State of the Labora

Editor's note—ORNL Director Alvin W. Trivelpiece delivered his annual State of the Laboratory address to employees and guests on May 12, 1998, in Eugene P. Wigner Auditorium, Oak Ridge National Laboratory. An edited version follows.

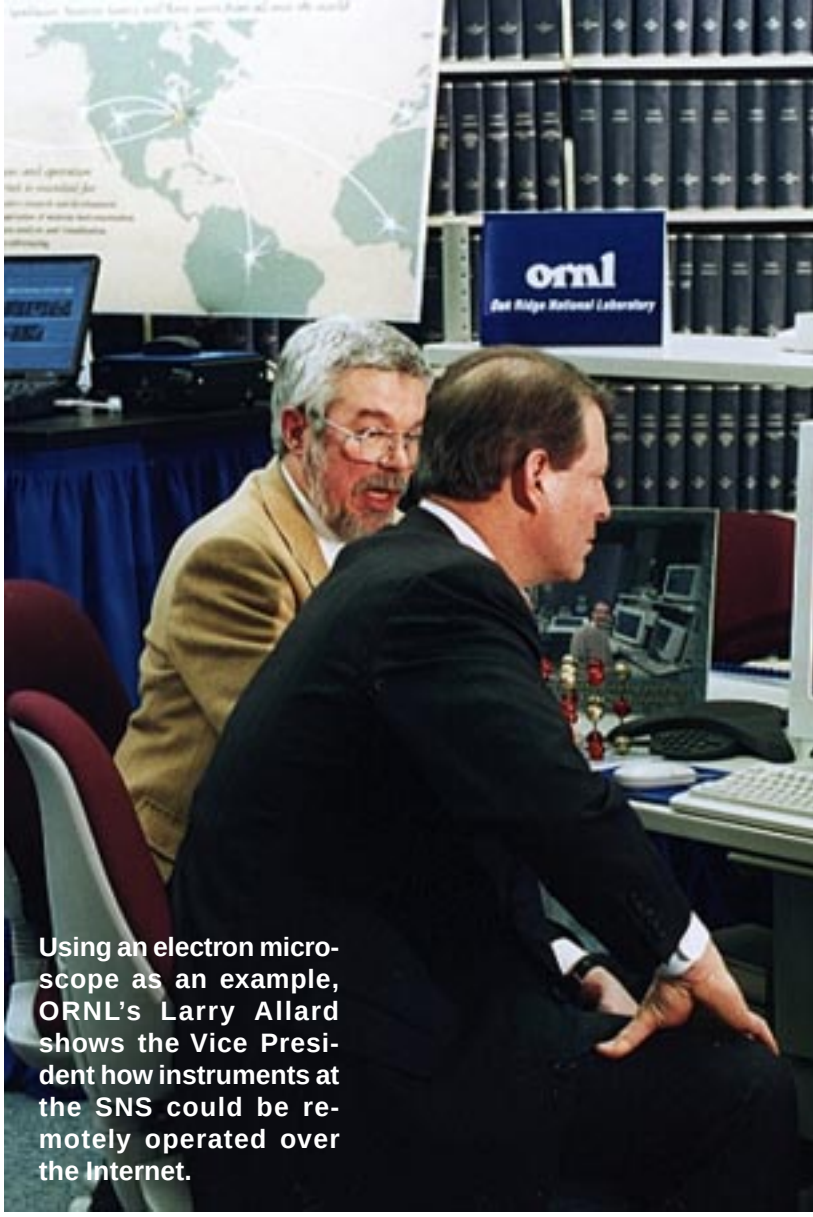
Vice President Al Gore's January 21, 1998, announcement about the Clinton administration's support for the Spallation Neutron Source (SNS) is received enthusiastically by, from left, Federico Peña, then Secretary of Energy; ORNL Director Al Trivelpiece; Tennessee Governor Don Sundquist; and William F. Brinkman, executive director of the Physical Sciences Research Division, Bell Labs, Lucent Technologies. *Photograph by Tom Cerniglio.*

atory—1997

Opportunities and Challenges

ORNL's Herb Mook explains the value of neutron scattering to Vice President Al Gore.

