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Is 'Star Wars' just a dream?

Program's scientists are turning skeptical

By Deborah Blum
Bee Science Writer

This is "Star Wars" country.

California, where scientists dreamed up tomorrow's bomb-driven lasers and orbiting battle stations. Where nearly half the total "Star Wars" budget — almost $5 billion — has been spent searching for those weapons.

And where they don't yet exist.

Here, in the heart of the program to build a shield against nuclear attack, scientists say they still don't know — and may not for a decade — if those space weapons will work.

In these laboratories and offices, where close to 1,000 "Star Wars" contracts have been awarded, President Reagan's vision of an invincible wall to make warheads obsolete is in disarray. The researchers themselves cannot agree whether it can protect people — or even other weapons.

Reagan remains convinced of the power of the Strategic Defense Initiative — popularly called "Star Wars." At the economic summit conference in Venice this month, he repeated that goal, firmly: "a time when we can breathe free, confident, secure and peaceful."

His administration is now pushing for deployment of "Star Wars" rocketry within five years. But a three-month investigation by The Bee, involving travel through California weapons laboratories and industries, found that those who work with the technology say it's not ready to fly. They are not even sure of what to launch.

"Can you build a perfect defense, an umbrella that will eliminate every intercontinental ballistic missile? At this stage in our history, the answer is no," says Robert Walquist, TRW's vice president for "Star Wars" contracts. "We don't know how.

"Can we reduce incoming warheads to a low enough level that we could survive a ballistic missile attack? The answer is yes. But it would be extremely expensive." He estimates a trillion dollars — but cannot put a date on when that low-leak system would be ready.

Why no perfect shield? Partly because it depends on technology that hasn't been developed.

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Ultimate shield still has holes

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The system involves layers of weapons: attack rockets, backed by lasers, backed by more rockets, backed by atomic particle beams, backed by more rockets. Much of it would be space-based. Even commonplace, everyday rockets would be loaded like big bullets onto the orbiting platforms poised to fire. Those would be complemented by ground-stationed lasers and rockets.

But most of the layers still don't exist.

None of three main lasers — all being developed in California — could shoot down a missile yet. Scientists are not even sure about their ability to fire through the atmosphere. And no one yet knows how to get them into space if they did work; even the internal mirrors of the chemical laser weigh too much for launch.

The hard-headed little homing rockets (some based on a 1959 proposal by Boeing) are available. But no one is sure exactly how they would work in space.

Chris Cunningham of Lawrence Livermore National Laboratory heads a group doing nothing but analyzing how the system would work. The report so far is somewhat grim. To start with, Cunningham puts launch costs in the "several-hundred-billion-dollar range." And he says the rockets — called kinetic kill vehicles — could be obsolete by the time they are launched.

"The problem is that while the rockets might be able to catch the current generation of Soviet missiles, we don't know if they could handle faster ones," Cunningham says.

"Right away, we'd have to worry about the competency of the system. Our concern, and it seems to be a real case, is that we might put up just anything and provoke a Soviet response. That doesn't make sense."

One easy Soviet response could be to destroy the rockets' support system — the satellites and sensors that guide it. These could be damaged by orbiting space mines — a current technology — or shot down from Earth. One researcher describes satellites as "sitting ducks."

Further, the Livermore analysis points out that scientists don't know whether the space-based sensors, even if they survived, would correctly guide rockets to targets. Satellites track the bright exhaust plume of a missile; researchers say there appears to be a risk that rockets would hit the plume rather than the missile.

Mel Brashears, who heads the Boost Surveillance and Tracking System work at Lockheed, says that the sensors would not lock the rockets on a missile. That would have to be part of the rocket's internal guidance. Brashears says it can be done, but like Cunningham, he argues that more research is needed.

"SDI is a research and technology program," says Brashears. "That doesn't mean deployment and that doesn't say it's feasible. I think we need more technological understanding to make an informed decision. By 1990 or so, we might be able to decide. Seven to 10 years of research (following the 1983 start) tells a lot."

For now, researchers are still not sure that they could get even the rockets into space. The American space program is in deep trouble; the shuttle, following the fatal 1986 explosion, is not expected to fly until mid-1988 at the earliest.

Sidney Drell, an arms-control expert at the Stanford Linear Accelerator Center, estimates that the rocketry, with its backup satellites and sensors, would weigh "tens of millions of pounds." Just to boost 10 million pounds would take 160 shuttle flights, he says — tying up that program's capacity for at least a decade to come.

The Defense Department worries enough about that aspect that it now runs a heavy launch program with an annual budget close to twice that of the National Aeronautics and Space Administration's $7 billion. So, far, while the Soviets have demonstrated massive lift ability, this country has not.

Some California defense contractors have warned the Reagan administration that the cost of boosting all those satellites and sensors could be "ridiculous," draining the Defense Department budget. TRW's Walquist

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suggests that the payments would at least need to be staggered.

"In one sense, a trillion dollars is not that big," he says. "If you spent $100 billion for 10 years, that would be about a third of the current defense budget. I'm not saying it wouldn't be a trial. But for the important things we want to do, this country could afford it."

Andrew Sessler, a former SDI laser researcher and physicist at Lawrence Berkeley Laboratory, warns that when and if the country launches its first rocket-loaded platform, the Soviets might simply shoot it down, announcing that they don't want weapons hovering over their country.

In fact, Sessler says, he has discussed that issue with officials at the Pentagon, who acknowledge that they may need to negotiate a treaty to protect the "Star Wars" weapons. They also acknowledge that it could be very difficult, given outspoken Soviet hostility to the program.

Researchers at Livermore say that perhaps the platforms could be boosted so high they would be out of range — at least of ground-based weapons. And SDI officials are looking at means of defending their weapons from other weapons, such as sending up escort attack rockets with their attack rockets.

"Survivability is a challenge with SDI," acknowledges Lockheed's Brashears, who is looking into ways to defend the space-based satellites as well.

He suggests that some could shoot back and others use "passive" means of protecting themselves, possibly by disguising themselves. Frustrated Lockheed engineers reportedly drafted a cartoon that showed a satellite hiding behind a Venetian blind.

The whole issue of countermeasures — the specter of U.S. technology pushing the Soviets and the Soviets pushing right back — has become one of the most troubling issues for the futuristic military program.

"It's not like the race to the moon," Sessler says. "The moon didn't shoot back. We're a long way from a weapons system, and in the 10 to 20 years needed, the other side is going to do everything possible to see that it doesn't work."

Lowell Wood, a Livermore physicist and "Star Wars" admirer, makes a similar point. Wood suggests that a shield that works

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Shield

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against current nuclear inventories — roughly 10,000 warheads on each side — would be no good. He thinks it would need to be perfected against 30,000 warheads.

"After all, by the time we put it up, the other side would have had at least five years to come up with countermeasures," Wood says.

Even the chief scientist for the "Star Wars" program, Al Mense, acknowledges that his office is having a difficult time making it clear to the public what SDI is — or will be. Every contractor, researcher and government official seems to promote a different version. The "Star Wars" office finds itself balancing between "zealots and critics," he says.

SDI chief scientist Al Mense has modest expectations: "It is not a technological fix for arms control."

"We've got to fill in the middle," he says, unhappily. "And we're not sure we can change the emotional response to the program. Part of the problem is the way it was introduced."

Reagan announced the program on a nationally broadcast speech in March 1983, promising it would make nuclear weapons "impotent and obsolete." The following year, presidential campaign ads showed the system as a rainbow over the country, drawn by a small child.

If it had started in the Pentagon, SDI never would have gained national prominence," says Mense, who favors a pragmatic approach to the program. "The first person who asked about paying for it would have killed it."

He does not describe an ultimate shield either.

"The real mission of SDI has never been made clear," Mense says. "It is not a technological fix for arms control. We are not claiming a set of technologies that will bring the Soviets to their knees."

California scientists say, in fact, that the SDI office has been actively trying to persuade them that the system need not be a shield. One says the Pentagon sees that as too narrow a focus.

Others say they are caught between the Air Force, which wants space-based weapons it will control, and the Army, which wants ground-based weapons it will control. At TRW, Walquist describes confusion in the SDI office as to what the system should be.

"SDI has changed," Sessler says. "At first it was a shield. But hardly anyone but Reagan believed that. Now it's to enhance retaliation, protect against cheating in arms control. Various people have various points of view. There is no party line."

Part of that comes from awareness of the technological problems.

> "While the rockets might be able to catch the current generation of Soviet missiles, we don't know if they could handle faster ones."
>
> **— Chris Cunningham, Lawrence Livermore National Laboratory**

A recent Pentagon study suggested that a first phase of the "Star Wars" system would take out just over 10 percent of incoming Soviet warheads. The Defense Department would, of course, add onto that layer. But even the last phase might not be foolproof; Walquist describes it as a "low-leaking ultimate system," screening out more than 90 percent of the incoming warheads.

