Los Alamos NATIONAL LABORATORY
NewsLetter

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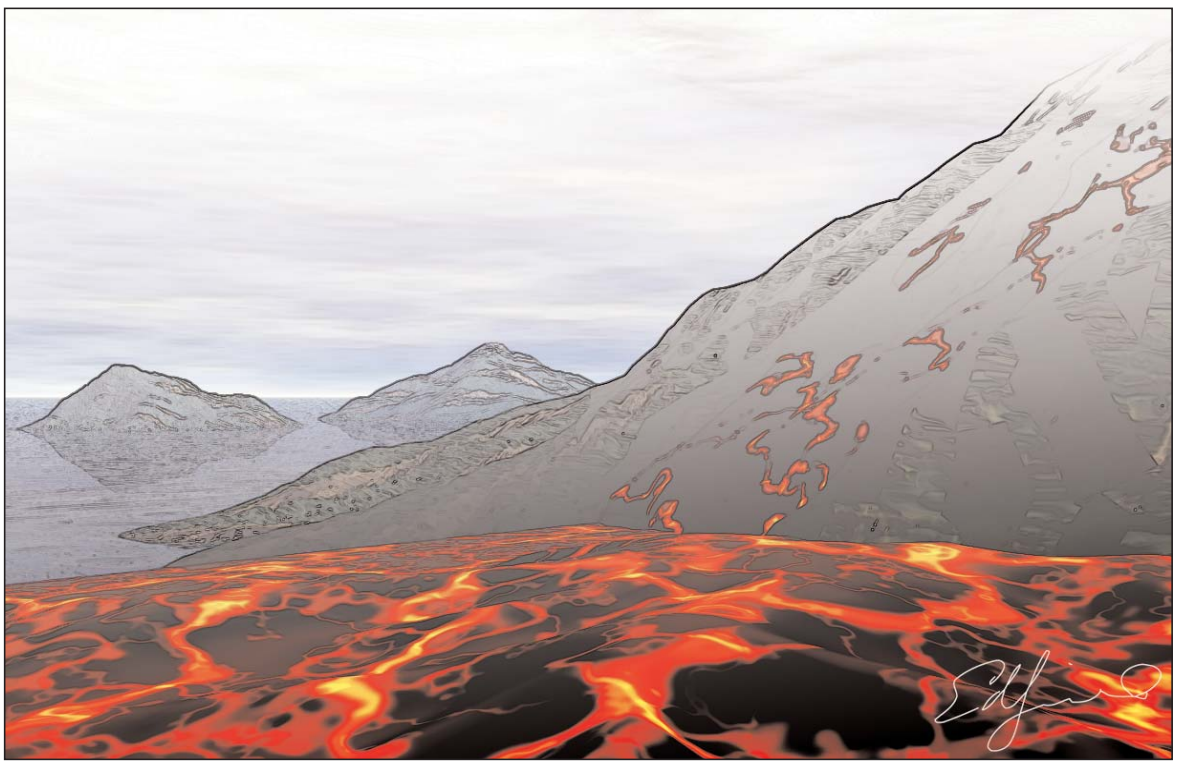

Researcher conducts volcanic voyeurism

by James E. Rickman

A researcher with the Laboratory has spied on volcanoes from a distance to learn whether they give out subtle clues before erupting.

He also learned that spying on volcanoes isn't always simple and straightforward.

Steve Love of Space and Remote Sensing (NIS-2) outlined the triumphs and tribulations associated with using remote-sensing techniques to study volcanic gases during a recent talk at the American Geophysical Union's spring meeting in Washington, D.C.

"Basically, after spending four years of taking infrared measurements of volcanic gases at volcanoes around the world, we've been fortunate enough to record a number of scientific surprises, as well as some pitfalls associated with our remote-sensing techniques," said Love. "In order to get accurate measurements and trends, you need to take frequent measurements over an appropriately long period of time."

Using both infrared and ultraviolet spectrometers — instruments that allow researchers to see the spectral "fingerprints" of gaseous chemicals being discharged by volcanoes — Love and Laboratory volcanologist Fraser Goff of Hydrology, Geochemistry and Geology (EES-6) studied volcanoes at all points of the compass to learn whether the composition or volumes of volcanic gases change when an eruption is imminent.

Love and Goff so far have found one spectroscopic clue that may precede an eruption. At Mexico's Popocatépetl — an active, 17,800-foot-high volcano located about 50 miles southeast of Mexico City, home to 20 million people — the researchers found that the amount of silicon tetrafluoride gas being released increased noticeably relative to the amount of sulfur dioxide gas before eruption. The amount of silicon tetrafluoride dramatically increased just after the eruption and then quickly returned to pre-eruption levels hours later.

This detection gives the researchers hope that volcanoes really can put out a chemical semaphore that signals impending eruption.

Interpreting remote-sensing data takes care, however, Love said.

For example, during their second trip to Popocatépetl, Love was stunned to discover that every now and then the volcano would blast out a huge cloud of carbon dioxide, which they had not seen previously. Continued spectroscopic monitoring of the mountain showed that Popocatépetl regularly spewed CO_2 blasts that were typically a hundred times larger than what they'd see coming from the mountain at other times.

The increase in CO_2 probably was the result of limestone, which lies as a foundation below Popocatépetl, being incorporated into magma and releasing the gas in the process. The observation helped the researchers realize that, unless measurements were made very frequently — at intervals of a few minutes or so — they could significantly underestimate the average amount of CO_2 being discharged annually by the volcano.