ORNL Director Al Trivelpiece (second from left) shakes hands with Vice President Al Gore, who visited the Laboratory to announce the Clinton administration's proposal of $157 million for new construction funds for the SNS. Also present were Jim Hall (left), manager of DOE's Oak Ridge Operations; Bill Appleton, ORNL associate director for the SNS; and Knox County Executive Tommy Schumpert. ***Photographs by Tom Cerniglio.***



Using an electron microscope as an example, ORNL's Larry Allard shows the Vice President how instruments at the SNS could be remotely operated over the Internet.

The opportunity for us is that the SNS is in the President's budget, and the challenge is to have favorable congressional action approving the project.

First, I would like to recognize Jim Hall, manager of the Department of Energy's Oak Ridge Operations Office, and to congratulate him on receiving a Presidential Rank Award for Meritorious Executives. In the past, I have been involved in the process of selecting winners for these awards. This is quite an honor, and it is given to only a few federal employees. The award includes a bonus for $10,000. Jim, when can we do lunch?

Second, I would like to recognize and congratulate Audrey Stevens, who was recently elected to the National Academy of Sciences. This is a singular honor that recognizes outstanding accomplishments.

Last year's State-of-the-Lab talk was given on June 12, so this is only an 11-month year. My talk will not be correspondingly shortened. A lot has happened in these last 11 months. I could devote the whole talk to describing the events of last year. However, I am not going to do that, but rather I am going to talk about some of the challenges that we face this next year, and I am going to talk about how we might take better advantage of the opportunities that are available to us. Even so, there are a few events from this past year that do seem worthy of some mention.

First and foremost was the announcement by Vice President Al Gore during his visit here on January 21, 1998, that President Clinton's FY 1999 budget would include a request for $157 million to initiate construction of the Spallation Neutron Source at Oak Ridge National Laboratory.

However, it is also important to remember that just because the President requests something doesn't mean that Congress is going to approve his request. The opportunity for us is that the SNS is in the President's budget, and the challenge is to have favorable congressional action approving the project.

Since the announcement that the funding to begin construction of the SNS would be in the President's budget was a pivotal

Vice President Al Gore hears from ORNL's Michael Wright how science can be conducted from a distance using computers and high-speed links between geographically separated laboratories.

event in ORNL's history, I would like to review a few of the events leading up to the moment of the Vice President's announcement.

Once upon a time, in a galaxy far far away, there was an Advanced Neutron Source project. Funding had been requested for this project in both 1994 and 1995. Congress did not approve funding for the ANS. The question was, should funding be requested a third time, or was our situation like the classic statement about drowning? Namely, if you go down for the third time, it's all over. In November 1994, we were given the opportunity to have the ANS put into the budget one more time. It was painfully clear that Congress was unlikely to approve such a request. At this same time, we were given less than one day to decide to stay with the ANS or to abandon it and switch to a Spallation Neutron Source. This was a difficult choice. After all, Congress might not approve initial funding for a Spallation Neutron Source at a level that would even permit doing a conceptual design for such a facility. Should we abandon the ANS or not? That was the question.

Our situation was somewhat like that of the worker on an oil platform in the North Sea that was on fire and about to explode. He was trapped out on the rig in a place that was over 100 feet above water. If he jumped and survived the fall, he was likely to die from hypothermia in just a few minutes. No rescue boat was in sight and he wasn't wearing flotation gear. Worse, there was a flaming oil slick on the water below him and a lot of debris floating in it. So even if he survived the fall, and didn't hit any debris, and didn't get burned in the oil fire, he still faced hypothermia. He jumped! It turns out that he was quickly rescued by the crew of a nearby boat, so he was one of the few survivors of this disaster. When asked later why he jumped, he said that if he had stayed on the platform, he faced certain death, but if he jumped, he faced only probable death. Well, if we had stayed with the ANS, it was certain death, but if we jumped to the SNS, it was only probable death. We jumped!

We had to start over and put together a team to prepare a new conceptual design report for a Spallation Neutron Source.