Others say the vulnerable shield — and a likely Soviet response to simply increase their firepower — would make SDI valuable for little more than protecting this country's missile silos in the Great Plains region. Its rockets would simply punch back at warheads aimed at warheads.

Still others suggest that SDI could prove valuable against accidental launches, terrorist attacks or threats from radical Third World countries, and be a valuable backup to an arms-control agreement that reduced nuclear inventories.

"If the system is good enough, it would work to protect us against cheating on arms reductions," says Bill Barletta, deputy program director for beam research at Livermore. "That's my personal motivation. It's a hedge. Because in the end, it will be politics that bring the numbers of nuclear weapons down. I don't believe we'll do it by technology."

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His co-worker, Lowell Wood, disagrees. Wood insists that SDI should be a perfect shield — "at every layer, which I admit is radical" — and a population defense for the United States. If, indeed, it were just missile protection, he says, he wouldn't be such a supporter.

"If it were just missiles, it wouldn't have the technical interest or the moral imperative," Wood says. "But it would be far easier."

Still, even Wood dismisses the idea that the country is ready to deploy SDI by the early 1990s. He says financial support — roughly $3 billion a year — has not been enough to advance the technology. The president can't launch the system because he doesn't have one, Wood says.

"Star Wars" is decades off, cautions Robert Selden of Los Alamos National Laboratory.

"That idea is manifestly stupid, stupid on its face," he says. "Reagan doesn't have SDI locked in. There can't be a deployment decision until 1992 or 1993."

At Livermore's sister facility, Los Alamos National Laboratory in New Mexico, Robert Selden, who heads the lab's Center for National Security Studies, points out that the technology may eventually be developed — if for no other reason than to stay abreast of Soviet work.

Even some prominent scientists who criticize the system — such as Drell and Sessler — say that research should continue near its current level. Sessler says there's no "physical law" why the weapons systems couldn't eventually be made — "It's the cost, engineering, time and complexity," he says. "Those are the overriding arguments."

But even with steady support, Selden dismisses the idea of some scientific miracle that will make "Star Wars" work in the next few years.

"It's already possible to shoot down rockets," he says. "But how well we can shoot them down remains to be seen. You have to be careful not to assign magic to technology. There are dramatic changes, but they are in a period of decades.

"People who say change will come in five decades are telling you the truth. People who say change will come in five years are selling you snake oil."

Next Sunday

The military business in Sacramento — as elsewhere in California — is big business. And it goes far beyond the obvious.

Assisting in this series are
- Projects editor Terry Hennessy
- Projects coordinator Robert Casey
- Copy editor David Mandel

Sunday, August 2, 1987

Need for nuclear tests 'totally phony,' study finds

CALIFORNIA
The Weapons Master

This is another in a series of articles that examine the consequences of being home to the country's weapons masters: the growing number of scientists dependent on military research, the plans for a new generation of nuclear devices and the role of California s weapons designers in arms control.

By Deborah Blum
Bee Science Writer

LIVERMORE — California's weapons laboratories have told Congress that the country's nuclear arsenal is undependable and needs constant testing. The scientists have told Pentagon officials the same story. The Pentagon officials have passed it along to European allies.

But it's not true, according to a review of classified documents by a senior physicist at Lawrence Livermore National Laboratory. The review was requested by Congress.

Ray Kidder, who is completing the independent case-by-case study, describes the labs' arguments in two words: "Totally phony."

In fact, newly declassified statistics from the U.S. Department of Energy show that nuclear tests needed to check or correct faulty warheads are extremely rare. Out of close to 300 nuclear tests since 1970, DOE officials say only six were required to maintain a reliable stockpile.

Kidder questions whether even those tests were needed for maintenance reasons. His study of secret documents shows that the American nuclear arsenal is holding up even better than predicted.

"And how's the public going to know that?" he demanded. "They lead the public to believe in a stockpile maintenance issue, and unless

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[illegible] that the examples aren't relevant."

There are scientists inside Livermore — such as physicist Hugh DeWitt, also an internal critic — who agree with Kidder. And there are a growing number of outside supporters, including Glenn Seaborg, who received the Nobel Prize for the discovery of plutonium.

Former administrators from both Livermore and Los Alamos national laboratories also have taken Kidder's part, saying that the nuclear stockpile can survive without testing. Their statements contradict one of the labs' strongest arguments to Congress against a comprehensive test ban treaty, which would outlaw underground tests.

Not surprisingly, Kidder has no support from current administrators of the laboratories, which are both U.S. Department of Energy facilities run by the University of California. They say Kidder doesn't belong to the inner circle of weapons makers, those in the know.

"Ray is on the sidelines looking in," said Bill Scanlin, deputy associate director for defense systems at Livermore. "I don't know what his motives are to make these statements."

Scanlin insists that regular testing is absolutely necessary for reliability, to develop and modernize weapons and to counter any Soviet surprise developments.

"Our basic contention is that any complex entity is better for testing," he said. "Would you ride a 747 jet if it had been sitting in the hangar for 20 years without being tested?"

Livermore, in fact, is preparing its own report to counter Kidder's analysis. But DeWitt, who reviewed the same internal documents, reached the same conclusion as Kidder.

In the past several years, Livermore and Los Alamos administrators have testified before Congress that one-third of the nuclear designs since 1958 have proved unreliable and that most could not have been corrected without nuclear tests. Kidder and DeWitt both say the classified evidence they studied does not support that claim.

"The labs are hiding behind the fact that this is classified information," DeWitt said. The two scientists also say that they believe the laboratories did not expect to have knowledgeable physicists, with security clearance, investigating their statements.

"They don't need to test to maintain the stockpile. And they've been caught — I think they had no concept of a mole like me," said Kidder. "I had the element of surprise. Their secrecy was breached — and it was too late."

Seaborg, who directed national energy activities including nuclear weapons development during the 1960s, says he also sees no reason the stockpile cannot survive on its own. Seaborg, at Lawrence Berkeley Laboratory, said such nuclear proof testing was never raised as an issue during his tenure.

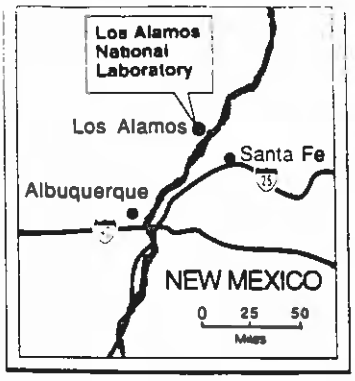
"My suspicion is that it's being used by the laboratories against a comprehensive test ban treaty whether or not it's true," Seaborg said. "At least, they are emphasizing only the aspects that support their point of view. Of course, in a way that's sort of natural. They want to support nuclear weapons development."

Officials at Livermore don't deny that. They point out that sophisticated new nuclear devices, such as those proposed for the "Star Wars" weapons system, could not be produced under a test ban treaty. But they also say today's arsenal should not be compared with that of 20 years ago.

During the past two decades the United States has turned increasingly to smaller, lighter warheads designed to be shot from submarines, aircraft and mobile launch pads. The compact bomb design has allowed military planners to pack a crowd of warheads onto one missile: The Navy's Poseidon missile carries 10 independently targeted nuclear devices.

"The way I view it, the United States has chosen its priorities," said Livermore's Scanlin. "No. 1 is always nuclear safety. But then it's minimum size and weight, principally to cut costs. And for that we have given up a factor of robustness in our weapons."

Robustness refers to the strength and hardiness of the nuclear device. Scientists say that a bigger, heavier



Bee graphic

Los Alamos National Laboratory has designed 63 percent of the nation's nuclear weapons. But its defense research also includes such technologies as powerful lasers. At right, scientists work with the Aurora laser, which they are using to study fusion energy.

weapon may be more durable partly because it contains more plutonium — the element that drives the nuclear reaction — and so is less affected if the element decays. Without a proper plutonium core, the bomb could be a dud.

Kidder, who has been a senior physicist at Livermore for 30 years and who has studied nuclear explosives extensively, said he began the reliability analysis strictly at the request of a group of federal legislators, including Rep. Les Aspin, D-Wis., chairman of the House Armed Services Committee. It is one of a series of analyses he has done since the officials became curious about laboratory assertions on weapons reliability.

Because the laboratories have claimed that one-third of the nuclear designs proved unreliable once placed in the arsenal, Kidder chose to review each of the cases — 14 out of 41 designs. Roger Batzel, Livermore's director, informed Congress that he is making the information available to Kidder but that the lab will do its own analysis as well.

"While it is indeed unusual that we are asked to make available a particular laboratory staff member for a particular, independent study, we will honor your request if he wishes to perform this review," Batzel wrote to Aspin.

