



United States  
of America

# Congressional Record

PROCEEDINGS AND DEBATES OF THE 107<sup>th</sup> CONGRESS, FIRST SESSION

Vol. 147

WASHINGTON, WEDNESDAY, SEPTEMBER 5, 2001

No. 114

## Senate

The Senate met at 10 a.m. and was called to order by the President pro tempore [Mr. BYRD].

### PRAYER

The Chaplain, Dr. Lloyd John Ogilvie, offered the following prayer:

Omnipotent God, all-powerful Lord, all authority comes from You. You raise up leaders and entrust them with spiritual, intellectual, and physical power. All You require is humility to acknowledge You as the source of all that they have, and they are accountable to You for how they have used Your entrusted power. You delight to bless those who delight in giving You the glory. Forgive us when we assume that power comes from titles and positions. Most of all, forgive our dependence on, and satisfaction with, our own limited human powers. You offer us supernatural power to think beyond our understanding and lead courageously beyond our abilities. May this be a day when we deliberately ask for Your power and live expectantly for Your divinely inspired strategies and solutions. When we give up the idea that we are the source of our power, You amaze us with what You are able to do through us. So free us from bartering power, struggling for power, and manipulating with power.

Spirit of the living God, anoint the men and women of this Senate with Your power so this Nation will know that it is being led by people who trust You, who share party power to accomplish Your plans, point away from themselves to You, and attempt great things for You because they have received great power from You. Amen.

### PLEDGE OF ALLEGIANCE

The Honorable ROBERT C. BYRD led the Pledge of Allegiance, as follows:

I pledge allegiance to the Flag of the United States of America, and to the Republic for which it stands, one nation under God, indivisible, with liberty and justice for all.

### RESERVATION OF LEADER TIME

The PRESIDENT pro tempore. Under the previous order, leadership time will be reserved.

### EXPORT ADMINISTRATION ACT OF 2001

The PRESIDENT pro tempore. Under the previous order, the Senate will resume consideration of S. 149, which the clerk will report.

The legislative clerk read as follows:

A bill (S. 149) to provide authority to control exports, and for other purposes.

The PRESIDENT pro tempore. The Senator from Nevada is recognized.

Mr. REID. Mr. President, the Senate is going to be working today on the export administration bill. Senator DASCHLE called a joint leadership meeting today, and he and Senator LOTT, among others, indicated a real desire to move on to the many things we have to do in this month, especially appropriations bills.

Senator SARBANES is certainly one of the most skilled legislators, and I know he is doing everything in his power, as is Senator GRAMM, to move this export administration bill as quickly as possible. We had an overwhelming vote yesterday on an amendment. The opposition to moving this bill forward I think got 18 votes. From my personal perspective, that is a high water mark. I certainly hope the few Senators who oppose this legislation will recognize the need to move forward with the legislation not only for the Senate but, more importantly, for this country.

We have eight appropriations bills we need to complete by the end of the month. Using the numbers we have, we probably only have about 12 legislative days this month, with the Jewish holidays and the big conference being held late in the month that will take a day away from us. We just need to move expeditiously.

I repeat, I hope those people who oppose this legislation will recognize that

we are going to pass this bill. It is just a question of when. Their holding this up isn't to the good of this country. I know that the people who oppose this legislation believe they are doing the right thing. I hope they will recognize that just a few Senators are opposing this bill. We need to move forward. We have a fiscal year that is coming to an end in just a few weeks. We have not completed a single conference on the five appropriations bills that have passed.

The leadership has committed 1 week to Defense authorization, which takes away more time from our appropriating process. Whether people like it or not, the 13 appropriations bills have to be passed or we are going to wind up with a big fat omnibus bill called a continuing resolution that doesn't help anybody, especially the country.

So I am confident there will be roll-call votes on amendments throughout the day. The Senate is going to recess from 12:30 to 2:15 for the weekly party conferences today. Again—and I think I speak for the joint leadership—we need to move past this bill and get on to the appropriations bills. On appropriations bills, we have to have a way of moving them more quickly. I think that is the belief the leadership has in trying to move to the Commerce-State-Justice bill just as quickly as possible.

The PRESIDENT pro tempore. The senior Senator from Maryland, Mr. SARBANES, is recognized.

Mr. SARBANES. Mr. President, I echo what my colleague, Senator REID, just had to say. We are back on the bill. We did a number of opening statements yesterday. I know there were a couple Members who indicated that they want to be able to just speak on the bill briefly. I invite them to come over. Anyone who has amendments, we are open to consider them. I hope we can possibly finish this bill today and thereby enable the Senate to move on to other business for the remainder of

• This "bullet" symbol identifies statements or insertions which are not spoken by a Member of the Senate on the floor.



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the week. I frankly say that ought to be our objective. Hopefully, we can reach it. I do know there is a state dinner this evening that may impact on the Senate's schedule.

Mr. REID. If the Senator will yield, all of us haven't been invited to the state dinner, so some of us can still work.

Mr. SARBANES. I implore my colleagues who are within earshot, if they wish to make a statement on this bill, to come to the floor and get that done this morning before we go to the two weekly conferences. I also hope that at some point shortly we could have an amendment laid down and proceed to move through the amendments.

I yield the floor.

The PRESIDENT pro tempore. The senior Senator from Tennessee, Mr. THOMPSON, is recognized.

Mr. THOMPSON. I thank the Chair.