There was no rescue boat to pick us out of the cold water. We had to start over and put together a team to prepare a new conceptual design report for a Spallation Neutron Source. It was necessary to develop a new approach to building such a facility, because we didn't have the in-house experience in building accelerators of the sort needed for a spallation source. We had to defend ourselves against some of the other national labs that believed that they should have been selected to be the site for the SNS. Switching from the ANS to the SNS was not easy, but what is important is how we

responded to this new opportunity that came wrapped in a large challenge.

I am pleased and proud of the way that everyone involved quickly overcame his or her intense personal disappointment over the termination of the ANS and turned to the task of working on the SNS. A conceptual design report was prepared and defended. Without a suitable conceptual design, there couldn't be any administration support. It was also essential that a sound management plan be developed and accepted. None of these tasks was easy, there wasn't much time to get them done, and there certainly was not enough money to do them.

As I look back over time since we had to make that quick switch from the ANS to the SNS, I cannot help but admire the outstanding job Bill Appleton has done in leading this effort. He has worked hard and made many personal sacrifices to bring about the technical and managerial results that provided the Clinton administration with the confidence that a facility like the SNS can be built on schedule within cost—and that it will do what it is supposed to.

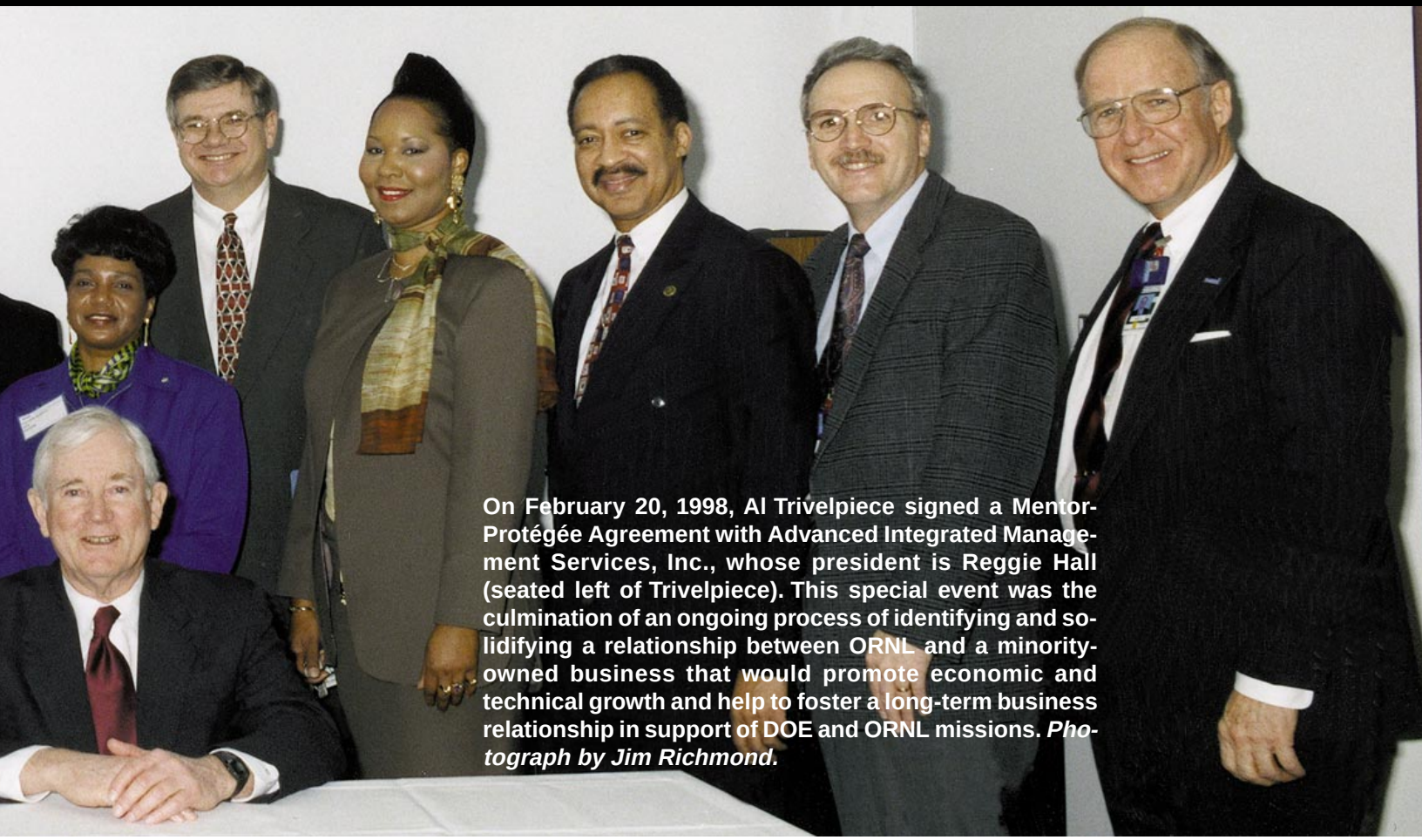
Without such solid hard work, it would not have been possible for Vice President Gore to have the opportunity to come here and announce that the SNS would be in President Clinton's FY 99 budget. Without such solid hard work, we would not have the essential support of the Department of Energy. Without such solid hard work, we would not have the $8 million pledged by Governor Sundquist as a cost-sharing contribution by the state of Tennessee for the SNS. These funds will build a much-needed facility near the SNS site to house the Joint Institute for Neutron Sciences. Without such solid hard work, it would not be possible to hope for the support of this project by the Congress.