If Livermore didn't like it, its parent agency, the Department of Energy, liked it even less. Sylvester Foley Jr., DOE's secretary for defense programs, refused Kidder's first request for a report on weapons testing. "I do not intend to provide you with a copy," Foley wrote this spring. "In my judgment, it is entirely inappropriate for you as a member of the Livermore laboratory staff" to make the review.

With congressional help, Kidder did receive Foley's declassified answers to questions about nuclear testing. Those answers made it clear that the federal agency does accept the labs' analysis, citing the claim that 14 weapons designs have proved unreliable and that three-fourths of the problems were identified or fixed through nuclear tests.

Kidder's review of the weapons that reportedly proved unreliable and were fixed through nuclear tests led him to conclude that none of them actually suggested any reliability problems with today's arsenal.

He dismissed nine of the cases straight away, saying they all occurred in the early 1960s and have no relationship to the existing stockpile. One of the nine problems identified was the aging of materials used to trigger the nuclear device, but that problem was researched and resolved 25 years ago, he said.

"It's not even relevant," Kidder said. "It's just being used to pad out the story."

Two of the cases involved military changes in the warhead design — requiring further tests in developing the system — not discovery of faulty weaponry, the analysis showed.

Three were not thoroughly tested before being put into the stockpile, according to both Kidder and DeWitt. They did prove unstable once in the stockpile. Problems developed with radioactive material decay in one warhead and with jamming of safety devices in two others.

But the two researchers said the three weapons were unreliable before they were added to the arsenal because of inadequate nuclear testing during development. Thorough testing is needed during those early stages to guarantee a working weapon, researchers say. Kidder said weapons that are poorly tested in design stages should be not be considered examples of surprise problems in the arsenal.

He and DeWitt say a classic example of such inadequate nuclear testing during development occurred with the warhead for the air-launched Cruise missile, to be carried on the wings of B-52 bombers. The warhead is expected to be severely chilled as the fighter planes fly at a height of 45,000 feet for several hours. In fact, Los Alamos scientists who designed it calculated that its explosives would have to work at minus 65 degrees Fahrenheit.

Yet the device was never chilled down and tested before assembly began. The scientists used computer calculations instead to reassure themselves that it would work. It was only after the warhead was in production that they ran a careful nuclear test and discovered that the high explosive needed for ignition did not work at that temperature. The entire production line had to be retrofitted.

John Immele, deputy associate director for nuclear design at Livermore, denies that the Cruise missile is a tale of inadequate preparation. Rather, Immele said, the problems with warhead prove that nuclear

tests should never be ruled out and that more are needed. He said the labs don't have the money for all the tests needed (an underground test runs between $6 million and $20 million) and chose to rely on computers.

"It's a modern example of the need for testing," Immele said. In fact, the Cruise missile is among the examples presented by U.S. defense officials to NATO allies as one of the unpleasant stockpile surprises that mean the United States must continue its nuclear-testing program.

It appears on a slide used by Defense Department representatives along with six other examples of "reliability problems discovered and/or fixed by nuclear testing." U.S. Secretary of Defense Caspar Weinberger also has cited those examples in arguing against a comprehensive test ban treaty. All are included in the critique by Kidder and DeWitt.

Scanlin acknowledged that some of the examples cited by the laboratories included problems that could have been resolved without nuclear tests. But he said, to be certain, the tests were conducted anyway.

"What we did was the right thing for the country," he said. "In view of the fact that we could test, it was right and prudent." Like Immele, he denied claims that some of the weapons had been inadequately tested before going into use or are no longer valid examples. "That's a matter of interpretation," Scanlin said.

Weapons lab researchers do acknowledge that they have not given top priority to designing weapons that would endure in case of a test ban treaty. The United States has made such a treaty a national goal for 25 years. It is spelled out in arms-control treaties dating back to the days of President John Kennedy.

In a letter to a University of California advisory committee investigating that issue, for instance, Livermore physicist George Chapline explained the lab position on designing tougher weapons:

"One immediate answer is that the lab was never asked to work on this problem. One might still ask why the laboratory never took it upon itself to study how nuclear weapons might be maintained during a test ban. The answer is that there were never enough people interested to get a program started."

Chapline added that without the opportunity to experiment, weapons work would become so boring that there would be no scientists willing to do the work.

"This brings me to the explanation of why a ban on nuclear testing will be a disaster for the country and the world," he said. "After few years, there won't be a single person left who understands in detail how nuclear weapons work."

Still, the UC committee report, due before the regents by September, concluded that the laboratories could have done more. The committee also noted that the federal government had not ordered the laboratories to build more durable weapons. In fact, the list of military requirements for warheads, handed down from the Defense Department, did not include robustness until 1982.

Both Scanlin and Paul Brown, Livermore's assistant associate director for arms control, say that the laboratories can influence that list of requirements by negotiating with defense officials. But they said that because of demands for lightness and compact size, arguing for sturdier weapons — primarily bigger and heavier — would have been arguing for a remake of the American missile system.

"If we as designers say no, sorry, we want to do something two times as heavy, that just isn't going to go," Scanlin said. "You'd need larger missiles. They'd have to retrofit thousands of silos. The cost would be prohibitive. If there had been a specific request, we would have done it. But despite that, we have made the weapons as robust as we can."

Immele concurred. "To anyone who says that our weapons are fragile, I say balderdash," he said. "That's generally a charge made by people not familiar with nuclear design."

And Kidder said his upcoming report will note that, despite a lack of interest, the labs have succeeded well in building tough, durable weapons. His review of testing showed the warheads to be very rugged. In fact, he said, the laboratories apparently did not review results before raising the reliability issue.

Sidney Drell, an arms-control expert at Stanford University, said it is true that after two decades without tests there could be questions about the stockpile's reliability. But he said if the United States is only concerned about maintaining a stockpile for nuclear deterrence, then the country should remain confident even if a few of its 30,000 warheads are under question.

"If you want to use it in a war, then you want to keep fine-tuning your arsenal," Drell said. "If it's just for deterrence, then our confidence would be sufficient without testing."

Livermore's Brown said the goal is deterrence, plain and simple.

"But if deterrence failed, then we'd have to use these horrible things," Brown said. "And we'd want them to work."

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CALIFORNIA
The Weapons Master

This is another in a series of articles that examine the consequences of being home to the country's weapons masters: the growing number of scientists dependent on military research, the plans for a new generation of nuclear devices and the role of California's weapons designers.

Weapons labs help set policy

Arms negotiators ask scientists' views

By Deborah Blum
Bee Science Writer

LIVERMORE — Congress has come to this quiet California valley, seeking an arms-control treaty.

Federal legislators recently asked the state's powerful weapons designers, at Lawrence Livermore National Laboratory to evaluate — and indicate if they accept — the latest proposal for a treaty that would limit nuclear tests.

In particular, members of Congress, including the House Armed Services Committee, are interested in a treaty that would shrink the size of nuclear tests, possibly to a tenth of the current limit.

That idea, called the low-threshold test ban treaty, is receiving increasing support both in Congress and from the country's arms-control experts. Many have backed away, for now, from the goal of a complete ban, after 25 years of failed attempts to achieve it.

Livermore and Los Alamos national laboratories, federal weapons labs run by the University of California, have consistently — and successfully — opposed all efforts to end underground testing.

Both in California and in Washington, D.C., officials say it is unlikely that any new limit on nuclear testing will win ratification without support from the weapons labs, which are the country's official experts on the nuclear arsenal. A Defense Department nuclear expert said that even the president would not consider lowering the size limit of tests unless the labs recommended it.

"The labs fight for what they believe in — which is not an end to testing — and they are a very powerful force," said Keith Miller, a UC Berkeley mathematician, who belongs to a group of scientists working to tighten university control of the labs. "What's going on now, behind the scenes, is an effort to find a treaty the labs can live with."

John Immele, Livermore's deputy

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associate director for nuclear design, said any reduction in the allowed level of nuclear explosions — set at 150 kilotons, more than 10 times the force of the Hiroshima bomb — would restrict creative work, especially in developing new weapons.

"It's like telling people who work on rockets that they can only work on little ones," Immele said. Still, he said, he considers that far preferable to a comprehensive test ban: "It's better, much better, than nothing."

And Paul Brown, assistant associate director for arms control at Livermore, who has served on treaty-negotiating teams at Geneva, said the laboratory is taking the congressional request seriously.

He noted that the idea of enforcing smaller test explosions is one of "growing activity," recently receiving public support from former U.S. Energy Secretary James Schlesinger and former Defense Secretary Harold Brown.

"We're giving it fairly high priority," Paul Brown said. "We're looking at the numbers, trying to get a feeling for the physics. We don't have all the answers, but we have some preliminary ideas."

Brown said that careful research into smaller nuclear explosions could eventually help in setting guidelines for a realistic treaty. He emphasized that any reduction should be negotiated with the Soviets — possibly in return for Soviet concessions — not set by legislation.