The lesson from Popocatépetl was that remote-sensing measurements must be sufficiently frequent and conducted over a long enough period to ensure accurate measurements.

Love learned other tricks, too. At Colima volcano in Mexico and at Mt. Etna in Italy, Love found that he could use incandescent light from lava in the volcano to help detect hydrogen

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Volcanologist highlights education collaboration

by James E. Rickman

A collaboration between the Lab and the University of New Mexico has resulted in a successful, one-of-a-kind educational program in which students can get a first-hand glimpse into the esoteric world of volcanology.

Fraser Goff — who has done numerous field studies of some of the world's most dangerous volcanoes — recently highlighted the UNM-Laboratory Volcanology program during an invited talk at the American Geophysical Union's spring meeting in Washington, D.C. Goff of Hydrology, Geochemistry and Geology (EES-6) is among a half dozen Los Alamos researchers who teach classes for the volcanology program, joining three UNM professors who also teach.

"The UNM-LANL Volcanology program has two major things going for it that help make it the success that it is," said Goff. "First, we have unique expertise and exceptional research facilities as a result of being affiliated with the two institutions of UNM and Los Alamos. Second, we have an extensive volcanic record preserved in New Mexico."

Indeed, the Land of Enchantment is home to hundreds of volcanoes. Most are relatively easy to access and study.

Started in 1991 by UNM Professor Emeritus Wolf Elston, the UNM-LANL Volcanology program has nurtured more than 100 budding volcanologists at the undergraduate and graduate level. Courses have ranged from basic volcanology to how volcanoes have played a role in human affairs from ancient times to the present. And the program offers one thing that no other volcanology program offers: a nearly month-long field-study course that uses the volcanically famous Jemez Mountains and Valles Caldera of Northern New Mexico as a classroom setting.

"Students compete very hard to get a place in the field-study course," Goff said. "We get students from all over the world who apply. Every other year we get 30 to 40 applicants, but we can only accommodate 17. Those who get in absolutely love the experience they gain from the course."

Volcanoes provide an opportunity for volcanologists to gain insight into Earth's history by studying the origins of magma; they learn the roles that volcanoes can play in Earth's atmosphere and in global climate change; and

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Los Alamos NewsLetter

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National Nuclear Security Administration

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Laboratory/UC collaboration leads to world's first high-temperature melt solution calorimeter

by Michael Carlson

Researchers from Los Alamos and University of California, Davis, are celebrating the world's first successful high-temperature melt solution calorimeter. Located at the Lab's Chemistry and Metallurgy Research (CMR) building in Technical Area 3, the device is capable of assessing actinide-containing materials.

An actinide is one of 15 radioactive metallic chemical elements with atomic numbers 89 to 95.

The calorimeter will be used for studying the long-term solution for burying nuclear material. By better understanding the energy that nuclear waste produces, researchers can develop new methods for disposing of radioactive waste.

The device measures the amount of energy needed to heat material from room temperature to 700 degrees Celsius.

"We know we are on our way to answering questions about the thermodynamic stability of plutonium pyrochlore, which is a major component used in the disposal of radioactive waste," said Tracy Lee of the University of California, Davis.

The project was a five-year collaboration between Lee, Charles Bennett and Alexandra Navrotsky from the University of California, Davis, thermochemistry facility; Robert Putnam and Ubaldo Gallegos of Plutonium Metallurgy (NMT-16); John Huang of Pit Disassembly and Surveillance Technology (NMT-15); and former Laboratory employee Mark Williamson.

"The collaboration, begun in 1998, has been long in coming to fruition and has been possible only with personnel exchanges between UC, Davis, and Los Alamos," said Navrotsky.

The UC directors funded the project through the Campus Laboratory Exchange program. The installation of equipment was funded by the Department of Energy and Laboratory Directorated Research Development funds for the study of metal materials. Nuclear Materials Technology also helped with funding by endorsing the project at that organization's Science Leadership Council, said Navrotsky.

"It's taken a long time, three years of my graduate program, my post-doc at Los Alamos, and finally my conversion to staff here," said Putnam. "In every turn, through the work control and authorization basis issues, NMT management has been extremely supportive and, of course, it's always nice to have money to do what one needs and wants to do."

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fluoride and hydrogen chloride gas. The gases are difficult to detect using infrared spectroscopy because their spectral fingerprints lie at wavelengths at which there is very little natural light. Under a clear sky, the infrared spectrometer has to rely solely on very dim thermal radiation to see the gases. Love learned that a pool of glowing lava in a caldera or red-hot rocks being ejected into the sky could be used to provide enough illumination for him to get a look at the two gases and measure their concentrations.

But remote sensing of hydrogen fluoride and hydrogen chloride gas presents its own set of pitfalls. Because volcanoes discharge small particles of ash, cinder and other materials into the air, they effectively provide material onto which water vapor can condense — in essence, they act as "cloud seeders." When clouds form over volcanoes, the water vapor in the cloud effectively scrubs the atmosphere of hydrogen fluoride and hydrogen chloride, which are extremely soluble in water. Infrared remote sensing can only detect hydrogen fluoride and hydrogen chloride in their gaseous form; these chemicals become invisible when dissolved in water. Consequently, Love learned that spectroscopic measurements of those two gases must be taken before the clouds form.