I believe that we are executing our work much better now, but we have to be still more competitive as a national laboratory.

We still have a long way to go this year before we might have congressional approval for the SNS. There is no guarantee that such approval will occur and that funds will be appropriated to start the SNS. Fortunately, members of the Tennessee delegation have been very supportive of the SNS project. Without their help, it is unlikely that the SNS would be approved in the Congress. Therefore, I was really pleased that Congressmen Jimmy Duncan, Harold Ford, Jr., Bart Gordon, and Zach Wamp showed their support for the SNS by coming to ORNL with the Vice President when he made his announcement.

Without Bill Appleton's efforts, we would not have the unique arrangement for designing and building the SNS through a collaboration with four other national laboratories. They are Argonne National Laboratory, Lawrence Berkeley National Laboratory, Brookhaven National Laboratory, and Los Alamos National Laboratory. Obviously, a lot of people have helped Bill along the way and they deserve a fair share of credit for what they have accomplished. Even so, as I see it, Bill deserves our special thanks for the pivotal role that he has played in getting us from the ANS to the SNS. Please join me in thanking Bill.

Over the years I have had the privilege of assisting in making arrangements for several visits for appointed or elected officials to various places. Each such visit has its own special opportunities and challenges. A visit by the President or the Vice President presents an enriched opportunity for something to go terribly wrong and an enlarged chal-



On February 20, 1998, Al Trivelpiece signed a Mentor-Protégée Agreement with Advanced Integrated Management Services, Inc., whose president is Reggie Hall (seated left of Trivelpiece). This special event was the culmination of an ongoing process of identifying and solidifying a relationship between ORNL and a minority-owned business that would promote economic and technical growth and help to foster a long-term business relationship in support of DOE and ORNL missions. *Photograph by Jim Richmond.*

lenge to get it done right. It is necessary to be able to work with elected officials, the Secret Service, the advance team, speechwriters, special guests, dignitaries, caterers, painters, guards, and many others. Of all of these kinds of events that I have been involved in, the visit by the Vice President to ORNL was by far the best organized and executed. It couldn't have gone better. At the middle of it all was our own protocol officer, Nancy Gray. Nancy did an outstanding job of getting it all done with skill and grace under fire. Please join me in thanking Nancy.

I know that many of you were inconvenienced by the events leading up to the Vice President's visit. If you stood still anywhere in or near Building 4500 North for more than a few minutes, you were painted, swept, replaced, mopped, or mowed. I want to again thank all of you who did such a great job of painting, sweeping, replacing, mopping, and mowing to get the Lab in shape to receive our guests properly.