Both the House and the Senate have introduced bills that would severely restrict testing over the next year. The House version calls for a flat, 1-kiloton limit. The Senate bill, introduced by Edward Kennedy, D-Mass., and Mark Hatfield, R-Ore., would permit one 15-kiloton test.

U.S. Rep. George Brown, D-Riverside, a supporter of the 1-kiloton limit — or preferably a total test-ban treaty — argues that testing is unneeded and dangerous.

"Nuclear tests do not bring more security," he said. "On the contrary, nuclear tests are provocative because they imply a military purpose beyond deterrence."

The Soviet Union, in fact, voluntarily instituted a 19-month moratorium on nuclear testing, but abandoned it earlier this year after the Reagan administration refused to join in. Nearly 20 American tests were conducted during the Soviet moratorium.

"U.S. nuclear tests provoked the Soviets to terminate their moratorium," Rep. Brown said. "Both of the superpowers now share the misguided policy of continuing the nuclear arms race."

Robert Barker, assistant to the secretary of defense for atomic energy, said the congressman has apparently misunderstood the point of nuclear testing.

"He is asking people to equate nuclear testing with the arms race," Barker said. "The cessation of nuclear testing will not remove one nuclear weapon from the Earth. It will not prevent the manufacture of unlimited numbers of warheads."

He said the administration's position is that first, the number of weapons on line must be severely reduced. U.S. and Soviet negotiators are now working toward a treaty eliminating medium- and short-range nuclear missiles in Europe.

Second, compliance with the existing test threshold of 150 kilotons should be better verified, Barker said. Then, he said, the Reagan administration would consider working on a treaty calling for fewer and smaller nuclear tests.

"But every time we are going to look to the laboratories to tell us what kind of testing would assure that the nuclear deterrent remains credible," he added. "If they should ever tell the president, that they could rely on, say, half the number of tests now conducted, at a limit of 50 kilotons, I would expect the president would follow up on that."

Glenn Seaborg, who headed energy programs under President Kennedy, said a sharp reduction in the size of tests would be a step in the right direction — but a complete ban on testing would be better. He said Kennedy very much wanted an end to nuclear tests.

Kennedy eventually negotiated the Limited Test Ban Treaty of 1963, which barred atomic testing in the atmosphere, in water and in space. The weapons laboratories are credited with keeping underground tests out of that treaty.

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Test limit

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Seaborg traces the weapons laboratories' opposition back even further, to the late 1950s, when Eisenhower first tried, unsuccessfully, to halt nuclear tests. Seaborg said representatives from Livermore talked the president out of it. The two laboratories have also been given credit, by their own staffers, for helping to talk President Carter, in 1978, out of pursuing a test-ban treaty.

Livermore and Los Alamos strongly opposed the 1974 Threshold Test Ban Treaty, which set the current 150-kilotons cap on nuclear tests, on grounds that it would limit their work and be difficult to verify. Indeed, the treaty was never ratified, but both countries say they have honored the limit.

Seaborg, a Nobel laureate now at Lawrence Berkeley Laboratory, said a comprehensive test ban would be the easiest treaty to verify. And he said it could have an important impact on slowing — or even stopping — new weapons programs: "It would be a litmus test for arms control," he said.

A growing number of California scientists, gathered to support a low-threshold treaty, say they have tried to persuade Seaborg to join them. The supporters, such as senior physicist Ray Kidder of Livermore, say that plan has a far better chance of surviving both Congress and the labs.

"As a practical matter, I think supporting a comprehensive test ban is an exercise in futility," Kidder said. "The weapons labs love that as a target because they can shoot it down. They say they can't verify, the Russians will cheat, they can't promise nuclear deterrence — that kills in Congress. They're more concerned about the low-threshold idea."

The weapons laboratories, so far, have indicated that they could not accept the 1-kiloton limit before Congress. At that level, they say, they could not guarantee the reliability of the stockpile — an argument disputed by researchers like Kidder — or match research by the Soviets.

"Any reduction is going to make our job harder," said Livermore's Paul Brown. "A test limit of 15 to 25 kilotons would allow use to assure the reliability of weapons in the stockpile. But it would tie our hands in responding to a need for new weapons developments."

Today's nuclear weapons have a two-punch design. A smaller bomb ignites a big bomb. The first, called a primary, is a fission nuclear explosive. It gathers energy from splitting atoms apart and fires up the secondary bomb. The secondary is a fusion device, far more powerful, burning with the massive energy released by fusing atoms together.

Immele said that if testing of bombs between 10 and 25 kilotons is permitted, then researchers will have no problem testing the fission triggers. But such a limit would not allow complete testing of the fusion secondary devices; researchers in that field could begin dropping out, he warned.

"If we end up with a 25-kiloton limit, after the country has discussed it and decided that's what it wants, it will forestall strategic development," he said. "And it will cancel projects like the X-ray laser," a proposed bomb-powered laser included in the "Star Wars" research program.

"We would have a lot of frustrated scientists if that came about," he said. "And I think we need consider the need for keeping good people in charge of nuclear weapons programs."

Next

The University of California manages the two most powerful weapons labs in the country — and struggles with the resulting controversy. See The Bee Sept. 6.

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Sacramento Bee Sept. 1987

UC and the arms labs: Who's really in charge?

By Deborah Blum
Bee Science Writer

BERKELEY — As Charlie Schwartz tells it, he just wanted to talk about arms control; maybe unload a few crisp anti-weapons statements. He just wanted to speak at a facility managed by the University of California, an institution famed for its tolerance of free speech. He ended up in court for five years, battling university lawyers.

Two summers ago, Schwartz, a physicist at UC Berkeley, was finally allowed use of the auditorium at Lawrence Livermore National Laboratory to lecture its cadre of weapons designers. He hasn't been invited back. And he's still angry.

"The contract to manage the weapons labs simply corrupts the university," says Schwartz. "It obliges the university to fight openness. It obliges it to go to court to fight free speech. It's a contradiction of everything a university should be."

James Kane, the university's special liaison to the labs, doesn't see the case as nearly so dramatic.

CALIFORNIA
The Weapons Master

This is another in a series of articles that examine the consequences of being home to the country's weapons masters: the growing number of scientists dependent on military research, the plans for a new generation of nuclear devices and the role of California's weapons designers.

True, the university manages Livermore and its sister facility, Los Alamos National Laboratory. But both are owned by the U.S. Department of Energy. It was DOE that didn't want its auditorium used for public speakers opposed to the lab's work — and Schwartz ranks high on that list.

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"It wasn't a matter of free speech," Kane says. "It was a matter of federal property. The university did defend the right of the lab to exclude whomever they chose. And the university's role in that doesn't bother me."

But Kane does acknowledge, with a sigh, that managing the country's two most powerful weapons laboratories, is a constant series of conflicts, confrontations. The management contract is up for renewal this month — at a time when the university faculty is increasingly disillusioned with it.

The accusation that plagues UC administrators most is that their management style has been so hands-off that the weapons labs have been able to build themselves into a powerful political machine, helping to drive the arms race. At the same time, Livermore and Los Alamos representatives, in pro-weapons testimony in Washington, D.C., have identified themselves as objective, University of California-backed scientists.

"The university has nothing to say about the defense aspects of what the labs do," snaps John Jungerman, head of the UC Davis physics department. "But when these people testify in Washington, they use the UC identification and they use its prestige to give them credibility."

Jungerman and several hundred other faculty members have held a series of private meetings — the latest in May — with university administrators, arguing for better control of the labs. The faculty group has asked the university to "forcefully propose" to laboratory directors that they begin working toward an end of arms development — rather than continually proposing new weapons.

Kane acknowledges his own frustrations with the weapons labs: "They do delude people into thinking there's a technical solution to the arms race," he says. "And there's always someone in Washington ready to vote to put the next bomb in place."

But he points out that the UC contract doesn't allow forceful proposals to lab management. It allows the university to pick the labs' directors and ensure technical excellence, such as helping to recruit top scientists and provide state-of-the-art equipment.

"We're not in a position to say, 'Hey, this is a better program than that,' " Kane says. "We're in the business of ensuring technical high quality. The weapons programs are determined by the policy of the United States. If the majority approves a new missile, then its warhead will be designed at one these labs. That's their job."

Faculty critics such as UC Santa Barbara physicist Walter Kohn, former director of the innovative Institute for Theoretical Physics, say the university hasn't really tried to reduce weapons-mongering at the labs. Kohn suggests the administrators might try pushing a little harder before declaring they can't do anything.

Sometimes, he says, it looks like they don't really want to. A recent, one-year investigation by a university-selected panel of experts, exploring issues raised by the faculty, concluded that no problems exist at the labs. But the panel did not interview lab staffers known to be critical of their bosses' policies. And it allowed lab directors, but not critics, to review the report for accuracy.

