

Los Alamos Director Talks About Security Problems, Morale, and Recruiting Young Scientists at Lab

In November 1997, John C. Browne became director of the Los Alamos National Laboratory, the first and best known of the nation's three nuclear weapons labs. As the sixth director of Los Alamos, Browne succeeded Siegfried (Sig) Hecker, who had served in the top job for 12 years—a period that spanned the collapse of the Soviet Union and the end of the cold war, the ban on nuclear testing, and major reductions in surplus nuclear weapons under START I.

While these events altered Los Alamos's mission in fundamental ways, Browne's arrival heralded even more sweeping changes. The lab was designated the crown jewel of the new stockpile stewardship and management program that would ensure the safety and reliability of the US nuclear arsenal without weapons tests. Stockpile stewardship introduced new challenges that the nuclear weapons labs hadn't had time, money, or people enough to attack in the past, when the compelling priority was to produce more, and more effective, nukes. With no tests and no new designs, the labs were to apply scientific research to understand the materials and components of the weapons and to simulate processes and tests by computer graphics and laboratory experiments.

At 57, just one year older than Los Alamos itself, Browne is the lab's first director to operate without an arms race. Affable and approachable, he was chosen as the right individual to make the pitch to the Department of Energy and Congress for more funds to run the lab in the stewardship era, even as the number of weapons decreased, and to recruit the best and brightest young scientists and engineers to replace the aging weapons experts. At his first meeting with New Mexico's news media, Browne described stockpile stewardship functioning under the comprehensive test ban treaty as "a really grand scientific challenge," principally because it requires the directors of all three weapons labs to certify the safety, reliability, and performance of a complex product without ever testing it. Though Browne tried to interest the local press with the lab's dedication to research in human genetics, biotechnology, and nonproliferation matters, the reporters showed disinterest. The questions to Browne dealt mainly

with issues of worker safety, community outreach, and management changes.

For the past year, however, Browne has been weighed down with other topics—especially, sensational allegations of espionage and heavy-handed security procedures. These issues and their ramifications were discussed by Browne during an interview with PHYSICS TODAY's Irwin Goodwin at the lab's office in Washington on 16 December. Following is the edited text of that conversation:

Q *Your position at Los Alamos placed you in the thick of the Wen Ho Lee affair even before the allegations that he had mishandled highly classified computer data about nuclear weapons came to the attention of Congress, the news media, and the wider public. What are your views of this extremely puzzling case?*

A I have to be careful of what I say because I've been a party to Justice Department discussions of the case, and some of our people were involved in the technical development of evidence. I think it's important that we [the country] get to the bottom of what Lee did or didn't do. My reasons for saying this are that, first of all, to be fair to Lee, he needs to get his day in court rather than to be the target of innuendo and inference. And, second, an open trial will give the country and the rest of the world a fair way of determining exactly what Lee has been charged with doing. Not only will justice be served by Lee's trial, but justice must be seen by everyone to be achieved. Lee needs a chance to say, "Here's why I'm innocent." For its part, the government will say why the charges are so serious that it's willing to go forward with an indictment that could lead to a long jail sentence. Many people at our laboratory are concerned that what Lee did was inadvertent, a mistake, and not meant to harm the United States, but others believe differently—that he knowingly violated national security. So the outstanding questions about what Lee did or didn't do need to be resolved. Neither the questions, nor Lee, can be left in limbo.

Q *Are Lee's actions very different from what John Deutch of MIT did in downloading classified information at the Central Intelligence Agency?*

A I don't know exactly what John Deutch did or didn't do, so I can't comment on that.

Q *Lee is accused of shifting top-secret information on the development, design, and tests of US nuclear weapons into a computer network at Los Alamos that is accessible to the outside world, possibly even to hackers. Lee contends that he is innocent, that he did not turn over the data to anyone else, certainly not to anyone representing China.*

A I think the ball is in Lee's court to address the issues as presented by the prosecution and the charges in his indictment. The big question mark punctuates what we all need to know: Exactly what did Lee do, and if he did what he is accused of doing, why did it happen? When the case comes to court, the Justice Department will have to provide the evidence, and Lee will need to respond.

Q *The big issue of espionage is not part of the 59-count indictment. Spying is difficult to prove without witnesses or confessions, and presumably there is no hard evidence that Lee was, in fact, gathering information about nuclear weapons to pass along to China or some other country.*

A He has not been charged with espionage. But we need to know and understand exactly what happened.

Q *Possibly because of the hysteria created by the accusations and publicity over the Lee case, there have been statements about low morale at Los Alamos. In fact, morale throughout the nuclear weapons complex appears to have been affected. In his recent report on the complex, Ernest Moniz (undersecretary of DOE) discusses the problems of morale and recruitment. At one point, Moniz speaks of the "urgent need to reestablish the compact and trust between the laboratories and DOE to address these issues." And he goes on to say, "It is absolutely crucial that the scientific excellence at the laboratories be maintained in order for the stockpile stewardship program to succeed both now and into the future." Has Moniz touched a raw nerve here?*

A Yes, he has. The morale in our lab is not terrible, but it's not where it should be or where it has been in the past. The reason I say it's not terrible now is that some things have happened in the last few weeks

that have helped to improve morale. I think Secretary Richardson's statements about polygraph testing—that he's going to reduce the number of people who will be asked to take the tests from, perhaps, 5000 to some 800—has made a difference. Many people at the labs are convinced that polygraphs are not a good method to determine whether or not they are trustworthy.