Los Alamos has a strong interest in remote sensing of chemical plumes because such sensing has wide applications to programs in global climate and atmospheric change and environmental pollution monitoring. Automated remote-sensing stations someday also could provide an early warning system for people who live near volcanoes, whose eruptions have killed tens of thousands of people and caused millions of dollars of property damage in just the last three decades alone.

"Remote sensing of volcanoes as an early-warning method shows a lot of promise, but you have to be aware of its limitations." Love said.

Volcanologist highlights education …

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they gather clues about a region's history by looking at the geology forged by the fires of volcanism.

Goff as well as anyone can appreciate what volcanoes have to offer. The Laboratory volcanologist has braved furnace-like temperatures, clouds of poisonous gases and acid lakes on numerous occasions to gather fluids, rocks and gases from active volcanoes — volcanoes that in some cases have taken the lives of colleagues. But the samples Goff has gathered have helped him understand whether cold fusion is going on inside the earth as a natural process (it's not), whether volcanoes give out subtle clues that signal an impending eruption (they might) or whether volcanoes unearth precious minerals such as gold (they do).

Goff's volcanology experiences make him an enthusiastic teacher. His colleagues who teach courses for the UNM-Laboratory Volcanology program are equally enthusiastic and experienced. Together the researchers are eager to pass on their knowledge and experience.

"Volcanology is an important aspect of earth science," Goff said. "Not many places teach volcanology, and those universities that do feature volcanology programs don't have the laboratory resources that we have available here, nor the setting we have in which to teach. Just like everybody else, I love volcanoes."

Technical, female and in charge:

A candid talk with some of the Lab's senior technical managers

The *Los Alamos NewsLetter* recently invited five female technical managers at the senior level to sit down for an informal discussion about women in positions of technical leadership at the Laboratory. Earle Marie Hanson, leader of Engineering Sciences and Applications (ESA) Division; Mary Hockaday, leader of Dynamic Experimentation (DX) Division; Susan Seestrom, leader of Physics (P) Division; Jill Trewhella, leader of the Biosciences (B) Division; and Kimberly Thomas, deputy leader for Chemistry (C) Division, were asked to share their thoughts on a number of issues, including whether they had a preplanned career course, factors that influenced their becoming senior-level managers, how and why they chose a career in science and what that has meant for them, mentoring and diversity. Seestrom was unable to attend the discussion (see sidebar on Page 6). However, the conversation with Hanson, Hockaday, Thomas and Trewhella turned into a freewheeling and insightful exchange. The following are highlights of that discussion.

Earl Marie Hanson

Mary Hockaday

Jill Trewhella

Kimberly Thomas

Los Alamos NewsLetter: After graduate school or even before it, did you have a chartered course or plan for your career? If so, did it involve becoming a senior-level manager?

Thomas: Not a clue.

Hanson: I think that's true for me also. When I graduated, I was totally naïve, not a clue. Actually, after graduate school my goal was to start a family, and I did that fairly quickly. After starting the family, I worked part-time and then eventually full-time when the kids were a little older.

Thomas: I just wanted a job. I'd been in grad school and then had the opportunity to get a job at Los Alamos. I've been here ever since. I came straight from grad school. I came here as a staff member. They were desperate.

(Laughter)

Hockaday: I was a grad student here. My plan was to be a researcher for a while and then go off and teach at a university.

Trewhella: I always had plans, but they always changed. And I think that's the secret. It's good to have plans, and it's good to have a target and a goal. But being flexible and responding to whatever comes along when it's the right thing is really a good thing to be able to do. When I started out, I wanted to be a math teacher, but I ended up being better at physics than math. So I took honors in physics, and I started in a physics Ph.D. program. But then like Earle Marie, I went off for a little while and started my family. When I came back, the physics program [at the university] didn't have what I wanted, so I did chemistry. By the time I graduated, I'd done math, physics, chemistry…

Hanson: And now you're doing biology.

(Laughter)

Thomas: It's still chemistry.

I started [career planning] in sixth grade. I was going to be a stewardess, but I found out that you had to be a minimum height of 5' 7". This was back in the old days when there was a maximum weight, minimum height because you had to look like Barbie. And there wasn't a prayer I was ever going to take on the Barbie form. In seventh grade, I had a biology teacher and there was a microbiology portion of the class. So then I was going to be a biologist. In eighth grade, I was going to be an aeronautical engineer. And in ninth grade, I started thinking that chemistry looked pretty good. In 10th grade, I stayed with chemistry, and it's been chemistry ever since. There was never any doubt that I was going to go into chemistry.

Hockaday: I was going to be the president of the United States. Really! From seventh grade until I was a senior in high school, I was going to be president of the United States and go into environmental law. But then I spent a year in Japan as an exchange student, and everybody there was going to be a lawyer.

At the high school in Japan, I ran into a really neat physics teacher. I went to an all-girls high school, and all the girls wanted to do was get married by the age of 23. And so here was this poor guy, who was a good physics teacher, teaching a bunch of girls who didn't really care. Then I showed up. I had a language problem but at least some aptitude toward physics. He would spend extra hours with me as we tried to translate the physics textbook. By the time I was done, I got the highest grade in the class on the final. I decided that when I enrolled at the University of Hawaii the next year, I'd go into physics.

Thomas: In 10th grade, it was my chemistry teacher.

Hockaday: Teachers make a big difference.

Thomas and Hanson: They make a *huge* difference.