Mr. President, I have listened to the distinguished majority whip this morning expressing concern that we move on with this bill. I think we can do that. We had a good discussion yesterday. We had a vote on one amendment that was a pretty definitive vote. We all get to the point where we can count votes around here, and we know which way the die is cast as far as this bill is concerned.

The administration supports this bill. Apparently, the administration is going to oppose any and all amendments. That is unfortunate. That is, frankly, shortsighted, but that is the way it is. I do not think we want to belabor the matter any more than necessary.

I must say, we have had some very good discussions this morning on both sides of export administration in this country. We are still talking, and we may be able to come together on some things that will help the bill and help some of us who have concerns about this bill. I know Senator KYL from Arizona is on his way to the Chamber and would like to make an opening statement, and then we will move on from there and see where we are.

Until Senator KYL gets here, I will reiterate some of the bases for our concern. We make no apologies for bringing these amendments up regardless of the fact we have an appropriations bill pending. As important as these appropriations bills are, the national security of this country is even more important. That is what we are dealing with here, the issue of national security. We all have the same thing as our ultimate goal for the protection of this country, but we have some quite distinct and different ideas about how to get there.

Export administration legislation in this country traditionally has been designed not to facilitate business but to help protect the national security interests of this country. If one looks at the purpose that is set out in this legislation, it does not say anything about expediting business.

No one wants to bog these exports down, but the fact of the matter is,

they are not being bogged down. It was said yesterday for a broad category of items, the average processing time is 13 days, I believe—13 days. What it does set out and the purpose for this legislation, as similar legislation in the past has set out, is that we want to make sure we are not assisting the proliferation of weapons of mass destruction. We want to make sure that in our haste to do business—there is no greater freetrader in this body than I am—and to export that we do not make mistakes. That is what the export administration legislation is all about.

We are living in a different time than the last time we addressed this issue. We are living in a world where we do not have the old Soviet Union and the massive European assault that we all feared looming over our heads. But what we do have is many different threats, more insidious threats in many respects and more dangerous in many respects because those threats are in the hands of totally irresponsible individuals in other parts of the world.

We get these reports from Presidential commissions. We get these reports from our intelligence community warning us, time and time again, that it is growing, that it is based on technology, that the threats are great—nuclear, biological, chemical threats—and the ability to deliver those threats to our soil is growing year by year. Even a country such as North Korea, which is starving it's people to death, can pose a mortal threat to major American cities, having already launched a three-stage rocket over Japan just to demonstrate what they can do, while a million people are starving in North Korea.

That is the nature of the growing threat based on technology. Our intelligence agencies point out to us that a lot of this technology is derived from countries such as Russia and China, which our intelligence agencies still say are massive proliferators of weapons of mass destruction.

Here we are getting ready to pass legislation to make exports of dual-use items, which can possibly be used for military purposes, to countries such as Russia and China easier.

When Mr. COX and others on the commission tell us that the Chinese, for example, are diverting products imported for civilian reasons to military purposes, and they also tell us that part of the problem has been created by our own laxity in our export laws, I do not know how much more definitive the record needs to be for us to be concerned, when we sit down to write an export administration bill, that we not make any significant mistakes in the bill with regard to contributing to the growing threat to the national security of this country.

There are great commercial interests involved. There is substantial commercial interest. They are substantially involved in the political process, but in terms of the trade welfare to this coun-

try, they constitute about 3 percent of our total exports. The exports to these controlled countries constitute about 3 percent of our total exports; 90-some-odd percent of those export applications to those countries are approved, so we are talking about a small fraction of 3 percent of our exports that we are dealing with.

Some make it sound as if we are trying to shut down exports or we are trying to close the borders. We are not. It is important, and it is growing. The interest here is not what can happen today. The interest is the potential, and the potential is great, but therein lies the potential problem.

Even though the technological genie is somewhat out of the bottle, to be sure, but not totally out of the bottle or we still would not be trying to keep things out of the hands of Saddam Hussein, Iran, and North Korea, we implicitly acknowledge some control is doable. But let's just say for the sake of argument the genie is out of the bottle and eventually everybody is going to get everything.

Does it not benefit our country somewhat to say with regard to these most sensitive items we need to slow certain countries down while we are trying to come together on a consensus on things such as national missile defense? We are expending great political capital in this country and will be spending, I think, great monetary capital, as it were, on a missile defense system. I think that is an appropriate thing to do.

We are willing to go to our European friends, Russia, China, and have a debate here based upon this threat about which I am talking. Does it make sense when we are so concerned about this threat, and we do not have a missile defense system off the drawing board yet, for us to be hustling to make sure that potential adversaries a few years down the road are caught up to date, technologically, to be even with us or to improve themselves to a point where they can be competitive with us?

Does it make sense for us to be helter-skelter assisting as much as we can while we are in this stage over here and trying to defend ourselves against these same technological challenges? That is what this is all about.

We may have appropriations bills we want to get passed and we may say: We had a big vote yesterday and the die is cast; get away, son, you bother me.

It is not going to be quite that easy. This issue is not going to go away. I understand those of us who comprise the committees that have to do with intelligence and national defense matters form a distinct minority. When we first started debating this issue, I was chairman of the Governmental Affairs Committee that has jurisdiction over matters of proliferation, as well as other things.

The chairman of the Armed Services Committee, the chairman of the Intelligence Committee, and the chairman of the Foreign Relations Committee,

all of us were as one in expressing the concerns I have laid out today. We still have those concerns, although we are ranking members now instead of chairmen of the various committees, but we also recognize we are in a distinct minority. We have been unsuccessful in persuading enough of our colleagues these concerns are so great we ought to at least have some amendments to address some of these concerns.