"It was the whitest of whitewashes," says Hugh DeWitt, a Livermore theoretical physicist known as an internal critic of the labs.

Faculty members also cite earlier, unsuccessful attempts by Livermore physicist Ray Kidder, another internal critic, to get the university's attention regarding weapons-design policy at the lab.

Kidder wrote to university officials both in 1977 and 1982. He suggested that the Scientific and Academic Advisory Committee, a

university-picked group of experts chosen to monitor the labs, look into whether the labs were designing nuclear weapons that would endure during a test-ban treaty.

The first time, he was simply ignored. The second time, he was informed by administrators that the committee felt it was not a proper forum to look at issues of nuclear-weapons planning.

"I want to be very clear that what was involved here was scientific issues," Kidder testified recently before a legislative hearing. "They have nothing to do with politics or policies. . . . My conclusion is that the university and the committee have not done their job in overseeing the principal activities of the weapons labs. The principal activity is nuclear design."

UC administrators point out that nuclear design needs are set by the federal government. Neither, they say, does the country necessarily want a state-run university deciding how a national weapons lab should supply — or not supply — the nuclear arsenal.

They say the weapons labs clearly reflect national priorities — as they should. At the end of the Carter administration, which did not favor a massive military buildup, Livermore and Los Alamos were split into about 50 percent weapons work and 50 percent basic energy studies, such as alternative fuel sources. This year, after six years under Reagan, almost 80 percent of the budgets is for weapons work.

"The labs don't sit out in a Pacific island, deciding what they want to do," says Jeremiah Hallisey, the regent who chairs the lab oversight committee. "The people running the labs are also responsible to the federal government, to the Energy Department. The truth is, many of the critics simply don't want nuclear weapons at all."

He, other UC officials and laboratory administrators, who strongly support the connection with the California university system, say the relationship still appears to be in the national interest. If the university didn't perform that function, most observers think private industry would take over.

And researchers at the laboratories say university oversight allows them independence far beyond that of federal facilities managed by industry. They compare Sandia National Laboratory, a weapons laboratory run by American Telephone and Telegraph Co., which operates in virtual seclusion, and the two UC facilities, which operate amid nearly constant, outspoken controversy.

The directors of Livermore and Los Alamos, for instance, have publicly contradicted Reagan administration claims that the Soviets have steadily cheated on nuclear test limits. And in a recent annual report, Livermore published a study dismantling Pentagon claims that an early deployment of "Star Wars" attack rockets would protect the country from Soviet missiles. It drew instant rebuttal from the Defense Department, but the Livermore scientists didn't back down.

"The whole point of the relationship is freedom of expression," says

Kane

Jt ·german

Paul Brown, Livermore's assistant associate director for arms control.

Charlie Brau, who works on "Star Wars" weaponry at Los Alamos, puts it another way: "If you want the work done reasonably well, by someone besides Darth Vader types, then the UC relationship has been a good thing."

Others point out that critics such as Kidder and DeWitt probably would not continue under a private corporation — as they have under the university.

Kidder is doing an independent study for Congress, challenging weapons lab assertions that the nuclear stockpile is unreliable and needs constant testing. He is backed by DeWitt, who has testified repeatedly before state legislators about laboratory wrongdoing.

"I haven't been fired," DeWitt says. "And I think university protection is responsible for that."

But university faculty members also point out that DeWitt and Kidder are the only vocal dissidents out of some 16,000 employees at the two laboratories. The rest, at least publicly, tend to stand united against a test ban — and for weapons development.

"If the labs were run by industry, none of this discussion would take place today," admits UC Davis physicist Paul Craig. "But on the other hand, how big a deal can you make out of Ray Kidder and Hugh DeWitt? They get a great hearing, but who else is there? Livermore gets tremendous mileage out of them — if they didn't exist, Livermore would have to invent them."

Even the state Legislature has become concerned. The Senate Committee on Health and Human Services held a hearing early this year, also questioning whether the university is the right manager. And state Assemblyman Tom Hayden, D-Santa Monica, is sponsoring legislation that would call for an annual review of UC supervision. Hayden says he hopes to force an honest accounting of whether the university really oversees lab activities or does its best to ignore the controversial ones.

Still, Hallisey and other regents say the university contract with the Energy Department will undoubtedly be renewed at their Sept. 17-18 meeting in Los Angeles. There may be a few changes. The university, for instance, is pushing for greater access to the high-tech equipment at the two laboratories.

. And Hallisey's committee plans to seek better monitoring of the laboratories. Hallisey says he wants an annual report from a scientific advisory committee on the labs, which now reports only in answer to specific questions. And he wants an annual report to the regents from the lab directors as well.

"There's some truth to the point that we need to keep a closer eye on the laboratories," he says. "And we're trying to do that. It seems to me that the university should continue its involvement. It's very easy to cry the blues about the relationship — I don't think anyone particularly likes being involved with nuclear weapons — but the fact is, I don't know what the hell the alternative is."

The current Scientific and Academic Advisory Committee, asked by UC President David Gardner to respond to faculty concerns, was also intended to respond to concerns raised by critics. But the recently released report dismissing the questions about the labs served to anger, rather than soothe, the faculty.

"Actually, we did not expect this report to silence the critics," Kane says. "This is not a report of scientific facts; it's judgments made by the committee. I don't think it's going to change the mind of anyone who's really into the issue. The most helpfu part, I think, is that it makes clea what the university limits are."

Meanwhile, the university's Aca demic Senate is beginning a ful scale probe of its own, chaired by researcher from UC San Francisc That report will be timed to preced a regents' decision in some thre years on whether to start up negoti tions on another DOE contract.

UC Berkeley mathematicia Keith Miller, a member of the facu ty group seeking lab control, said th panel is also targeting that decisio as the time to really make an in pact.

"UC has nothing but the right to r view technical composition, to a point the directors and to refuse t renew the contract," says Mille "And we flub that every three year We're not using the leverage w have. I don't think we can rid ou selves of the labs. But we can figh from within to improve them."

Regent Willis Harman, howeve points out that quarrels over the un versity's administration of the co tract miss the bigger point: that th weapons labs exist and are operate because of the country's commi ment to having — and improving - a nuclear arsenal.

"The university could make a pul lic statement by refusing to hav anything more to do with an arm race that's becoming more and mor insane," says Harman, who als serves on the lab oversight commi tee. "But I think, probably, that it's secondary issue. We're just a litt part of the bigger picture, the glob buildup of nuclear arms."

Coming Sept. 27

An interview with the weapons master himself, Edward Teller, inventor of the hydrogen bomb.

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UC, 'Star Wars' data hit as summit nears

By Deborah Blum
Bee Science Writer
1987, The Sacramento Bee

LIVERMORE — California scientists gave top Reagan administration officials misleading information about "Star Wars" weapons before the Reykjavik arms-control summit with the Soviets last year, according to documents obtained by The Bee.

The University of California, whose scientists prepared that information, was told it was wrong — much of it based on exaggerated claims — but did nothing to correct it. UC executives say they have no plans to intervene before next week's arms-control meeting with the Soviets either.

CALIFORNIA
The Weapons Master

Internal letters and memos claim that overly optimistic presentations on space weapons have been made to White House arms-control negotiators, ranking Pentagon officials and members of Congress as recently as this fall — and as long ago as 1983.

Four years ago, for instance, scientists at Lawrence Livermore National Laboratory, managed by the university, wrote to the White House science adviser, saying that one key "Star Wars" program, the classified X-ray laser, was entering "engineering phase," ready to be developed as a full-scale weapon. The laser is still reportedly not a usable weapon.

The 1986 Reykjavik summit collapsed because of a U.S. refusal to restrict "Star Wars" research, partly based on administration insistence that space weapons could be deployed by the mid-1990s. President Reagan said recently that he will not bargain over the program this year either.

Robert Park, who monitors politics for the American Physical Society, the professional organization of the country's physicists, said that Reagan has become such a strong backer of the space weapons program that perhaps balanced information from Livermore would not have made a difference at Reykjavik.

"But the president should have had all the facts, and they should have been correct," Park said, from the society's Washington D.C. office.

"What disturbs me in all this is the role of the University of California. It's not very comforting to find that they are stewards of a national nuclear weapons laboratory and that they didn't give the rights of the rest of the country to be assured good information a moment's thought. And a lot rides on that information."

Shortly before the Reykjavik summit, in October 1986, Roy Woodruff, the former head of nuclear weapons programs at Livermore, urged university administrators who operate Livermore for the U.S. Department of Energy to make sure that

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balanced information was provided to Reagan. The university took no such action, Woodruff said.

In formal complaints filed with both the university and the laboratory, Woodruff charged that two top Livermore scientists, Edward Teller, developer of the hydrogen bomb, and Lowell Wood, a physicist and a protege of Teller, made exaggerated statements about the X-ray laser and other "Star Wars" programs to high White House officials. Teller, a friend of Reagan's for 20 years, has been considered one of the most influential voices in persuading the president to support the space weapons program.