Q *In our society today, it's not far-fetched to say that the use of polygraphs create the impression of an inquisition. I'm sure you have heard the arguments of some that the purpose of the tests is not to determine whether scientists had compromised sensitive information but to terrorize them.*

A I think there's a proper use for polygraphs. From what I have learned from counterintelligence people I've dealt with, if polygraphs are used in combination with other evidence that lead the investigators to suspect somebody of doing something wrong, they are a good tool because they focus on the problem. But as a way of screening people, they are not very successful, because there are too many other factors that could upset the results.

Q *Could polygraph tests be likened to the College Board exams—that is, the numbers provide information for judging whether to admit a student to a college or university, but only in conjunction with additional factors that are weighed in determining to accept or reject a student?*

A There are too many uncertainties about the use of polygraph tests. What if the test is taken several times, and the subject never passes? Does that mean a career is over, even though there is no evidence that the respondent has done anything wrong? The possibility of false positives and other anomalies has led a lot of people in the department to conclude that polygraphs ought to focus on those scientists and engineers with the highest level of clearance and those who are willing to take the test because of their access to certain kinds of information. But polygraphs ought not to be a general condition of employment. When the tests were first announced by the secretary, many people thought that was the purpose of polygraphs. Secretary Richardson has announced his intention to request a National Academy of Sciences review of the validity of polygraphs for screening people.



BROWNE: Managing a brave new era at Los Alamos.

Q *Are there indications that Richardson's clarification of the tests has changed the mood at the labs?*

A I think there are people who still want to see how the tests are going to be implemented, but for the vast majority the anxiety level has dropped a notch. Public hearings on polygraphs have been held at all the labs. I have told those who spoke, both current employees and retirees, that their arguments were impressive—passionate at times, always thoughtful and intelligent, sometimes confrontational, sometimes humorous. All the concerns seemed to stem from two underlying themes: trust and the scientific validity of the polygraph. Many said that the proposed polygraph tests suggest the government's lack of trust in people who have dedicated their careers to the security of our country and who have already undergone invasive and thorough background investigations. Some of the statements indicated a lack of trust in the government's ability to prevent official misuse of the test results and to protect people from leaks of the results to third parties. In this connection, I've made it clear that I have stated publicly to the department, the University of California [which operates the labs under contract with DOE], and the Congress that in spite of the allegations of lax security, I trust our employees with protecting the nation's secrets. After all, they created the secrets that we all want to protect. Our employees are loyal and dedicated to this nation's security.

Q *Has morale also been affected adversely by prohibitions on foreign scientists at the labs?*

A Secretary Richardson has stated that he would sign off on waivers

for foreign visitors from sensitive countries to come to the laboratory and that he would seek an end to the moratorium on foreign scientists visiting DOE labs early in the year. The secretary has emphasized the need to restore a balance between science and security at the labs. That reassured many people, especially the foreign postdocs, and helped to raise morale.

Q *The balance Richardson speaks of was upset by Congress in its frenzy over allegations of China's espionage activities. Aren't many of the foreign postdocs from China and India?*

A Our postdocs come from many countries, including China and India, and of course the United States. One of our concerns is that the foreign postdocs will stop coming. We hadn't seen any indication of that before the Wen Ho Lee case broke in the papers. In the last few months, however, applications by Chinese and Indian postdocs have dropped off precipitously. That surprised me because in earlier months we hadn't seen any dramatic change. It may be a statistical fluctuation, of course, but in December we selected some very distinguished postdocs for the Oppenheimer Fellowship, the Reines Fellowship, and the Feynman Fellowship. The best young scientists vie for those fellowships. And in recent years, because of the quality of foreign born scientists in the United States, there's been a heated competition for those fellowships. This year, there were a few foreign born but none from any of the sensitive countries. And there were no Russians in the bunch.

Q *That suggests that the political and public crossfire over spying allegations has already taken a toll on foreign scientists. Are Russian scientists among the casualties?*

A Somewhat. Some Russians who indicated their intention to stay in this country have left over the Lee issue and the atmosphere it generated. One of our most highly regarded young Russian mechanical engineers, who had been part of a nonclassified team studying turbulence in soap films and other nonlinear phenomena, left for an academic post at the University of New Mexico. We had wanted to hire him for a permanent slot at the lab. He still stays in touch with people at Los Alamos, but he was very outspoken about the current atmosphere being wrong for him.

Q We've been talking about the troubles wrought by the allegations of espionage, but the issue has also led the department to examine the defense labs more closely. The Moniz report is most likely to have a positive effect.