I am still hopeful. We have had some good discussions recently, as discussions tend to come about once we are considering an issue. With regard to things like a Presidential commission, for example, that is an idea that Senator SHELBY, who was chairman of the Intelligence Committee, now ranking member, has espoused for a long time and one that we have all supported at one time or another. The idea is we have a blue ribbon commission established. We know some of these commissions do a good job and some do not, but we had such a good experience with the Rumsfeld commission, a bipartisan commission made up of experts, some from a more liberal persuasion, some more conservative, but people of unimpeachable expertise who were appointed and took a look at the kinds of issues I have been talking about this morning, why can't we do something along those lines to answer some of these questions we have posed, such as what effect are our export policies having on national security?

As I talk about it, I am very well aware the distinguished senior Senator from West Virginia, who now presides, has been a leader on this very issue and he is responsible for a commission that is doing some good things in this same area but perhaps targeted a little bit more on answering some of these questions. The problem, as I see it, is not that I have the answers that we are definitely doing something that is going to be hurting national security or it is not that my colleagues on the other side of this issue have the answers that they are definitely sure we are not doing anything that is going to be harming national security. I am afraid the point is, we do not really know. We do not know the effect of what we are doing. We do not really know, now that we are about to pass this bill, what the effect of this bill is going to be or what it might look like a year from now.

As a part of the Defense appropriations bill in 1998, there was a provision which acknowledged, first of all, that there was a massive decontrolling of our supercomputers going on in the Clinton administration. They changed the MTOPS level rapidly so more and more supercomputers could be exported. There has been a growing consensus almost, I would say, among a lot of the people who follow these matters in the country that perhaps MTOPS is not the best way to decide what should be controlled in terms of these supercomputers. Maybe we need to look at something else. We did not

really look at something else. We decontrolled, and now what we are doing in this legislation, in terms of MTOPS, is totally decontrolling and doing away with it. So it is an extension of the Clinton policy.

Also in that 1998 legislation, there is a provision that says, as we do that we must do a national security assessment of the effect of doing this. That was never done. It has never been done.

It is bad enough we are not following our own laws, but it is doubly bad we do not know the answer. So we are having some discussions now about can we not get together and come up with an independent assessment, over a period of time, as to what the effect of this might be?

Another issue we are discussing is the so-called deemed export rules. As I am sure the Presiding Officer knows, we have a system in this country that basically says if you export a certain item or information to another country, you need a license for certain kinds of things. Also, if you give that same information to a foreign student, a foreign national, who is over here working in, say, one of our laboratories, or one of our businesses, if you give him that same information, that is the equivalent, potentially, of exporting the matter. It is called a deemed export, and we need to look at that carefully also.

We had hearings in the Governmental Affairs Committee a year or so ago, and we found out that the law is being universally ignored by our laboratories. Private business is doing a much better job of complying with the deemed export rules and seeking licenses for these transfers of information than is the Government. Of course, they have a proprietary interest in doing so, but for whatever reason they are doing a much better job. Our laboratories have done a very poor job and now, of course, we know that valuable information has been taken, illegally and improperly, from our laboratories, which is the repository of some of the most sensitive information, if not the most sensitive information, our country possesses. We need to do something about that.

This bill does not address that. These are as much exports or potential exports as some of the goods flying to another country.

My understanding is the administration has expressed some concern that this is a complicated subject which they have not had an opportunity to address yet and would prefer to have the opportunity to address, and I understand that. A lot has been laid on their plate in a short period of time. We came to them with this whole export business, this whole overhaul issue, when they were still trying to get draperies in their office. Getting any modern President's team together now is a long, drawn out process. Some say it will be 12, 14, or 16 months before this administration gets its team together. We are laying this highly tech-

nical stuff on them at a time when many of the important departments do not have their team together. I prefer to put this off until later, until they have had the opportunity to get their team together, but they have seen fit to agree to have this go forward. It makes a certain amount of sense.

We do not want to discourage foreign students from coming to the United States. It is important for many different reasons. We do not want to close our borders. With as many problems as we have had with the People's Republic of China over the last few years, they have 54,000 students here now. We do not want to reverse that process. Many make valuable contributions to us and what we are doing. Many choose to stay here. However, in the process we have to learn to protect ourselves. Because we have peace and prosperity today does not mean we will have it forever.

I just finished reading a book called "While America Sleeps" in which the Kagans were drawing a parallel between the United States today and England after World War I. This book is based on Winston Churchill's "While England Slept." They talk about when a country wins a war or skirmish, the tendency is to allow your military to go down, to have a higher threshold for engagement elsewhere. You want a peace dividend. You want to come back home and enjoy the peace dividend and forget about the unpleasantness. By doing that, you encourage problems here, there, around the world. They are very small at first, and they grow into major problems that ultimately a democracy has to address. We do not want to do that. That is what we are trying to avoid.

These are a couple of areas on which I think we might still have come together, even at this date. I am hopeful of that. Again, I reiterate, this is not foolish business we are engaged in. These are not dilatory tactics. These are not things to get on with while we wait to get on with the more important business of spending money. It is not about money but about the national security of this country. I do not care if we have to have 95-5 votes on some of these issues. Time will tell the correctness of the various positions. Some Members believe it is very important to lay them on the table, require deliberate consideration, and see whether or not even at this stage of the game we cannot come together at least on some things that might make this a better bill and ensure the enhanced security of this country.

I yield the floor.