"Last October, I met with (university Vice President) William Frazer and I said, 'The president is about to go to the summit and the only person from the university laboratory who has given him advice about 'Star Wars,' as far as we know, is Edward Teller,' " Woodruff said.

"I asked him how he felt about that. He said he would check into it. But he didn't call me back."

Frazer, UC vice president for academic affairs, said he recalled the meeting, but at the time, he didn't feel any specific concern about the Reykjavik summit. Frazer said he was more concerned about the larger issue, of protecting freedom of speech for laboratory scientists, including Teller.

Teller and Wood refused to comment.

James S. Kane, the university's liaison to the laboratory, said that it's not the university's job to judge the accuracy of information coming out of Livermore or its companion facility, Los Alamos, even though it is responsible for making sure the labs produce good technical information. The university receives $12 million a year from the Energy Department to manage the labs.

"I don't see the university ever going around with a truth squad trying to correct errors," Kane said. "And that's admitting that errors may exist. I don't think it's the university's mission to establish institutional truth."

The only formal action the university has taken is to review personnel grievances filed by Woodruff, who is charging that the laboratory retaliated against him for trying to correct misinformation put out by Wood and Teller. Woodruff resigned as head of defense systems at Livermore in October 1985, after the director repeatedly refused to allow him to send out letters of correction, according to the grievance.

Woodruff claimed, in documents filed with the university, that from 1983 to 1985, Teller and Wood sent out a series of letters greatly overstating progress on the X-ray laser, which relies on a nuclear bomb explosion to drive multiple laser beams, each supposedly capable of destroying a missile. The statements included a 1983 letter to then White House science adviser George Keyworth saying that the X-ray laser was ready for engineering work.

During that time period, the White House promised Livermore an extra $100 million for X-ray laser research, causing even supporters of weapons development, such as the director of Los Alamos and the top Defense Department official on nuclear weapons, to warn that more legitimate weapons research was suffering as a result.

After Woodruff spent almost a year trying to interest other university officials, he sent a letter last February to UC President David P. Gardner, asking him to help protect the lab's scientific integrity.

"Fearless independence and objectivity" in a nuclear weapons program are essential to the country's security, he wrote.

Gardner refused to see him and still has not done so; today, the UC president says he didn't want to get involved with a potential grievance and was well-informed through Woodruff's discussions with university staffers.

David Gardner

"I can't understand why the university would act as if the only issue involved is a personnel grievance," Park said. "I find it troubling and so do a lot of other scientists. I suppose because I'm an academic myself, I expect more from a university."

Woodruff says, both in his grievance and in a series of letters sent to university officials, that he first became aware of faulty information going out from his program in December 1983. A colleague at Livermore leaked him a copy of the letter sent to Keyworth.

"Although I was in charge of the X-ray laser program at that time, I had not been allowed to see the letter," Woodruff said. He asked laboratory director Roger Batzel to send a letter of correction, but according to Woodruff's grievance complaint, Batzel refused to send a letter or to allow Woodruff to do so.

The complaint adds that although Batzel promised to allow Woodruff to review future letters from Teller and Wood, the same thing happened a year later: misleading letters were sent to Paul Nitze, one of Reagan's top arms negotiators, and Robert McFarlane, then head of the White House National Security Council. Again, Woodruff was not allowed to correct them.

During that same time period, records from Livermore's classified briefing books show that Teller and Wood were making similar presentations to other high-ranking officials about "Star Wars" issues, both concerning the X-ray laser and more generally.

In spring 1985, Wood briefed the late William Casey, then director of the CIA, about Soviet work on the X-ray laser, calling his report: "A Technological Race for the Prize of the Planet." But other laser experts say 1985 was a slow year in Soviet X-ray laser work — during most of 1985, the Soviets voluntarily halted nuclear bomb tests, which are essential to the research.

In April 1985, Wood also briefed Gen. James Abrahamson, chief of the SDI program. That briefing, called "Columns of Fire in the Valley of the Giant Mushrooms," referred to a proposal to do a fiery demonstration of the X-ray laser at the Nevada Test Site. Livermore scientists say Abrahamson changed his mind after others told him it was not possible.

In early October, 1985, Wood again briefed Abrahamson on the vulnerability of objects in space to powerful ground-based lasers. In a letter to the Energy Department, Woodruff said Abrahamson asked him, as head of the program, if the information was accurate. "I had to respond that I had never seen it before."

Woodruff resigned a short time later.

University officials argue that Woodruff was also able to present his point of view. He made repeated trips to Washington, D.C., to that end, even persuading a former lab director to get him an interview with arms negotiator Paul Nitze. "Roy certainly wasn't muzzled," Kane said.

But Woodruff says he was never able to reach many of the top policy-makers — McFarlane, Secretary of Defense Caspar Weinberger, Energy Secretary John Herrington, President Reagan — whom Teller and Wood saw frequently. He said he needed help from the laboratory management to get there — and he didn't get it.

"They keep saying to me, 'You were able to brief congressional staffers and so you should be satisfied,' "

Woodruff said. "I thought this was more important than that."

And Kane acknowledges that point: "It's probably true. The quality of the people he could talk to wasn't as good as the people Teller and Wood were seeing. We might have been able to strengthen his hand. But I can't see us ordering the lab director to ... establish a laboratory view."

Woodruff wasn't the only weapons scientist alarmed by the kind of presentations coming out of Livermore. The director of Los Alamos at the time, Donald Kerr, warned Batzel in early 1985 that bad information was draining money away from more genuine science projects.

"It was a concern of mine at the time and it still is," said Kerr, now an executive with the private technology firm EG&G Corp. in Wellsley, Mass.

Richard Wagner, a former Livermore scientist who had become the top nuclear weapons official in the Defense Department, called the laboratory in concern, according to Energy Department correspondence. "I was very concerned about the way the information about SDI was being presented," said Wagner, now a science consultant with Kaman Sciences Corp. in Alexandria, Va. "It's a very far-out technology, and there's so little data."

Wagner said the nub of misrepresentation was statements that actual weapons could be delivered in a fairly short time period, perhaps within half a dozen years. He said he talked to Woodruff about the program — "he's a superb technical scientist and manager" — but wasn't sure others in the Defense Department knew enough about Livermore to do that.

Hans Bethe, the Nobel-Prize-winning nuclear physicist who worked with Teller on the Manhattan Project, was also concerned, even conferring with Kerr at Los Alamos about the need for objective information from the labs.

"Dr. Teller often overstates the facts," Bethe said, in a telephone interview from his office at Cornell University. "Whether he does it for political reasons or otherwise, I don't know. And I sat in classified briefings at Livermore and heard Lowell Wood exaggerate the facts as well. And it is important, because they have been influential on SDI."

Even George Miller, who replaced Woodruff as an associate director of the lab, expressed the same worries: "I was aware of the many statements Dr. Wood and Dr. Teller made within that time frame, and my view of the program was always consistent with Roy Woodruff's. And I have a great deal of concern that in the discussions surrounding this issue, the integrity of the lab will be damaged."

Roger Batzel refused to be interviewed for this story. But in a statement released earlier this fall, he also said Woodruff's assessment of the laser program was close to the lab's official position. Batzel said he knew Woodruff thought national leaders were being misled by Teller and Wood, but he felt that correct information was being disseminated through other channels.

By Oct. 29, 1985, Woodruff decided he'd had enough. He resigned as associate director, requesting another position at the laboratory. Batzel accepted his resignation two days later in a letter praising his contributions to the laboratory.

In his unclassified letter of resignation, Woodruff warned that Livermore was losing credibility because of "potentially misleading information" going out about the X-ray laser. "If Lowell (Wood) is given even moderate credibility by those key leaders of the Administration and the Congress with whom he has discussed his views (and I believe he is considered credible), than the damage is much more serious," Woodruff wrote.

In fact, high-ranking government officials and scientists say, Teller and Wood have played a powerful role in the development of the Strategic Defense Initiative. Research done by Gregg Herken of UC San Diego's Institute on Global Conflict and Cooperation found that as early as February 1981, shortly after Reagan took office, Teller and Wood were briefing national leaders about the promise of a "third generation nuclear weapons", including the bomb-pumped X-ray laser.

Reagan launched the "Star Wars" program with a speech, in March 1983, which emphasized the potential of such lasers. Herken describes Teller as a key member of the "laser lobby", insiders who sold Reagan the "Star Wars" program and have kept the President a believer ever since in the possibility of building a technological shield over the country.

The White House Science Office, in response to a query by The Bee, said that Teller remains a member of the White House Science Council and that his credibility is extremely high. "The fact that he is a member of the council speaks for itself," said an office spokeswoman.