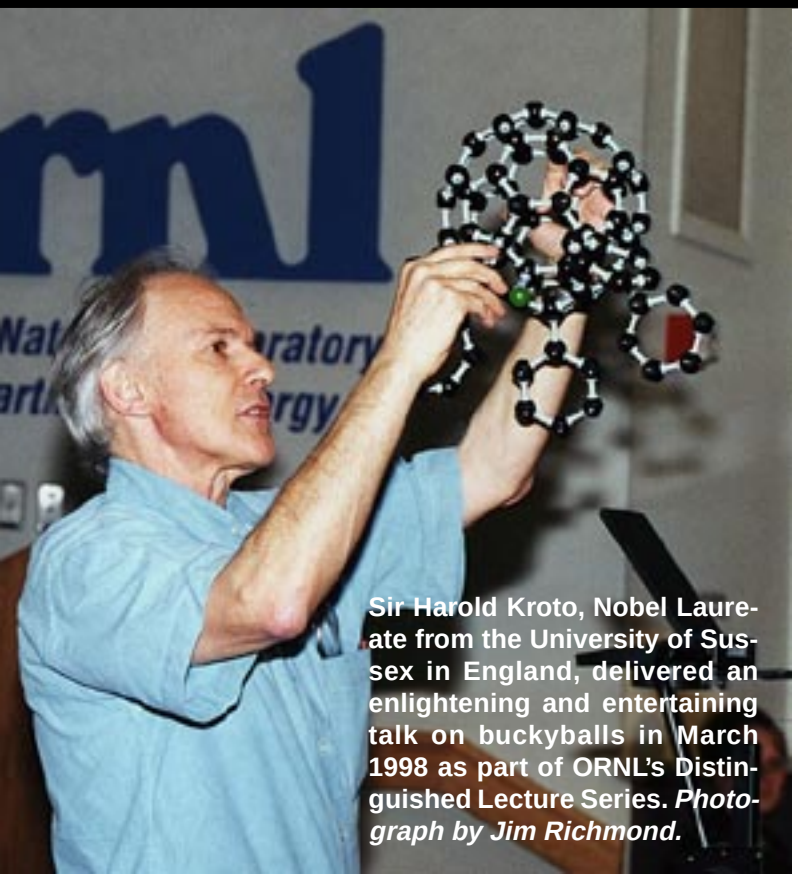
Why have I spent so much time talking about the Spallation Neutron Source Project? True, it is a large project and it certainly is important to the Lab's future. But this is not the reason. I want to use it as an example of what it means to be competitive. I am sure that all of you know the line from William Shakespeare's Julius Caesar. No, not, "Et tu Brute," but rather, "The fault, dear Brutus, is not in our stars, but in ourselves, that we are underlings."

To me this is the essence of being competitive. That is, not to blame something or someone else for the fact that you didn't get what you believed was due you because of your good looks, or the pivotal role that your institution played in the development of atomic weapons in World War II. Perhaps you didn't train hard enough to run fast enough to win the foot race. Perhaps your otherwise stellar proposal that didn't get funded contains an unfortunate number of avoidable spelling errors. You didn't get the job because. . . I will let you complete the list of reasons for failure from your own experiences. I always favored "the dog ate my homework." I guess the more modern version is "my hard disk crashed."

ORNL will be the first national laboratory to give scientists and engineers the kind of financial tools that will permit more effective management of R&D programs.

Because we have separated from Lockheed Martin Energy Systems (LMES), we no longer have the excuse that their business rules prevent us from doing whatever. After all, the rules we must follow are now our business rules. If they don't enhance our ability to compete, we should change them. That takes time and work, but it is not impossible. From time to time I hear that the weapons labs have an unfair advantage. That's true, but so what. I also hear that New Mexico has an unfair advantage because of its congressional delegation. Maybe, maybe not. If the SNS team had allowed themselves to consider the odds against getting as far as they have, they might well have just given up. They didn't. Their aggressive and competitive spirit should be more widespread at ORNL.