The PRESIDING OFFICER (Ms. CANTWELL). The Senator from Maryland.

Mr. SARBANES. Madam President, I am hopeful we can work out some of these matters which he discussed. I think the idea of a presidentially appointed independent advisory committee to review the matter and submit its findings to the Congress at an

appropriate time is a good idea. It may well prove of significant benefit.

I repeat what I said yesterday. I think all 100 Members of the Senate are concerned that our national security is effectively protected. I hope what we went over yesterday, provisions of the bill and some of the authority given to the President, provided some reassurance in terms of ultimate authority to act on behalf of important national security and foreign policy interests. I hope in the course of the day we can work through some of these matters and perhaps move to a conclusion.

Again, I state my appreciation to the Senator for the questions he raised and focusing our attention on them. He has done that consistently as we have moved through the process. I know my very able colleague from Wyoming, Senator ENZI, has interacted throughout. What is before the Senate in this legislation has been shaped in part by questions and concerns the Senator has raised. It is not as though there has not been a response to some of the matters brought forward, and that is reflected already in the legislation before the Senate.

Mr. THOMPSON. If the Senator will yield, I certainly agree with that. I should not leave the impression that this has been a totally adversarial proceeding. We have had discussions, and this bill does incorporate some of the points we have discussed at prior times. I appreciate that.

Mr. SARBANES. I yield the floor.

The PRESIDING OFFICER. The Senator from Arizona is recognized.

Mr. KYL. Madam President, this past weekend the Washington Post ran articles on a Bush administration decision to impose sanctions on a Chinese company that it found to be transferring sensitive missile technology to Pakistan in violation of last November's agreement to terminate such transfers. Two of my colleagues, the chairman of the House Intelligence Committee and the chairman of the Senate Intelligence Committee, and I just returned from a visit to Pakistan, and we expressed concerns about the proliferation of weapons of mass destruction technology in that area of the world. We are very aware of the situation which could easily evolve in that part of the world because of tensions between different countries that could inadvertently result in the use of nuclear weapons, something no one in the world wants to occur. Part of that is because of the willingness of countries such as China to transfer technology to countries that could use those weapons.

Sunday's Washington Post article to which I referred noted that the decision to impose sanctions on the Chinese Metallurgical Corporation came over the objections of Asia experts in our State Department who "had warned that this could further fray Sino-American relations."

Of course, anytime one enforces a provision which is designed to protect

the U.S. national security on a corporation that is violating the terms of agreements or provisions which could prevent the transfer of this technology, it will upset someone. They have been caught cheating, and to the extent we are willing to enforce it, they are not going to like the result. However, that is what is at stake: Our willingness to enforce the regime which we have heretofore imposed that hopes to at least reduce the amount of transfer of technology to countries that would use that technology in an irresponsible fashion.

I ask unanimous consent to have printed in the RECORD the article "Chinese Arms Firm Faces U.S. Sanctions."

There being no objection, the article was ordered to be printed in the RECORD, as follows:

[From the Washington Post, Sept. 1, 2001]

CHINESE ARMS FIRM FACES U.S. SANCTIONS  
TECHNOLOGY ALLEGEDLY PASSED TO PAKISTAN  
(By Alan Sipress)

The Bush administration will impose sanctions today on a major Chinese arms manufacturer because it transferred sensitive missile technology to Pakistan despite assurances by Beijing last year that it would refrain from these exports, according to the State Department.

A department official said yesterday the United States would place sanctions on the China Metallurgical Equipment Corp., a private company that administration officials say works closely with the Chinese government, and at the same time on the National Development Complex of Pakistan, which received the missile technology.

The decision to take these punitive measures comes a week after a U.S. delegation to Beijing headed by Deputy Assistant Secretary of State Vann Van Diepen failed to break a deadlock over U.S. demands that China halt the transfer of technology for missiles that can carry nuclear warheads. Last-ditch negotiations in recent days also proved unsuccessful, officials said.

The new American measures could further sour relations between the United States and China, which have begun to rebound after a tough spell in the opening months of the Bush administration. With President Bush scheduled to visit China late next month, the two countries have tried to move beyond their dispute this spring when a U.S. Navy surveillance plane and its crew were detained on Hainan Island after colliding with a Chinese jet.

Secretary of State Colin L. Powell raised American concerns about missile proliferation during a visit to Beijing in July and warned that the administration might impose sanctions unless China adhered to an agreement reached last November. Under that accord, the United States agreed to issue licenses for American companies to launch satellites on Chinese rockets.

Powell and his Chinese counterparts agreed during his trip to resume talks on weapons proliferation. The two sides had not discussed this matter since last November, when China agreed not to help other countries build missiles capable of delivering nuclear weapons. U.S. diplomats had filed formal protests with China alleging that it had violated the agreement numerous times by providing missiles or missile technology to Pakistan and other countries.

Both the Chinese and Pakistani officials have denied allegations of missile technology sales.

But a State Department official said yesterday that China's transfer of Category 2

technology had contributed to Pakistan's missile program, flouting the international guidelines established to govern the proliferation of missile parts and technology. Under the Missile Technology Control Regime, Category 1 refers to whole missiles while Category 2 includes constituent parts and technology.

As a result, the administration has also been considering whether to suspend the issuance of licenses for U.S. companies to place their satellites on Chinese rockets and make it illegal to transfer American technology to China's satellite industry. The Los Angeles Times reported in today's editions that the United States had decided to take these punitive actions.