Woodruff said that the national security issues are so important that the University should have felt compelled to investigate. But UC officials Frazer and Kane called that a matter of judgment. Both said the university chose not to interfere with laboratory affairs.

When Woodruff resigned, the university inquiry consisted of Kane talking only to Batzel, the lab director. He didn't talk to Woodruff about why he had resigned; he didn't ask to see the resignation letter, which raised the question of the X-ray laser. And according to Kane, Batzel only told him that he and Woodruff disagreed about lab management. The university then let the matter drop.

James S. Kane

"In retrospect, I fault myself for not pushing further, and others fault me as well," Kane said.

In March 1986 — seven months before the Reykjavik summit — Woodruff himself alerted Harold Weaver, who then chaired the university committee that oversees the technical quality of the laboratories. He told Weaver about his concerns that the lab was not providing objective information to policy-makers. But Weaver, a UC Berkeley astrophysicist, did not start a Scientific and Academic Advisory Committee investigation.

"We were bamboozled by the laboratory in the beginning," Weaver said. "But I'm sorry we didn't do more at the time. And I hope that the SAAC is not partly to blame for what has turned out to be a very bad situation."

Frederick Reines, a UC Irvine physicist who chairs the advisory committee today, said his panel has not looked into the quality of SDI information disseminated by Livermore either, although Woodruff raised the issue with him both last fall and this summer.

As part of an information packet he sent Reines this July, Woodruff wrote: "I resigned from a position that was the most satisfying of my professional career, out of a deep concern for my country and the damage to national security that I believe was — and is — occurring from the misrepresentation of the Laboratory's X-ray laser and other SDI-related research to the highest policy-makers of our country."

Reines wrote Woodruff on July 17, saying he had re-

NEXT: A closer look at the University of California's role.

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ceived the material. Woodruff has heard nothing from him since. In a telephone interview with the Bee, Reines said his committee, although chartered to do technical investigations, has not and is not considering exploring this one.

"The labs are enormous programs, and we have a relatively limited amount of time," he said. "We choose those things we feel have the most direct bearing on the laboratories."

Herbert York, a former director of Livermore who serves on Reines' committee, said members are aware of problems at the lab. "If I were the lab director now, I would be figuring out a way to better control Teller and Wood," he said. "They've gone too far. But it's hard. The president calls Teller to the White House to ask his opinion. We can't tell him what to say. I don't know if anyone in a university context can control this. Maybe, if Boeing or Lockheed were running the program, they'd just be fired."

Frazer said he was offended by charges that the university is not meeting its responsibilities. He said he believes the university acted properly in backing Batzel's decision not to officially counter Teller's and Wood's statements.

William Frazer

"The lab director's judgment was that Woodruff had ample opportunity to do that on his own," Frazer said. "It's easy in retrospect to come to other conclusions. But our chancellors on UC campuses don't always make perfect decisions. We don't try to follow them around, second-guessing them."

Frazer said that the university left it to the U.S. Department of Energy to investigate the accuracy of statements made to federal leaders. Department spokesman Jack Vandenberg said the proper official to comment on questions concerning Livermore was not available.

But the Energy Department has recently moved to counter statements made by Lowell Wood at a Congressional hearing this fall. At the hearing, on defense issues, Wood asserted that the basic power source for orbiting space weaponry could be as simple as today's solar panels; a top energy official promptly wrote to Congress, saying the department took "strong exception to Dr. Wood's claims."

Wood also suggested, during that hearing, that a single X-ray laser station would have the potential to wipe out a whole missile field. Congressmen have queried Livermore about that statement, without so far receiving a response.

The legislators have also a requested a General Accounting Office investigation into the quality of technical information from Livermore.

And the Pentagon's Strategic Defense Initiative Organization also acknowledges trouble in California: "There appears to be an internal problem with DOE or more specifically, with Livermore lab," said Maj. Alan Frietag, an SDI spokesman.

Woodruff says that technical integrity remains the central issue.

In a Nov. 5 letter to Gardner — as yet unanswered — he emphasized that point: "If you were to take the time to check, . . . I believe you would find a key piece of information — that the problem remains with us today."

Sunday, December 20, 1987

What California pays to be a state of war

By Deborah Blum
Bee Science Writer

California has become the nation's weapons master — at a price.

Its defense industry now dominates both the design of traditional weapons, and those of tomorrow; almost half the contracts for "Star Wars" programs have come here. Its nuclear weapons designers have grown powerful enough to shape the country's arms control policies, making or breaking treaties, according to some weapons experts.

But, in return, its economy is increasingly vulnerable, dependent on military spending that supports everything from weaponeers to rice growers. Its university research now tilts toward military programs, raising concerns of academic secrecy. And its scientists — and state officials — express growing concerns that the Golden State is becoming a cradle of war.

"We lead the world in weaponry," says state Assemblyman Sam Farr, D-Carmel. "We're taking up the best and brightest minds for defense work. Think what we could accomplish in solving human problems with those same resources."

A six-month investigation by The Bee, following California's weapons scientists behind the scenes as they plan tomorrow's arsenals, found:

- Top administrators at Livermore and Los Alamos national laboratories have effectively fought a treaty banning nuclear tests, saying that the country's nuclear stockpile is not reliable enough to survive without tests. But at least two former lab directors, several ex-weapons designers and a practicing Livermore physicist who just finished a report to Congress say that an already well-tested arsenal is sturdy enough to allow such a treaty.
- The University of California, which manages the Livermore and Los Alamos labs, issued a report supporting the labs' stand on nuclear testing. But in its yearlong investigation, the UC technical committee that wrote the report did not talk to any of the lab scientists who oppose that viewpoint, among them

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Livermore physicist Ray Kidder, who prepared a separate report for Congress. This fall, the labs used that UC support as part of their arguments to Congress against a test ban.

• Under the Reagan administration, the university, the labs and the state of California itself have become increasingly dependent on military support. And increasingly vulnerable. Economists now say that more than a third of the state's manufacturing is tied to the defense industry — a fifth of its engineers and scientists do only military work.

• During the high-spending influx of "Star Wars" grants into California, Livermore scientists exaggerated the progress made on space weapons progress to White House officials, gaining millions of dollars in extra money, according to internal laboratory documents.

• University officials, who manage the laboratories for the U.S. Department of Energy, were told about the overly optimistic "Star Wars" information more than a year ago and did nothing to correct it, despite warnings that it could harm arms-control negotiations. The university has refused requests from lab scientists and its own faculty to investigate the technical accuracy of information released by the labs.

• And today, scientists at Livermore and Los Alamos — and at California's huge aerospace companies — say that despite accelerated research on the Strategic Defense Initiative, totaling close to $5 billion in this state alone, they still have no working "Star Wars" weapons and may not be sure of the program for another decade.

"We've diverted money from reasonable research into the Strategic Defense Initiative," says John Holdren, a professor with UC Berkeley's energy and resources group. "It's a fantastically dangerous diversion when this country is faced with so many needs."

Holdren and other UC faculty members have become increasingly critical of the university's management of the laboratories, which they say is far too lax.

Many say that since the university accepts $12 million a year for managing the labs, it should actually manage them. They blame its hands-off approach for growing evidence that lab scientists are not always objective — or even honest — in their reports to federal officials. The university's refusal to investigate those charges is particularly troubling, they say, because scientists at other academic institutions are often severely disciplined — fired or demoted — if caught providing misinformation.

"It's a matter of intellectual integrity," says Owen Chamberlain, a Nobel Prize-winning UC Berkeley physicist. "The university owes the people of the United States and the world an absolute insistence on honesty at the labs."

University officials argue that they have successfully performed the most essential of services: They allow all these arguments to occur in public. They call that a healthy sign that they have preserved free speech, even in the sensitive environment of nuclear weapons work.

In fact, four years ago, when Energy Department officials tried to suppress publication of SDI information from the laboratories, the university was among the first to protest in Washington D.C. The controls were quickly dropped.

"This is a fundamental matter, on which the university simply cannot compromise," UC Vice President William Frazer said then. He calls the basic philosophy, the right of scientists to speak out, the guiding rule of university management. And university officials say, overall, that they are satisfied with the labs' performance.

James Kane

"Say, if the labs came up with a bomb that killed only pregnant women, then we might walk away," says James S. Kane, the university's liaison to the labs. "But the fact is, if the labs can think up a new and horrible weapon, that's their job."

But critical scientists at the university's campuses and even at the laboratories say the prevailing hands-off attitude has allowed Livermore and Los Alamos to quietly build a pro-weapons power base. In fact, many believe that some arms-control treaties — such as one severely limiting or banning nuclear tests — could never be passed without lab approval.

A former Los Alamos director, Harold Agnew, has stated publicly that he and Livermore Director Roger Batzel persuaded President Jimmy Carter not to pursue a test ban treaty.