Right now we have a wonderful new opportunity with the Strategic Simulation Initiative (SSI). Earlier, the DOE weapons labs initiated an Accelerated Strategic Computing Initiative (ASCI) as part of their Science-Based Stockpile Stewardship program. DOE Under Secretary Ernie Moniz has decided to use the ASCI program



Sir Harold Kroto, Nobel Laureate from the University of Sussex in England, delivered an enlightening and entertaining talk on buckyballs in March 1998 as part of ORNL's Distinguished Lecture Series. *Photograph by Jim Richmond.*

Trivelpiece congratulates Marilyn Lloyd during the dedication of the Marilyn Lloyd Environmental and Life Sciences Complex. *Photograph by Manuel Gillispie.*

as a springboard to launch the SSI on a department-wide basis. Workshops were held to determine which technical areas would benefit from a major thrust to establish computing capability at the level of 30 to 100 teraops (trillions of arithmetic calculations per second). It was decided that the understanding of what influences climate change was a worthy subject. It was agreed that research into combustion using such computers could make a difference in emissions from internal combustion engines. It was proposed that the ability to design materials and to make progress in other scientific and technical fields are worthwhile goals. All of this is directed toward proposing that an element be added to the Department's FY 2000 budget to accomplish these goals. This would be a several-hundred-million-dollar program, if it materializes. That means submitting the request to the Department's budget by this June or July. All of this SSI effort is then directed ultimately at the President's signing the appropriation bills that would support such work into law in October 1999. A lot has to happen between now and then.

To get started on this effort, Under Secretary Moniz invited all of the directors of the Department's labs to a one-day meeting in Washington a few weeks ago. The SSI was discussed, and a program that would seek to make it happen was laid out. Martha Krebs, director of DOE's Office of Energy Research, and I were asked to chair a group that was assigned the responsibility of setting up an outreach program. This may involve having a conference in Washington in the near future. It will be a challenge to get this done. Are the chances that this initiative will lead to new DOE programs good? Maybe. We will not know if we don't try. Ed Oliver, our associate director for Computing, Robotics and Education, is on detail to the Office of Energy Research for a few months to help make this happen.

I am more optimistic this year than last about the future of the Lab.

When I hear how Sandia National Laboratories does as well as it does because of its political support, I have to smile. They write excellent proposals, they do a good job of marketing them, and they have a good sense of which areas might be in line for increased support by the government. Perhaps some of their success is related to the fact that they have more than 100 members of their staff in Washington on detail working in virtually every agency of our government. We are doing better in this regard, but we need a lot more people

Robert J. Stevens (right), president of the Lockheed Martin Energy and Environment Sector, chats with ORNL's Mark Spann. *Photograph by Jim Richmond.*

I believe that new opportunities for funding in areas where ORNL could be expected to compete will increase. Our challenge is to find out where that funding is going to appear and then to write winning proposals.

like Ed Oliver working to make programs like the SSI come into being. We then need to write proposals that compete with places like Sandia. Now is the time to start writing proposals for the SSI, not a year from now. I have noticed a tendency here to wait until the money is in the budget and then assume that we will get a fair share. This may have worked in the past, but it sure doesn't seem to work too well today. I don't want to belabor the point and maybe I already have, but I want to make it clear that nobody is going to give us anything. We (you) have to write proposals that compete with those written by university faculty members. In fact, they have to be better proposals because there is a bias in funding agencies in favor of universities. Now that ought to get a rise out of somebody.

Last summer, President Clinton challenged his Cabinet to provide him with some information on what could be done to reduce greenhouse gas emissions. Secretary Peña in turn asked the directors of the Department's laboratories to conduct a study and write a report on this subject. Dick Truly, director of the National Renewable Energy Laboratory, and I were asked to lead this effort. We in turn asked Stan Bull and Dave Reichle to do the heavy lifting on this project. This effort involved coordinating the activities of nearly 200 scientists and engineers from 11 national labs. Dave was heard to mumble something about herding cats on horseback a few times. The report, which is widely known as the 11-Lab Study, is correctly titled Technology Opportunities for the Reduction of Greenhouse Gas Emissions. This report will not necessarily result in new opportunities for projects or programs at ORNL. However, if its recommendations are adopted, it should result in some research and development (R&D) programs in areas where ORNL should be able to compete. The challenge is to take the next steps that will cause programs to materialize. Dave and Stan did an outstanding job. This is the kind of activity that more members of our scientific and technical staff need to participate in if we and the other labs are to prosper.