These steps, which could set back China's efforts to develop its industry, may also prove painful for some American companies that have seen Chinese rockets as a relatively inexpensive way to place their satellites into orbit.

The Bush administration has said it is worried about recent reports that China was providing sensitive missile technology to Pakistan. Sen. Joseph R. Biden Jr. (D-Del.), Chairman of the Senate Foreign Relations Committee, pressed Beijing during a recent visit there to end these transfers and called for sanctions to be placed on Chinese companies that are shown to be helping Pakistan's missile program.

U.S. officials have at the same time expressed concern about what they say are Pakistani attempts to develop a nuclear missile program. The United States imposed sanctions on Pakistan and India after both countries tested nuclear weapons in 1998. India and Pakistan have a long-standing border conflict over Kashmir and their development of nuclear weapons, security analysts say, has made South Asia potentially the most dangerous place in the world.

While Sino-American relations have been complex and often difficult for decades, the United States long has close relations with Pakistan, especially when it was a crucial Cold War ally. But those ties have grown estranged in recent years and not only because of Pakistan's nuclear program. U.S. officials have also expressed dissatisfaction with the 1999 military coup by Gen. Pervez Musharraf that ousted democratically elected Prime Minister Nawaz Sharif and with Pakistan's ties to the Taliban movement ruling much of Afghanistan.

Mr. KYL. This mentality that enforcing the law could further fray relations with countries such as China, for example, lies at the core of much of what we are debating with respect to the legislation before the Senate. It is the continued relevance of robust export controls on the one hand versus legislation that is explicitly designed to weaken those controls in order to enhance trade on the other.

While the case that the Washington Post article discussed involves Chinese technology transfers to Pakistan, these actions on the part of foreign countries with records of proliferating militarily sensitive technologies are central to the overall debate over U.S. controls on exports to countries that in turn transfer knowledge and hardware to third countries to which the United States would not currently export such items or knowhow. In other words, it is the transfer of this technology through a middleman, so to speak.

In addition to this most recent China-related proliferation development, the U.S. Customs Service last

week arrested two United States-based Chinese nationals involved in smuggling, and smuggling extremely sensitive military encryption technology to China—another violation of the Arms Export Control Act.

While the encryption case does involve the Arms Export Control Act and not the export administration regulations which are the issue today, it does nevertheless significantly highlight the scale of the problem that confronts the United States in preventing certain countries from either legally or illegally obtaining militarily sensitive technologies that could most assuredly be used against the United States or our allies in a future conflict.

There exists a mistaken notion that the end of the cold war eliminated the national security justification for controlling exports in technologies with both civilian and military applications, but nothing could be further from the truth.

The President, in April, announced his decision to sell to Taiwan \$4 billion worth of weaponry to better defend itself against the growing military threat from China. That threat, already considerable, involves primarily conventional arms, including the 300 missiles currently targeted against Taiwan, a number that is projected to grow in the future.

A decision to liberalize controls on dual-use technologies, every one of which by definition have military applications, while acknowledging, as we all do, the very real threat posed by China to Taiwan and to U.S. interests in the Far East, is therefore inconsistent with and clearly contrary to our national interest.

Make no mistake, much of this debate is about China. The so-called rogue nations are at issue here only to the degree that other nations such as China, and at times even the United States, end up selling military-sensitive items to those countries, either directly or, as I said before, through third parties. So this is just one example of the fact that the end of the cold war has not ended the necessity of keeping an eye on the kind of dual-use technologies sold abroad because in the end those technologies could be used against the United States or our allies.

Let me just give some examples of things that have happened with exports in the not too distant past that illustrate this point.

In July of 1998, IBM's east Europe/Asia subsidiary entered a guilty plea for the unlawful export of computers to Arzamas-16, a Russian nuclear weapons laboratory.

Silicon Graphics similarly illegally sold high-performance computers to Russia's Chelyabinsk-70 nuclear laboratory.

This past July a company in my home State, Arizona, settled charges that it had illegally exported diode lasers to Israel, 16 times between 1995 and 1997.

And, of course, there is the 1994 sale by McDonnell to China National Aero-

Technology Import-Export Corporation of an entire warehouse full of machine tools for the production of modern military aircraft and missiles continues to represent not just a highly inappropriate export but the problem of diversion of exported dual-use technologies to the noncommercial side of the equation. Some of the machine tools in question were diverted to a factory that manufactures Silkworm missiles—the very missiles that now line Iran's coastal waters on the Persian Gulf.

These are just a few examples of what can happen.

When the post-World War II export control regime was established in 1949, there was an explicit recognition of the difficulties that would be faced in regulating militarily sensitive items that also had benign commercial applications and that should not necessarily be denied to all potential customers. It is a problem.

The principal country at issue then, of course, was the Soviet Union, with China a secondary concern. The success of United States unilateral, as well as COCOM multilateral export controls in keeping many vitally important dual-use technologies out of the hands of the Soviet Army was an important component in the national strategy that ultimately resulted in the Soviet Union's demise.

There is no denying the gravity of the problems we faced after the cold war when sensitive technologies exported by western countries to Iraq were suddenly threatening United States and allied troops in the Persian Gulf war. The lack of a more far-sighted export control policy—and I would be remiss were I to ignore the geopolitical context in which legal if questionable sales to Iraq occurred during the Iran-Iraq war—was instructive as to the nature of the problem we face today.

It must be assumed that nondemocratic regimes will exploit dual-use technologies for military purposes. So the end of the cold war has not reduced the need for us to continue to be concerned about the export of these dual-use items.