Thomas: Once I had taken my [10th grade teacher's] course, it was chemistry for me. Later it became nuclear chemistry because I had a chance to spend a summer at Brookhaven National Laboratory working in nuclear chemistry — you can only do that at national labs. The reason I wanted to do nuclear chemistry so much was that it was the chapter you never got to. It was the chapter at the end of the textbook, and the school year always ran out before you got to study it.

I had a professor in college who summered at Stanford [University], and he kept trying to convince me to go to Stanford for grad school. But when he realized I'd come back from Brookhaven and was hooked on the nuclear aspect, he said there's only one place in the country, "you gotta go to Berkeley." I ended up praying, *praying* when I went to Berkeley that I would be mediocre, because I was coming from a school of 1,600 total enrollment in New England (a liberal arts college). I was just scared to death that if I went to a school like Berkeley, the MIT [Massachusetts Institute of Technology] grads and the Yale grads and the Harvard grads and the Caltech grads would blow me away. I got to Cal, and I was very pleased. I was right smack in the middle of the class. I met my goal.

(Laughter).

Hanson: Well, I wonder how many of you had a relationship with a husband or family that had something to do with your choices? At least for me it did. I got married right out of college, went to grad school and then went looking around for places to go. My husband

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was in high-energy physics, so we didn't have a lot of choices as to where to go. For a while, I taught at Cornell and then we came here, but my career at that time was all directed by following where he was going to go.

Thomas: My husband had to follow me, because I was a year ahead in grad school. We decided to get married — we met in grad school — because it was either that or we could meet at the occasional ACS [American Chemistry Society] meeting or something. He had grown up in the south, and he was going to work at Oak Ridge — when he was five, he knew he was going to work at Oak

Ridge. I interviewed at Oak Ridge and had a job offer. My last job interview was Los Alamos. My mentor was Darleane Hoffman [a Los Alamos researcher], so, there was a pretty strong tie to Los Alamos. After the interview, my [then fiancé] picked me up in San Francisco, took one look at me and said, "You took a job, didn't you?"

I said, "Well maybe. You know, we're not getting married for at least a year, and Los Alamos is a really nice place. I think you'll love it, but even if you don't, maybe we won't stay together…" And so, some 24 years later here we are. We're still in Los Alamos.

Hockaday: We graduated from the University of Hawaii, and my future husband was offered a summer job at Los Alamos. His office mate was offered a job at Livermore, and I got to choose between Livermore and Los Alamos. I decided that since I was only dating one of the guys, I'd go to Los Alamos. We had been engaged, but it wasn't until we got to Los Alamos that we realized we could have a dual career and find a place that could accommodate us. After my first year in graduate school at New Mexico State University, we decided to get married.

The path to management

Los Alamos NewsLetter: At what point in your careers did you start looking at management as a career option or a career ladder, and how did you make that decision and start moving up the management ranks?

Thomas: I was a couple of years into [my position] as a staff member, and my mentor was here. The person I was sharing an office with, who'd been here since 1943, was getting set to retire and somebody had to step up. He was not replaceable, but [someone] had to at least try to handle the responsibilities he had. Since we were office mates and I was learning as fast as I could and as much as I could from him, it was almost a natural transition.

What really helped was that the testing program was still very active, and we were very, very active with Livermore. We had a sister group, if you will, in radiochemistry with the Livermore folks, and we had a major conference that we sponsored twice a year to go over the results of the various tests we had done and to make sure we were calibrated with each other. It fell to me to help my office mate with this major program and to run this major conference as well. I got a lot of responsibility early on just managing this particular conference, and I also got a lot of personal visibility doing it.

Trewhella: To me it was much later. I really was driven by science very strongly through a lot of my career, and that came out even very early on when I was a physicist. My passion was to understand biological structures …

Mary Hockaday: *'I was going to be the president of the United States. Really!'*

My goals throughout my science career were always very incremental. It was to get my doctorate; then it was to publish a paper; then it was to publish an independent paper; and then it was to publish a body of work. It was like, okay I've done that, now what can I do. It was really during my time at Los Alamos that I would, because of my science, get pulled into discussions and [involved in] writing white papers and figuring out what should bioscience at Los Alamos do, what should it be, what should it look like, and how should it be run. I spent eight years involved in one committee or another at every level at the Laboratory, from the most senior management to sort of random groups of staff members who would spontaneously decide to do something. Just two and a half years ago, I was asked if I would be the acting leader for the new Bioscience Division; [Lab management] had been struggling for a long time over how to figure it out.

Jill Trewhella: *'It's still a treat to go once and a while and immerse myself in an experiment!'*

This was really an incremental step for me. It was based on everything that I had been thinking about for the last eight years — what bioscience could do at the Laboratory, what it could be, what it could make. It wasn't that I decided to be a senior manager. I decided that I needed to take the next step with what I had put together in my thinking and my evolution as a person. Now instead of understanding where atoms are and how they bond and form little rings and methyl structures, I'm trying to figure out how to put people together and make them bond and figure out how they will make big or little units that will achieve some function. It really is an evolution. It's an evolution of my science and the way I think about science. I'm now playing in management, and it's much more complex and just as interesting.

I really value the time I spent in science, and I really value the fact that I spent a long time working as a scientist. I took this step [into senior management] after I had the chance to really think about it and evolve it in my head. It wasn't planned, but it is logical.

Hockaday: I got sucked into it.