A The 30-day study on stockpile stewardship, ordered by the secretary, given that it was done by a small group led by Ernie, is remarkable. The findings are very consistent with our own feelings about the need to maintain the balance in the program between basic science and the needs of the Department of Defense and weapons manufacturing. Questions have been raised about the new National Nuclear Security Agency and whether its semi-independence from DOE might isolate the weapons laboratories from the rest of the scientific enterprise—the other DOE laboratories and the indispensable links with Office of Science programs and the academic and industrial communities. This is a disturbing issue. Congress came to grips with it by writing into the law creating the DOE–NNSA structure that the weapons labs would have a role in science and technology in support of DOE and other agencies. How well this works in the long run depends on a shared vision of the mission by Congress, DOE, NNSA, and the labs. We have emphasized to members of Congress our concern about maintaining our basic science activities. Ernie makes a point of this in his report. And he speaks about restoring the funding cut that Congress made in laboratory-directed R&D. It was reduced by Congress in fiscal 2000 from 6% of our budget to 4%. The 30-day study states that we need to do the underlying science for stockpile stewardship and to maintain overall scientific excellence.

Q In Moniz's report, there is a statement that the weapons program is under pressure, that it's "wound too tight." What does that mean?

A It refers to the large number of expectations in a program funded with \$4.4 billion in fiscal 2000. That is a huge amount of money, but it is inadequate to accomplish all we're expected to do—the remanufacture and replacement of components in the weapons stockpile, as well as the development of longer term science capabilities we will need for certifying the stockpile without nuclear testing some 10 or 20 years hence. It's not just dollars but also priorities. We need a sustained commitment to the long-term research. Ernie's report states that many of the changes made

in the stockpile in the last few years were based on the research that was done at the labs over decades.

Q Isn't there a related long-term question—the support of stockpile stewardship, a nuclear deterrence, in the distant future, say 25 or 50 years from now?

A I think there will be a serious debate about this in the coming decade. Washington has supported stockpile stewardship thus far. But how long will that support go on? Stockpile stewardship is the only approach we have without testing, and the program is working. The challenge for the Department of Defense, the Department of Energy, and the Congress is to define what nuclear deterrence will mean in the future. How many weapons of what type will be needed? How will that be supported? Can we remanufacture and certify pits for the weapons without testing? Do we understand the aging process of plutonium? How do we go about developing a set of reliable metrics to underpin the certification procedure? What should we do about our aging facilities—the Y12 plant at Oak Ridge National Laboratory, some decrepit buildings at Los Alamos, and so on?

Q Those are all stunning questions. The issue of metrics for certifying the weapons is certainly challenging.

A The first few years of the certification process has relied on the judgment of experienced old hands in the game. The worry is that people unfamiliar with previous tests of weapons in the stockpile will get called upon to certify the safety and reliability of those weapons 10 or 20 years from now, without nuclear testing, and without adequate tools and metrics for success. That's why we need to have metrics, if for no other reason than to assign a level of uncertainty to the weapons. If we are able to demonstrate over what range certain parameters are important, both from the history of tests and from the physics we understand, then we will be in a better position to say, here are the weapons we are confident will behave in a certain way and the probability is very high that they will work. If we are outside that realm, we will be less confident that the system will work in a certain way. The challenge before us is similar to putting a man on the Moon. Well, we did that!

Q Did the stockpile stewardship program suffer a setback when the Senate failed to ratify the Comprehensive Test Ban Treaty last fall?

A In the CTBT hearings, senators heard what they wanted to hear—that the program has not advanced enough to accept the treaty. The laboratory directors didn't say that. We said stockpile stewardship is working and that it will continue to improve every year. Progress in the program has given us and the secretaries of energy and defense, enough confidence to certify, for the fourth year in a row, that the nuclear stockpile is safe and reliable.

Q Even after the four other major nuclear powers (Russia, China, Britain, and France) ratified the treaty, there were senators who claimed it was technically flawed and, therefore, needed more debate before they could endorse it.

A To me, it is clear that although the danger of a massive nuclear exchange is greatly diminished today, global security is still threatened. So nuclear deterrence will remain essential to the defense of this country and its allies for the foreseeable future. I must add here that the US has the safest, most reliable, and most capable nuclear deterrent in the world. How do the lab directors determine this? Each year, we remove 11 nuclear weapons from each of our stockpile systems for examination. We inspect each weapon for signs of aging or other problems. If any doubts turn up, we conduct laboratory experiments. We also do computer simulations to determine if our models can determine what might have gone wrong. Although we have remanufactured some components to fix problems, none of the significant findings to date has required that we conduct a nuclear test to know we need to fix some problem that we spotted. Some senators worried that we will not have all the tools for stockpile stewardship for another five to ten years. We have some powerful tools today to certify the stockpile. For instance, the computers used today are 1000 times faster and more powerful than those we had at the beginning of the test moratorium in 1992, and more advanced supercomputers, even 30 times faster than today's models, will be available to us by 2004. Advanced radiographic machines, designed to take motion pictures of a mock implosion of the "primary" or "trigger" are coming on line now. Do we have all the tools we need? In science, one is never satisfied with whatever set of tools is available. As long as you see how to get an improved tool to resolve some technical issue, you will keep going for it. That's an imperative for scientific research, and that's why we refer to the program as science-based stockpile stewardship.