I would like to take a couple of minutes to review a classic case of dual-use technologies being permitted to be sold a nondemocratic regime known to be interested in developing weapons of mass destruction and the means to deliver them: the case of Gerald Bull's Supergun. The British author James Adams back in 1992 wrote about Iraq's covert efforts at acquiring the components with which Canadian ballistics expert Bull was to assemble a cannon capable of firing large nuclear payloads to Israel. We can discuss the military utility of that gun, had it not been destroyed during the Persian Gulf war, all we want. What we can't ignore is the manner in which it was being built. It is also indicative of the type of problem the Customs Service recently uncovered with regard to Chinese efforts

at attaining United States military encryption technology. This Adams described in his book on the life of Gerald Bull:

British intelligence knew that . . . the Iraqis had already established a vast international procurement effort . . . [I]n information was discovered in Europe that suggested two British companies, Walter Somers and Sheffield Forgemasters, were also implicated in the scheme [in addition to a Spanish company].

At the beginning of April, a few weeks after Jerry Bull had been killed, SIS (British intelligence) was tipped off that a shipment of parts destined for the supergun was about to be sent to Iraq . . . On Tuesday, April 10, 1990, customs officers examined a number of crates stored in the warehouse on Quay Seven of Tees Dock . . . Eight wooden cylinders, each twenty-five feet long by three feet wide, were marked "Republic of Iraq, Ministry of Industry and Minerals, Petrochemical Project, Baghdad, Iraq." The crates were about to be loaded onto the *Gur Mariner*, a ten-thousand-ton Bermudian-registered cargo ship that was due to sail for the Iraqi port of Umm Qasr. The ship had been chartered by the Iraqi Maritime Organization.

Inside each crate was a smoothbore barrel that had been carefully machined so that it fit perfectly into the next barrel, with the tube tapering toward one end.

Adams goes on to write:

"We are considering the possibility that the gun was manufactured in Britain for the Iraqis," said a spokesman. "It is capable of firing a nuclear shell, or anything else you wanted to put on top of a one-meter shell, and could easily hit Iran or any other Middle East spot." [Note: The gun was, in fact, immobile and constructed against a mountain pointing directly at Israel]

To conclude the item from the book:

After the raid on the company premises of Sheffield Forgemasters, customs officials raided another company, Walter Somers . . . the maker of high-technology heavy forgings. They also claimed they had been supplying forgings to an Iraqi petrochemical project. Both companies claimed that the forgings were steel pipes and had no military application . . . The company that had made the pipes, Sheffield Forgemasters, claimed not only that the pipes were for the oil industry but that the company had received permission to export them from the Department of Trade and Industry.

Finally, on this case, Adams notes that:

In fairness the DTI (Department of Trade and Industry) was not familiar with the latest intelligence, and neither the intelligence community nor the MOD (Ministry of Defense) was made aware of the petrochemical contract. In addition, the DTI employs ninety-four staff members to vet seventy thousand export applications a year . . . It was precisely this kind of bureaucratic fumbling that had allowed Iraq to build up such an effective military machine in the face of international arms embargoes.

Forgive the digression onto an 11-year-old case, but it is highly relevant to our discussions on S. 149, the Gramm-Enzi export facilitation bill. S. 149 places inordinate control over dual-use exports in the hands of the Federal agency least capable of making informed decisions on the military applications of dual-use technologies and most interested in increasing U.S. exports, namely the Department of Commerce.

So the point of discussing the case is to illustrate that if you do not have the involvement of the intelligence community, which knows what is going on, or of the Department of Defense, that if you only have the Department of Commerce approving the export of these items, they are going to look at the face value of the application and assume it is for a benign commercial purpose. Without the knowledge of the intelligence community or the defense community, it will not necessarily know that in point of fact there is an ongoing specific effort to use that technology for very aggressive military purposes.

That is why you need an export regime which enables all of the communities of interest to be able to be a part of the decisionmaking process: To put the items on the list that need to be reviewed, to review the items that are subject to review, and to grant whatever licenses are appropriate to grant.

It is a big mistake to simply assume the department that is in charge of commerce is going to be able to make those decisions using all of the criteria that should inform the decision.

I go back, then, to this past week-end's stories on the sanctioning of the Chinese company for transferring missile technology to Pakistan, bringing this full circle. That simply illustrates the continued relevance of cases such as the one that I described in the story of Gerald Bull and the Iraqi supergun.

Take a look at the web site of the China Metallurgical Equipment Corporation (MECC), the company sanctioned. This was the subject of a Washington Post story. On the surface, this is a legitimate company with legitimate customers. As its web site states, ". . . the core enterprise of the China Metallurgical Equipment Group, MECC is involved in sectors of metallurgy, nonferrous metals, building materials, environmental protection and light industry." It does business around the world and considers itself a private enterprise.

While I support trade with China and certainly encourage privatization of its industries, we cannot let this hope that China will privatize industry and that we can expand trade with China get in the way of our national security interests. China Metallurgical may qualify as a private-sector company. It operates, however, under the thumb of an autocratic regime that is the single worst proliferator of technologies associated with nuclear weapons and ballistic and cruise missiles, and which as violated numerous agreements that ban such proliferation.

There should also be no mistaking the fact that we are not talking about technologies that anyone can purchase today at Radio Shack, which is something that sometimes you hear. We are talking about technologies with applications for the design and construction of weapons of mass destruction and their means of delivery. Cavalier assertions about the availability of these

items in your neighborhood electronics store trivialize the gravity of this issue.