(Laughter)

I was a graduate student, and the team I was working on was falling apart. When you're a graduate student you form connections, and I saw a lot of people that I cared about getting hurt. So I found myself being an interface, trying to work issues, even though I was a graduate student. By the time I actually became a staff member in the team, we had lost about 50 percent of the team. Within two years, I was team leader and trying to rebuild the team and go from there. I just progressed. Because I had the strength of the science and the people skills, I went into the project mode where you need to have your people skills to bring people together to apply [their expertise] to large projects and complex experimentation. Working on a large team doing diagnostics on nuclear tests, you don't stand alone. You have to work in a team environment. I also tend to have a few pushy characteristics, so instead of just being a member of the team, I ended up either back-dooring — pushing where I want to go — or leading.

But I still remember the issue of having the long technical background, because when you go to school, you never dream about going into management. I remember in graduate school when I became pregnant with my first kid, I couldn't say the words, "I'm pre-e-g … pre-e-g …" I also remember being on an airplane after becoming a deputy group leader, and someone asking me what I did. I said, "I'm a maa-maa. I'm a maa-maa… I'm a manager." It was a realization that I had gone to the "dark side," because when you get your Ph.D. you are so focused on the science that [management] is foreign.

Trewhella: But management is *not* the dark side.

Hockaday: To a lot of people it is.

Trewhella: In all honesty, as I said, I had a long science career, and I really enjoyed it, but it was time to move on. I am more diverse. I have more capability. I have more things to give in life than following the nth experiment into the deepest level of understanding of a particular issue about nature. The technical arrogance that says the only worthwhile thing to do is science is just that, technical arrogance. I have said to multiple people that I will not go back and do full-time bench science anymore because it is no longer enough for me — although

it's still a treat to go once and a while and immerse myself in an experiment!

Hanson: But you know, I think that varies. For some people bench science is the thing that really drives them. For others it's management. I think from the management perspective, you have a lot more ability to leverage the direction that things go. You can have a larger impact. You can focus the activities of the bench scientists or the bench engineers on areas that really need to be done, and I think that's important.

I started out a little differently. In grad school you all were saying you knew what you wanted to do; you were really into science. But at that point in my life, university teaching was far above industry, although in my particular area — I was in organometallic chemistry — people were recruited by DuPont and a few of the other big [chemical companies]. But right after I graduated, my husband and I went to Cornell, where he did a post doc. And within three months of my daughter's birth, I was back teaching. I taught freshman chemistry for about five years and then we came to Los Alamos. Within nine months, I had a job at the Lab, but I started as a casual employee. After about half a year, I went to part-time, and I didn't go full-time until I had been at the Laboratory about five or six years. In doing what I was doing part-time, I think the Lab really got a bargain.

(Laughter)

Thomas: I'll bet you actually worked full-time.

Hanson: You work hard, you go home and you think about it some more. You're not taking breaks, so I think they got a real bargain. But I also got great experience in that I got to work on a diversity of projects. It was all in the weapons area, but it was materials work and high explosives work and work with the plants. For me, working with the production plants was a very good experience. I got a wide exposure to a lot of different areas and a lot of different people. I did a lot of work in process development planning. I started my management career with project management assignments. Along with that, I had a lot of opportunities for training. I did "Models for Management," which is one of the old training courses. And then the "Engineering Science Management Training Program," where they took me out of my regular job for about a year. That's when I went full-time and did full-time training. We were given a lot of leadership training. We also were given opportunities to be mentored and to work in different groups. That was a very good opportunity for me. After that, I was project leader for a while, then team leader, then deputy group leader, then group leader, then an office leader, and then a deputy program director. Now I'm

Earle Marie Hanson: *'For some people bench science is the thing that really drives them. For others it's management.'*

division director. So I think I've paid my dues along the way, you know. It wasn't a jump into fame type thing. It was building up the contacts and building up the relationships across the organization, as well as building my experience base.

Mentoring and mentors

Los Alamos NewsLetter: Several of you have said mentoring played a role in your careers. To what extent are you currently mentoring, and if you are mentoring, how do you choose the people that you mentor? Do you focus on women, minorities, students, post docs? Do you focus on a particular area of science? How do you choose?

Thomas: I am actively involved in mentoring and have been almost since I got here. That's perhaps because I had such a strong mentor. Darleane Hoffman was one of the first women technical division leaders at the Lab. I understand she wasn't the first, because there was somebody during World War II, at least that's what I was told. But I always thought of Darleane as first in real time anyway. She was a nuclear chemist, and my being at Los Alamos is specifically because of Darleane. I had sent in my job application, and they couldn't have had it 24 hours before it came back to me. You know, thanks, but we'll call you; don't bother us. Obviously, it had never even gotten out of personnel. But I knew Darleane, and she had told me there were positions open. So I got up the nerve to actually call her after about two weeks just to ask if she had seen my application. She said no, and I said it's kind of strange because I already got a rejection

Kimberly Thomas: *'I am actively involved in mentoring and have been almost since I got here.'*

letter. She said, "Send me your application right away." A week later I had an interview.

But the reason I'm really here is not just from that connection. It was also because of my thesis project. Darleane was spending a lot of time in Berkeley with Seaborg's group, so I had a lot of technical discussions with her. At the time, she was married and had a family, and so she became a role model, and not just scientifically. Here was a person who had a family — her husband was a physicist — and she was someone that I could relate to and see that there are things that you can get done. In fact, she was the very first person my husband and I told that we were getting married. I asked Darleane what was the chance of two jobs. Dual careers was an issue even then, and it was very important to me.

