baths, in great condition, $200,000. Schrader, 859-0543.**

**2-bedroom, 1 bath, $170,000. Schrader, 859-0543.**

**house, 3 bedrooms, 2 baths, in great condition, $200,000. Schrader, 859-0543.**

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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 founded “Centro de Enseñanza Moderna” (CEM) or center of modern education.

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

In the months that followed Don Luis’ death, Juan considered the inheritance and asked how they could be a part of this effort. 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 Sandian scientist. The whole process seemed overwhelming, but he was determined.

CEM targets families who 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.

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

DONA ANITA RAMIREZ, the mother of Juan Ramirez giving 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.