The case of the Iraqi supergun involved pipe sections forged with highly advanced machine tools for extreme precision. At the end of the day, though, they were still something as otherwise seemingly innocuous as pipe sections. If supporters of S. 149 have their way, the kinds of technologies that will be available for export will be far more threatening than the Iraqi supergun.

For example, the Commerce Control List, which is maintained by the Department of Commerce and which lists dual-use items for which a license may be needed, has 2,400 items on it. The military applications of most of them would, in the wrong hands, directly threaten the security of the United States.

For example, thiodiglycol, which admittedly now falls under the Chemical Weapons Convention and its production is being phased out, is nevertheless a dual-use item. An industrial solvent, 500 tons were sold by the Belgian company Phillips Petroleum to the Iraqi State Enterprise for Pesticide Production. In 1988, the United States company Alcolac International exported over 300 tons of it to Iraq. It is believed that these shipments were diverted for use in the manufacture of mustard gas.

Aluminum alloy, which has a number of legitimate commercial industrial applications, is also used in the manufacture of rocket casings. China developed a welded aluminum alloy for use in its Yu-3 torpedo.

Ceramic composite materials are used in commercial electronics, but are also used in the construction of ballistic missile reentry vehicle antenna windows.

Side-looking airborne radars are on the CCL, yet have a very obvious application for foreign military aircraft against which we may find ourselves fighting some day.

Something as simple as wind tunnels, used in measuring the aerodynamic performance of airframe designs, are routinely used in the design of military fighter jets and missiles.

The Wisconsin Project on Nuclear Arms Control has noted, with respect to arguments that we should "build higher walls around fewer goods," that "Saddam Hussein's scientists were masters at upgrading medium-tech items to 'chokepoint' level. The Iraqis imported equipment that was dual-use . . . The Iraqis bought dual-use isostatic presses to shape A-bomb parts, dual-use mass spectrometers to sample A-bomb fuel, and dual-use electron beam welders to increase the range of Scud missiles. One of those Scuds killed U.S. troops sleeping in Saudi Arabia." That was the largest loss of life in any single attack in the Persian Gulf war.

There are many more examples.

A United States company headquartered in Rockville, Maryland,

American Type Culture Collection, was the most prominent of a long list of United States biological laboratories that exported pathogens to Iraq during the 1980s.

Biological pathogens represent the penultimate "dual-use" item. Even the Biological Weapons Convention permits the possession of otherwise banned pathogens for the purpose of developing vaccines.

We have just seen on the news this morning the breaking news about the work the United States is doing on certain strains of anthrax for purely defensive purposes because we understand those were developed for offensive purposes by countries. Without some kind of antidote to them, their use against other people would, of course, be devastating. That is why we need to develop the technology to find a defense against—a way of inoculating against—these particular pathogens.

But common sense should have indicated that the regime of Saddam Hussein would use the dozens of shipments he received from American commercial laboratories for the development of biological weapons, which is precisely what happened. Such biological agents as anthrax and botulinum toxin were sold to Iraq by American firms.

Gary Milhollin of the Wisconsin Project on Nuclear Arms Control has noted another example of this kind of dual-use proliferation to Iraq. It involved the component of what we refer to as the lithotripter, which is a medical device that is used in destroying kidney stones by blasting high-energy beams. There are high-precision electronic switches which are part of the lithotripter. These kinds of switches are also needed to detonate nuclear weapons. They would be decontrolled here because they are part of the lithotripter, a medical device.

It is interesting also because of their foreign availability. You can buy them elsewhere, but they would be decontrolled in effect under this legislation. Iraq purchases these lithotriptors. The amount of lithotriptors they purchase is interesting.

Milhollin has also noted the suspicious nature of the Iraqi purchases of lithotriptors, state-of-the-art machines used in breaking up kidney stones. Iraq's purchases of the lithotriptors, and far more spare parts than should ever be required, is suspicious because these devices are also used as triggers for nuclear weapons and the number purchased is consistent with the number of assembled weapons—minus the requisite fissile material—Iraq is believed to have by former members of UNSCOM.

So the point is that we should be highly suspicious of the import of these dual-use technologies by Iraq when they appear to be directly related to Iraq's nuclear program. Yet under the legislation before us, this shipment would be liberalized, and there is virtually no way to stop that kind of export to Iraq.

Another case is glass and carbon fibers used in ballistic and cruise missile construction as well as the enrichment of uranium. This would be decontrolled because of their use in the manufacture of items such as skis, tennis rackets, boats, and golf clubs. These fibers would also fall under the mass market of foreign availability criteria of S. 149.

Maraging steel used in the manufacture of solid rocket motor cases, propellant tanks, and interstage for missiles, as well as the enrichment of uranium, would also be decontrolled because of their application in the commercial rocketry and their availability in other countries.

Another example listed is corrosion-resistant valves used in the enrichment of uranium for nuclear weapons, yet also used in commercial energy, paper, and cryogenic industries.

The list of deadly serious military applications for items this legislation would decontrol is long and sobering. I will later ask unanimous consent to put in the RECORD a list that further illustrates this point.

Let's focus on the case that has been discussed in the past about fiberoptic cables. All of us know about the situation in which the United States actually had to destroy Iraqi air defenses because of the development of these air defenses as a threat to the United States and British aircraft carrying out their mission in Iraq. The systems were being upgraded through the installation of fiberoptic cable provided and installed by the Chinese.

Fiberoptic cable is clearly a dual-use item, but it also clearly has significant strategic importance. And its export to China again would be permissible under S. 149.