So when I have the chance to mentor, I do it. I have had some grad students from the University of New Mexico and some summer students. It's not in my mind limited to anybody, whether they are men or women, young or old or whatever. It has to be a fit, and I don't know how I go about choosing them or they choose me. You can't legislate it. It has to be a fit, and it's either a fit of my personality with theirs or what I have to offer that they need. I have a couple of people that I work with actively right now — two are men and one is a woman.

Trewhella: I actually got a formal request to be a mentor just recently. I don't really know if someone would say I have mentored him or her. I think I look out for people where I can, help where I can, but I don't know if someone would come up and say, yes I remember Jill Trewhella, she was … Actually come to think of it, I won an award for mentoring.

(Laughter)

Thomas: I did too, and I was going to remind you of that. You and I have a mentoring award and that means somebody said we mentored him or her.

Trewhella: Certainly informally I've tried to look out for younger people just in general and promote their careers. I got a surprise e-mail saying that someone is interested in me mentoring them, and I thought, really? But I was very busy, and I didn't reply for a while. Recently I decided I should respond and find out who it was. I just went and had lunch with the person the other day, and it turns out I've known [this individual] for quite a long time. I had no idea how wonderful this person is. I walked away excited because I had discovered a whole person that I didn't know before. This is a formal mentoring, and we're going to try it. We're going to continue to meet and interact. But I think a lot of mentoring happens very informally. I mean, I have never had a formal mentor, but there are people that I can point to in my career who I have really learned from and who have taken the time to teach me survival skills.

Hanson: Well, I think that's mentoring. It doesn't have to always be a long-term relationship. Sometimes just short-term mentoring in a difficult situation helps a lot.

Thomas: And then there can be mentors for a certain part of your development.

Trewhella: That's right. And even today, even at my level now, it's most valuable when someone will take you aside and help in that way … in that developmental way. I've been lucky, and I'm lucky now. I have people in my sphere who do that for me. It's very important.

Hockaday: Constructive advice. You've heard of constructive criticism? I consider mentoring constructive advice. There's a lot

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of advice that's not constructive, but a successful mentor provides constructive advice.

Thomas: I get as much out of it as the other person, because I don't do it as me passing on profound wisdom. I get every bit as much out of that kind of relationship as I hope the other person gets.

Hanson: Well, I've certainly had a number of mentors, and I think that mentors really made a difference. They showed me the ropes; they introduced me to people; they helped me put together presentations that deliver the messages I wanted to make. One of the things that mentors also do is help stretch your comfort zone. You know, I wouldn't have taken some adventurous steps on my own without the backing and support of a mentor. So I really credit my mentors with a lot of my success because they really were very effective. Many of them still are around and support me in my decisions, help build my confidence when I need confidence building and tell me that I'm full of it when I'm full of it.

(Laughter)

Recruitment, role models, diversity

Los Alamos NewsLetter: Are you held to a higher standard being a woman?

Thomas: I feel that we are held to a higher standard by some people, but not by all. But there are people — some recently retired, some still around — who have some old-fashioned values. I think it's changing dramatically, but I think in society we're still a long way from … maybe it will never go away because society is so diverse and everybody is so different. But I think it's a lot better [for women managers] than it used to be. That's for sure.

Hanson: Well, I don't think that if you are mediocre you're going to get to these positions as women. I do think that whether you put it on yourself or somebody else pushed it on you, there is a high standard. It's like Avis. We try harder.

Los Alamos NewsLetter: What barriers exist here at the Laboratory to increasing the recruitment of women in the technical ranks? How can they be overcome and how can you get more women to follow you into highly technical arenas?

Hanson: I'd like to speak to that because I think we need more people studying science and engineering in school. You really need to develop students in elementary education though junior high through high school and through college. They need to know that there are opportunities out there; that there's exciting science and engineering work to do. And whether they are women or men, I think we need to be recruiting and developing them all, because right now there's sometimes a shortage of men as well. And I think that some of the barriers for women coming here are very similar to barriers for men coming to Los Alamos.

If you come without a family — that is without an already established family — then you have to have that social network to meet people, to have people your own age to do activities with. I don't think that's well established in Los Alamos. There's a distance from a big city that affects women and men. There's also the high cost of living here. That's a challenge for a graduate student or a post doc.

For women, it's very important to show examples of successful women at Los Alamos, to let them know that there is that possibility in their future and that women are respected at the Lab. We just had Family Day, and there was this gentleman when I was over at TSE [Tritium Science and Engineering] who introduced me to his daughter, who looked like she was about eight. He says, "This is the big boss. She leads all of ESA, and ESA is a division people want to come and work in." I said, "Well thank you," and he says, "I just want her to know that there are role models out there and that she can do well." I think being a role model is important.

Thomas: I've got to tell you one more thing before we close. One of the questions you asked us to think about was what diversity means to us, and I have to put this on the table. One manager in a post-job debrief, who at the time thought he had terribly insulted me, said, "You know what really perplexes me about you? I never know if you're going to react to a given situation as a man or as a woman." When I hesitated [to respond], I think he thought, "Oh God, what did I just step into." I thought about it for a second, looked at him and said, "Thank you." He started to fluster, and I said, "No, actually I'm glad to hear that because I do not wish to be predictable. Every situation requires a unique response, and I'm very glad that I'm not acting in a stereotypical manner."