Members of the Laboratory staff received directly or shared nine R&D 100 Awards in 1997 from *R&D* magazine. This is a record for ORNL, and the number of awards we won was more than any other DOE lab received. I took good advantage of the bragging rights the nine R&D 100 Awards gave us over some of our sister labs.

We also paused for a moment to thank our former Third District Representative, Marilyn Lloyd, by designating the west end of the Lab as the "Marilyn Lloyd Environmental and Life Sciences Complex." This is a well-deserved recognition for someone who has given much to ORNL and who continues to support our goals and objectives.

Professor John L. Finney, Quain Professor of Physics at University College in London, was hosted by Bill Appleton, ORNL associate director for the Spallation Neutron Source. Finney gave a talk at ORNL on scientific research that would be possible if the proposed European Spallation Source is built. *Photograph by Curtis Boles.*

A conference on "Partnering for Functional Genomics Research," organized by ORNL, the University of Tennessee at Knoxville, and the Gene Research Access Corporation (GENRAC), was held at Pollard Auditorium. About 15 companies accepted the invitation to attend. It was a good event that resulted in the establishment of good contacts that may lead to some new opportunities for research on functional genomics. I also believe that we are on the path to a new facility for the mouse colony.

Together with the University of Tennessee we are working to bring into being a transportation research center to be located on Pellissippi Parkway. Secretary Peña presented a check for $870,000 during the Knoxville Summit to help get this project under way.

I would like to remind you that it was just a little over two years ago that ORNL was separated from LMES and that we were allowed to have a separate corporate structure better suited to our needs and functions. This was a great opportunity, and you have done much to take advantage of it. However, much remains to be done. Al Narath retired this year as the president of the Lockheed Martin Energy and Environment Sector, and Bob Stevens replaced him. These corporate comings and goings may not seem to have much direct influence on our daily activities, but they do have a major effect on the more global aspects of our activities. It was Al Narath who sought and obtained Department of Energy approval to have ORNL separated from LMES. Lockheed Martin Corporation has played an essential, but nearly invisible, role in the efforts that have resulted in the SNS being in the budget. Events such as the visit to Oak Ridge by Senator Pete Domenici and Senator Bill Frist don't just happen. Their visit was one of the keys to the SNS. That visit would not have occurred without Lockheed Martin help. I am pleased that Bob Stevens is following the same supportive approach for ORNL that Al Narath started. Narath will continue to serve as chairman of Lockheed Martin Energy Research Corporation's Board of Directors.

I am also pleased that Lockheed Martin continues to emphasize ethical behavior among its most important corporate goals. This year again, all of the nearly 200,000 Lockheed Martin employees will receive ethics training either from or with their direct supervisor. This is an important function. I have seen several companies nearly go bankrupt for failure to adhere to the highest ethical standards of behavior. Please take

One of our main challenges remains recruiting and retaining excellent scientists and engineers.

Clockwise: in 1998 Audrey Stevens was elected a member of the National Academy of Sciences for identifying and characterizing eight proteins. In 1997 David E. Newman and David J. Dean each received a Presidential Early Career Award for Scientists and Engineers. Jonathan Woodward received the Christopher Columbus Fellowship Foundation's $100,000 award for his new procedure that uses enzymes to produce hydrogen gas from simple sugars. Rodney McKee received a NOVA Award for Technical Excellence from Lockheed Martin Corporation in 1997 for the development of a transistor that will allow computer memory chips to hold more information and enable users to read and write on them faster. The development of short superconducting tapes using textured substrates received a NOVA Award for Teamwork from Lockheed Martin Corporation in 1997. Team representatives who were honored were, from left, Mariappan Paranthaman, Dave Christen, and Don Kroeger.

your ethics training seriously. I do. In addition, Lockheed Martin conducts an ethics survey every few years to provide us some information on how we do in this area with respect to other Lockheed Martin organizations. The ethics survey reveals some areas where we need to better understand what the answers mean and to take appropriate action.

It was this separation from LMES that gave us the chance to have a reengineering program. It has not gone as fast in producing results as many of you would like, or me either for that matter, but I would remind you we have only been at this for a little over two years. Other organizations with resources and flexibility that greatly exceed ours take many years to complete their programs. The new SAP accounting system is expected to be in operation in October 1998. With it, ORNL will be the first national laboratory to have put into the hands of its scientists and engineers the kind of financial tools that will permit more effective and efficient management of research and development programs. This should make you more competitive. It is a good opportunity. Your challenge is to take advantage of it.