Records also show that the weapons labs have a long history of such anti-treaty lobbying — and influence. Livermore scientists take credit for talking President Eisenhower out of working toward a nuclear test ban. They also reportedly kept President Kennedy from including underground tests in the 1963 Limited Test Ban Treaty, which barred atmospheric explosions.

"For 10 years, the labs have been one of the driving forces in the arms race," says Hugh DeWitt, a physicist and internal critic at Livermore. "And they do it insulated from the rest of American life — protected by a wall of secrecy."

Other laboratory scientists say they simply provide expert information on nuclear matters, as required by their charter. Robert Selden of Los Alamos said lab presentations are based on science, not politics: "We're responsible for the technical base of the weapons program and that's what we talk about."

But last year, at the request of Congress, Livermore physicist Ray Kidder began examining one of the standard laboratory presentations to national officials: that nuclear tests are necessary to maintain a reliable arsenal. The United States has used those presentations in arguing against a test ban treaty to its NATO allies.

Ray Kidder

In a report released this fall, Kidder concluded that the nuclear stockpile is durable enough to survive without steady testing. He pointed out that proof tests have revealed a remarkably stable arsenal.

Further, Kidder maintained that laboratory examples of troubled weapons — provided to prove that tests are needed — reflect weapons that were poorly tested *before* being put in the stockpile. For example, the air-launched cruise missile, which turned out to work poorly in cold temperatures, was not given a nuclear test for such effects before going into production.

Kidder's position on stockpile reliability is supported by Livermore's DeWitt, who reviewed the same data, and three former Los Alamos weapons scientists, including former Director Norris Bradbury.

But it is contradicted by a team of Livermore scien-

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tists, who also prepared a report to Congress this year. That report said there is no such thing as a "thoroughly tested weapon" that goes into stockpile. The costs — a minimum of $10 million per test — prohibit scientists from exploring every angle.

"The matter of adequate testing is one of interpretation," says William F. Scanlin, deputy associate director for defense systems at Livermore. "We're in charge of the program. We've got the responsibility on our backs. Ray Kidder doesn't."

Still, so many doubts have been raised that university faculty members requested an investigation last year. UC's Scientific and Academic Advisory Committee, which monitors technical excellence at the labs, was given the job.

The committee members interviewed only pro-testing scientists at Livermore and Los Alamos. They did not talk to Kidder or DeWitt. And Kidder said that when he offered committee members some of the documents he was reviewing for Congress, they turned him down.

"What I got instead was a lecture on patriotism," Kidder says.

The committee report, released this summer, said that both the labs and their managers were performing exactly as they should. Panel members said that the labs had not affected progress toward a test ban treaty.

"In our opinion, the report demonstrates the ineffectiveness of the university's oversight of the weapons laboratories," wrote UC Santa Barbara physicists Jose Fulco and Walter Kohn in an angry rebuttal to the UC regents.

"No independent technical judgment of the laboratories' positions on weapons testing was made; faculty suggestions which would have broadened the lab's posture were rejected; and all aspects of the laboratories' operations and the university's management role were found to be without a single blemish."

Further, the faculty began to suspect that the report didn't accurately reflect even the panel members' views. Shortly after the report, Kohn and Fulco received a letter from committee member Herbert York, saying he considered the stockpile to be "already robust enough to maintain deterrence during a test-ban regime."

York, a former director of Livermore, didn't consider the report an appropriate place for stockpile analysis. But he didn't deny concerns about whether the labs have been kept objective.

"Does UC protect the labs from the political winds? That's the question all right," York said. "And maybe things are out of control there. It's an important question."

Scientists say lab politics were highly visible in difficulties experienced by Roy Woodruff, a Livermore nuclear weapons expert who tried unsuccessfully to counter exaggerated reports on "Star Wars" programs.

Roy Woodruff

In a grievance filed with the university, Woodruff said that overly optimistic reports on the X-ray laser, a key "Star Wars" weapon, were sent to top Reagan administration officials for at least two years. A 1983 letter to the White House sci-

ence adviser even stated that the X-ray laser was entering "engineering phase," ready for full-scale weapons development. Today, the laser is still not a workable weapon.

In fact, Woodruff wasn't the only scientist alarmed at the reports on the nuclear bomb-pumped X-ray laser. Nobel laureate Hans Bethe of Cornell University expressed concern about misrepresentation; so did Donald Kerr, former director of Los Alamos, and Rich Wagner, who served as one of the top nuclear weapons officials in the U.S Department of Defense.

Woodruff said, in a formal complaint, that the lab's director blocked all his efforts to correct the misleading statements by two colleagues, Edward Teller and Lowell Wood. Woodruff resigned as head of nuclear weapons research in October 1985, largely in protest. Although he repeatedly sought help from the university, officials there refused to investigate the accuracy of "Star Wars" information coming from the laboratory.

William Frazer

Internal documents show that Woodruff even met with UC Vice President Frazer before last year's failed Reykjavik, Iceland, summit and argued that the university should assure that the president receive balanced information. No such steps were taken. Frazer said he was more concerned with the larger issue of freedom of speech.

Laboratory director Roger Batzel has refused to comment. Teller, developer of the hydrogen bomb, acknowledges today that the X-ray laser is still not a weapon. But he refuses to discuss the specifics raised by Woodruff. And Kane and Frazer both say that the university doesn't want to be in position of defining accuracy — what Kane describes as "institutional truth."

Concerned faculty members, however, point out that Woodruff was denied free speech when — according to his grievance — the director stopped him from writing letters of correction. Both the faculty group and Woodruff have asked the university and its scientific advisory committee to explore that issue and the broader one of essential lab integrity. So far, both have refused.

Questions of credibility, however, have sparked two federal investigations. The General Accounting Office is looking into the X-ray laser situation. And the House Energy and Commerce Committee is investigating claims that lab scientists have lobbied in Washington against a test-ban treaty.

The latter investigation began earlier this year, when officials discovered that a Los Alamos nuclear weapons scientists wrote a memo lining up a group of pro-weapons scientists to visit members of Congress and discuss the need for nuclear tests. The Energy Department maintains that such a move is simply part of the labs' mission to inform — and lab administrators agree.

"The real issue is: Are DOE and the administration right to go out and inform Congress on nuclear tests," said Livermore's Paul Brown. "I think they are. I did congressional briefings myself at DOE's request. That was all there was to it."

Brown, assistant associate director for arms control at the lab, said that laboratory scientists recognize the importance of treaties limiting warheads — but maintain that such negotiations depend on reliable weapons.

A similar insistence on a believable arsenal has led many Livermore and Los Alamos scientists to raise concerns about an early launch of space weapons for the Strategic Defense Initiative. Researchers told The Bee that they have solved some interesting physics problems in the past four years but have yet to produce a workable weapon.

Private contractors in California admit the same. They point to the the Alpha laser, a chemical weapon being developed by Los Angeles defense contractor TRW. The laser is considered among the most promising — but its internal mirrors, developed at Livermore, weigh more than two tons.

"That's no good for a weapon that has to be launched," says David Atkinson of Livermore. In addition, both the X-ray laser and the free-electron laser are unproven. And guidance systems on the proposed space-based attack rockets, called kinetic kill vehicles, are yet incomplete.

In fact, Chris Cunningham, who leads an SDI analysis group at Livermore, says national leaders should consider themselves years away from making a decision on deployment: "Our concern is that we might put up just anything and provoke a Soviet response," he said. "And that doesn't make sense."

John Pike, executive director of the American Federation of Scientists, worries, however, that SDI may become increasingly unstoppable as private industry gets more interested. He warns that the commercial incentive is not in research — at some $3 billion a year — but in deployment.

"The reason the SDI program is significant for aerospace companies is not because of research," agrees TRW Vice President Robert Walquist. "But deployment would be hundreds of billions to a trillion dollars. There's big money, obviously, in that phase."

And California is very dependent on big defense spending these days, indeed unmatched in defense contracts. Last year, it received almost a fifth of the Pentagon's budget, including close to $30 billion in prime contracts to such aerospace giants as Lockheed, TRW, Boeing and Rockwell. A state study shows that 39 percent of California's communications industry and 22 percent of its electronics business are defense supported.

California's universities, too, have become highly reliant on Pentagon support; more than a third of the federal research grants at the University of Southern California now come from the Defense Department. The University of California and Stanford also report steady increases in defense research — and fewer grants from other federal agencies. At UC, for instance, federal environmental research has been cut in half in the past seven years.

State officials acknowledge that the increasing reliance on defense spending — both at universities and in the private sector — is part of a national trend under the Reagan administration. But they say, California, by being such a magnet for defense money, has become far more vulnerable.

"If you throw the defense industry out of California, the economy collapses," says Robert Kuntz, executive director of the private California Engineering Foundation. "And that's something to be concerned about."