To me, that gets to the essence of diversity. We don't want to be "like a woman" or "like a man." We shouldn't be, because every situation is different.

Los Alamos NewsLetter: What can the Lab do to expand the recognition of diversity across the Lab as being more of what you were describing, where none of us are viewed as a single thing?

Hanson: A part of that is welcoming and valuing different approaches to doing things. I don't think that diversity is just women and minorities. It's also background and the way you think about things.

Thomas: Mary hit on it when she said we've got to get away from the that's-the-way-we've-always-done-it [mentality]. It's not just people's ethnicity, culture or sex. It's also their thinking process. Some people think one way, and other people think in other ways. To experiment in science, we have to be willing to experiment in approaches to things and our way of solving problems, and experiment in our way of dealing with people.

We're real good at the experiment side in tools and science and research. We need to be equally as willing to experiment with people.

Additional thoughts …

Susan Seestrom, Physics (P) Division leader, was among the senior-level technical female managers invited to sit down for a discussion with the *Los Alamos NewsLetter.* Seestrom was unable to attend the scheduled session. However, she offered to share her thoughts on some of the questions sent to the participants in advance. Below are select questions and her responses.

• *What have you done to ensure success at the senior-management level?*

I have tried to establish relationships with key senior managers who let me use them as advocates and advisors. I also have employed outside executive consultants on some key or difficult issues.

• *Do you think female managers in a male-dominated management structure are held to a higher standard than their male counterparts? Do you allow yourself to make mistakes?*

I think we are held to a somewhat higher standard, especially where tough or confrontational behavior is needed. Behaviors that seem acceptable in men are sometimes criticized in women — we've all heard terms like "strident," "bitchy," "hysterical" used on women.

I allow myself to make mistakes because I believe that [making mistakes] is an essential element of improvement. But, this must be coupled with a strong commitment to learn from one's mistakes.

• *Is it difficult to get your opinions heard and your advice taken by senior-most leaders at the Lab?*

I don't think so — at least not with my direct supervisors and their chain, all the way to the director. I occasionally have had some trouble with people who don't know me — especially on the nontechnical side.

• *What do you think is needed to enable greater numbers of women to rise to senior management in the technical ranks?*

The presence of an increasing number of women already is a big factor. I think another thing is acceptance of the different lifestyle issues for women – we often have young families and are therefore less flexible in our ability to deal with travel, etc. In the old days [when being male was the norm for senior managers], they all had a wife at home to keep life in order. I think the ultimate effect of dealing with the demands of [today's] two-career families will be healthy for all of us.

I have been blessed with colleagues and supervisors who are accepting of the effects of my commitment to my family and, of course, a husband who is an equal partner is dealing with family responsibilities.

• *If you were starting your career all over again, what would you do differently and why?*

Analytically, I think I might have been better off to first establish a research career and then marry and have a family. My choices would have been broader. But the path I chose turned out to be far better than any I could have planned in advance. I think it is best to make the most of the opportunities that come your way, rather than to try to build a "career." If your goal is to do good work and make a difference, wherever you are, the career will follow.

Pan named ESA-GTS deputy

Paul Pan is the new deputy group leader for Gas Transfer Systems Engineering (ESA-GTS). Pan's responsibilities include providing leadership, ensuring effective teaming, coordinating roles and responsibilities and aiding in the group's professional development.

Pan will work closely with Engineering Sciences and Applications (ESA) Division management, Laboratory weapons systems managers and other ESA groups. He also will continue to serve as team leader in Weapons Systems Engineering (ESA-WSE) until short-term deliverables are met and delivered to the National Nuclear Security Administration.

"GTS is one vital element in the nuclear weapons stockpile program. I will help the GTS group leader, Kenneth Keeler, build cutting edge technologies and establish advanced stockpile stewardship programs to meet challenges for today and tomorrow," said Pan.

Pan came to Los Alamos in 1983 and has been employed with WSE since 1996. His career at the Lab includes positions as principal investigator, project leader and team leader. Pan recently received the Chinese Institute of Engineer's Asian American Engineer of the Year Award for 2002 (see the March 7 *Los Alamos NewsLetter*).

Pan has a master's degree in chemical engineering from Syracuse University and a doctorate in nuclear engineering from Kansas State University.

Lab publications garner international awards

Three Laboratory publications received awards in the recent Society for Technical Communications' International Technical Publications competition.

The Los Alamos Science issue on "Challenges in Plutonium Science" and the book, "Cerro Grande: Canyons of Fire, Spirit of Community," received awards of Distinguished Technical Communication, which is the highest award conferred by the Society for Technical Communications.

"The Laboratory in a Changing World: A Los Alamos Chronology," won an award of Excellence in the informational materials category, said Judy Prono of Communication Arts and Services (IM-1).

The international awards were recently announced in Nashville, Tenn.

Alison Grieggs of IM-1 led a team of IM-1 and Imaging Services (IM-4) personnel in writing and producing the Cerro Grande Fire book.

The Los Alamos Science Plutonium issue was written and produced by the Los Alamos Science team of the Science and Technology Base (STB) Program Office with the assistance of IM-1 personnel.

The Los Alamos chronology publication was developed by **Nadine Shea** of the Associate Director for Weapons Programs (ADWP) office, and **Maureen Oakes**, **Jay Tracy** and **Larry McFarland** of IM-1.