Yevgeni P. Velikhov, president of the Kurchatov Institute in Russia, gave a talk on the future of energy development in February 1998 as an ORNL Distinguished Lecture.

The various human resources reengineering projects are doing well. There is a lot of work yet to do, and some of these activities take more time. Even so, the new approach to salary administration is providing many of you with better tools with which to run your programs.

One of our main challenges remains recruiting and retaining excellent scientists and engineers and all of the other talented people it takes to make a national laboratory. We need to do this in a way that recognizes the need to be a diverse organization. We need to do this during a period of great uncertainty as we adjust to working with Bechtel Jacobs.

Last year I mentioned that Richard Genung had volunteered to set up a program called Leadership ORNL. It is modeled after community leadership programs. This activity is going well.

There are many other subjects that I might have discussed today, but none of them would have changed my principal conclusions about the state of our Laboratory. Namely, that in spite of all of the uncertainties that we face, I am more optimistic this year than last about the future of the Lab. I believe that new opportunities for funding in areas where ORNL could be expected to compete will increase. Our challenge is to find out where that funding is going to appear and then to write winning proposals. For those that we win, we need to perform the work in an excellent and cost-effective manner. I believe that we are executing our work much better now, but we have to be still more competitive as a national laboratory. I look forward to being able to tell you next year about the progress that has been made on constructing the SNS.

♦ AWARDS ♦

Trivelpiece Presents Laboratory Director's Awards

The ORNL Award of Excellence in Environment, Safety, and Health recognizes distinguished and outstanding performance in the area of environment, safety, and health (ES&H) by any ORNL division or program during the previous calendar year. By giving this award, we emphasize the importance that ORNL places on this area of our activities. This year's award goes to the Chemical and Analytical Sciences Division.

The citation reads: "For exemplary teaming to achieve sustained superior ES&H performance, for an effective self-assessment program, for cost-effective pollution prevention initiatives, and for leadership in Laboratory-wide ES&H activities." Accepting the award was Marvin Poutsma, division director.

The ORNL Award of Excellence in Operations and Support recognizes distinguished and outstanding performance by an operations and support division or program during the previous calendar year. By giving this award, we emphasize the importance that ORNL places on providing the kind of service that will make us more competitive. This year's award goes to the Technical Support Section of the Instrumentation and Controls Division.

The citation reads: "For outstanding and dependable maintenance of the Laboratory's electronic instruments, for recognized customer service and satisfaction, for dedication to quality and efficiency, and for contributing as integral team members to ORNL's research teams." Accepting the award were Dan McDonald, division director, and Richard Hess, section head.

The ORNL Award of Excellence in Research and Development recognizes distinguished and outstanding performance by a research and development division or program during the previous calendar year. By giving this award, we emphasize the importance that ORNL places on excellence in research and development, which is at the core of our reason for existence. This year's award goes to the Metals and Ceramics Division.

The citation reads: "For recognized leadership in materials R&D at ORNL, in the United States, and in the international community, and for outstanding leadership within ORNL in the areas of reengineering, cost-effectiveness, ESH&Q, and work force diversity." Accepting the award was Linda Horton, deputy director of the division.

On October 10, 1997, ORNL dedicated the Marilyn Lloyd Environmental and Life Sciences Complex. The complex is named in honor of retired U.S. Representative Marilyn Lloyd, who served Tennessee's 3rd District, which includes Oak Ridge. Among the dignitaries participating in the dedication ceremony are, from left, Trivelpiece; U.S. Representative Jimmy Duncan of Tennessee's 2nd District; ORNL's Liane Russell, senior corporate fellow in the Life Sciences Division; Martha Krebs, director of DOE's Office of Energy Research; former Tennessee Representative Marilyn Lloyd; U.S. Representative Zach Wamp of Tennessee's 3rd District; Herman Postma, former ORNL director; and Gordon Fee, former president of Lockheed Martin Energy Systems. *Photograph by Curtis Boles.*