The STC is an international organization dedicated to advancing the arts and sciences of technical communication. Its 25,000 members include technical writers, information architects, usability and human factors professionals, visual and Web designers, and others who work to make technical information available to those who need it.

Additionally, the Imaging Professionals of the Southwest in a separate competition recognized four Laboratory photographers for their photos.

Presley Salaz of Imaging Services (IM-4) received two IPSW prizes. In the Scientific/Technical Category, Salaz took first place with his "Femtosecond Pulse Laser" photo. This is the third year that Salaz received first prize in this category. His "Fluorescing Capillary" image won second prize.

Bob Brewer's photo, "Coyote Bridge in Escalante," took third place in the IPSW Illustrative Color Category. Brewer also is in IM-4 and a former president of the IPSW.

Mick Greenbank of Nuclear Materials Information Management (NMT-3) won first place in the Commercial/Industrial category for his image called "Suite Dreams," and third place in the Scientific/Technical category with "Eye of the Beholder." Greenback also received an Honorable Mention in the Special Category, which this year was "Wet" with "Psychedelic Splash." Greenbank also is a past president of the IPSW.

Joe Riedel, also of NMT-3, won first place in the Special Category with his image titled "Catch a Wave," and Honorable Mention in the same category with an image called "Splash."

For more information on the STC awards, call Prono at 5-8383 or write to *jprono@lanl.gov* by electronic mail.

Resource Center opens White Rock branch

by Fran Talley

The Española Energy Employees Occupational Illness Compensation Resource Center has opened a branch office located in White Rock at Technical Area 0, Building 1329, behind the Metzger's True Value store.

The office is staffed with caseworkers to assist current and former Laboratory employees, retirees, contractors and survivors of former employees who are interested in filing a claim or are in need of information concerning the Energy Employees Occupational Illness Compensation Act. Claim forms also are available on the Department of Labor Web site at *http://www.dol.gov/dol/esa/public/regs/compliance/owcp/eeoicp/main.htm* online.

According to the Española Research Center, the EEOICPA provides $150,000 in lump-sum compensation as well as medical expenses for eligible workers who became ill because they were exposed to beryllium, silica or radiation while working in the nuclear weapons industry for the Department of Energy including its contractors or subcontractors.

The White Rock office is open from 9 am until 4 pm Monday through Friday. For information regarding benefits or to schedule an appointment with a caseworker in either White Rock or Española, contact the Española office at 412 Paseo De Onate, Suite "D" in Española at (505) 747-6766, toll free at 1-866-272-3622 or by fax at (505) 747-6765.

Laboratory garners award at SBA conference in D.C.

Dennis Roybal, Business Operations (BUS) Division deputy leader, makes some comments after accepting a Dwight D. Eisenhower Award for excellence in small-business operations at the 35th annual Industry and Small Business Administration business and procurement expo awards ceremony held recently in Washington, D.C. The Lab received the award from the federal Small Business Administration in the research and development category, one of four categories the SBA recognizes. Bennie Gonzales, former Small Business Program (BUS-SBO) Office manager, and Stan Hettich of Procurement (BUS-5) also represented the Lab at the awards presentation. For more information, see the May 1 Daily Newsbulletin at http://www.lanl.gov/newsbulletin online.

Photo courtesy of the Small Business Administration

A man of many talents

by Michael Carlson

Step into Frank Harlow's office, and you'll find yourself traveling backward through time. A Laboratory employee for 48 years, Harlow still uses the same desk, table, file cabinets and wooden chairs he started with as a young theoretical physicist. A PowerBook in the corner is the only indication that the year is 2002. Harlow of Fluid Dynamics (T-3) said he only uses his computer for e-mail.

In addition to being recognized for his technical achievements, Harlow is an accomplished painter. Some of his work is in private collections throughout the world, including Russia and France. He began painting in the late 1960s, and some of his office walls are decorated with acrylic works of American Indians and Harley Davidson Motorcycles. His paintings also are in three of the Laboratory conference rooms.

"I decided to give it a try," Harlow said. "At first it didn't work, but after practice, I got brave enough to start showing people," he said referring to his artwork.

These days he's looking forward to being the first Laboratory employee to complete 50 consecutive years of service. Although he might retire after meeting this milestone, he said he would plan to come to the Laboratory every day for work as an affiliate.

Harlow said he could have retired 24 years ago, but working with younger staff members has kept him young. He has mentored about 150 high-school, undergraduate and graduate students as well as 16 doctoral candidates.

"They really keep me on my toes," Harlow said. "They ask strong questions. Sometimes I don't always have an immediate answer; sometimes they come up with a solution to a problem that I never considered."

Reflecting on his long career, Harlow said, "I knew I always wanted to be a scientist."

Frank Harlow

He chose to pursue theoretical physics because he wasn't good at the experimentation aspects of other sciences. He has used his scientific mind to work on problems of turbulence, the material properties of metals and polymers, and the development of computer problem-solving techniques that are used for a variety of applications around the world. His work recently earned him the 2001 Computational Mechanics Award from the Japan Society of Mechanical Engineers.

The organization invited Harlow to Japan, but he didn't like the idea of traveling that far, so a representative from the society came to New Mexico to present him with the award.

"I'm proud of winning the award," Harlow said.

Harlow also writes books on Indian pottery. He likes the period between 1600 and 1800 — because the early historic period is more difficult to research than the prehistoric period, Harlow said he couldn't resist the challenge. His latest book on pottery is due out this year.

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