Allow me to talk for just a moment about the cost of business of these export controls, because the argument is frequently used that the reason we have to do this is because there is such a drag on the United States economy from the existence of export controls today, and that is why we have to liberalize the export of these dual-use technologies. Many major corporations are lobbying hard for this legislation based on this argument.

While I support free trade and support these appropriations normally, I disagree with them on this description of the sense of urgency. The fact is that the effect is only negligible from the export controls because they represent such a minor part of our overall economy. According to the Department of Commerce figures, the total value of all the goods exported to the control destinations represents less than 3 percent of all U.S. exports. We would be talking here about a very small percentage—less than 3 percent—of all of our exports.

Of just over 1,200 applications filed with the Commerce Department in 1999, for example, for licenses to export control dual-use items to China, the total value of those applications of sales was less than \$1.5 billion, which is

obviously a minuscule number as a percentage of our gross domestic product.

In short, I don't think we should judge this legislation on the basis that the U.S. economy is going to suffer if we continue to maintain a sensible export control regime worthy of the values we represent and the interests we seek to defend. In fact, there is really a critical argument being made by some here.

On the one hand, they argue there is such a dramatic negative impact on the American economy that we have to loosen up these exports. On the other hand, they assure us nothing much is going to change, that the same kind of items that have been controlled in the past that we believe are necessary to control will continue to be controlled, so don't worry about national security implications. One of those two assertions cannot be true.

Now let me discuss for a moment why I think Senate bill S. 149 actually makes the problem worse. There is one advantage to the legislation: It increases some penalties for violation by U.S. companies. That is an important advantage, but it is about the only thing that is better than current law.

I have spent a long time discussing some of the complexity of dealing with dual-use technologies because it is a complex subject. But that fact should not require us to throw up our hands and say we give up; that because some of these things can be mass marketed in the United States and because they are available abroad, we have to throw our hands up in the air and forget controlling these items.

The question is whether the United States wants to be part of the proliferation of technologies that could come back to haunt us in the future simply because somebody else in the world might do the same.

Let me just illustrate the point. I say this with all due respect to the members of these committees. The issue of export controls falls under the jurisdiction of the Banking Committee. This creates a situation analogous to that at the executive branch level. The Department of Commerce, under the provisions of S. 149, would be given most of the influence in the definition of what is on the control list and the subsequent regulation and licensing of those items. That is essentially at the expense of the involvement of the Department of State and the Department of Defense, who heretofore have been much more directly involved in the decisions made with respect to the export of these items.

Remember the case I cited, on which I took some pains to get into detail, of the gun sold to Iraq that could deliver a nuclear weapon. The point was that the Commerce Department of Great Britain did not know what the intelligence community and the defense community knew about the potential use of the item that was being exported, which calls into question a regime which only involves the agency of

our Government which is most interested in seeing that exports are increased.

So it should come as no surprise that the Banking Committee, which has this jurisdiction, has produced this bill which gives the Commerce Department most of the jurisdiction and gives, frankly, what I consider short shrift to the agencies of the Department of Defense, the State Department, and our intelligence agencies that should have more of a role to play.

The House version of this bill, on the other hand, interestingly, originates with the International Relations Committee and will next go before the Armed Services Committee, and it, of course, is much more heavily tilted toward the involvement of the State Department and the Defense Department, I would suggest, as a result.

So it seems to me we have to be a little more careful in the Senate to recognize that there are other committees, that there are other departments, and that we need to reconcile these differences between the House version and the Senate version of this legislation in the interest of national security.

Of course, it is true that the White House has endorsed S. 149. But I think it is also recognized that there is the potential for some improvements. They have indicated that in the administration of this legislation, with an Executive order that will implement it, some of the issues we have raised with them will be addressed. I very much appreciate their willingness to address these concerns.

I must say, I have the highest confidence in the current administration and in the officials who would have the obligation to administer this legislation. So hopefully there will be some improvements made at that time in the execution of the law.

It is also my hope—and I will echo what Senator THOMPSON said a moment ago—that before we conclude the discussion on this legislation, it will be possible for us to agree on at least some provisions that would improve the bill from our standpoint.

So I will be participating in those negotiations. I hope we can come to some conclusions on this matter. I will discuss a couple of the items I think we should address in just a moment. But to move forward with the description of the bill itself and why I think it is problematic, the primary concern is the fact that it will seriously weaken controls on literally thousands of items that have a dual-use capability—again, items that have some commercial application but also have some specific military capability.

For example, its provision establishing a National Security Control List would continue the unfortunate trend of marginalizing those agencies that are most responsible for national security—the Department of Defense, the Department of State, as well as the intelligence organizations that possess vital knowledge about the military significance of some of these items.

Specifically, the bill diminishes the role of the Department of Defense, the Department of Energy, the State Department, and the intelligence community in the license review process. Even the Clinton administration Executive order regulating dual-use exports in the absence of a permanent Export Administration Act authorized the Departments of Defense, State, and Energy to review any license application submitted to Commerce. But S. 149 would leave to the Secretary of Commerce the discretion to refer to the national security agencies those applications the Secretary of Commerce deems appropriate.

The bill would also repeal the requirement in the fiscal year 1998 National Defense Authorization Act that computers with certain capabilities be controlled. This is important because this represents the work of the Congress and the signature of the President on important legislation just 2 years ago, in response, primarily, to the breaking news of the technology transfers to countries such as China and the work that different groups did to evaluate the way that was happening, especially the work of the Cox committee which made, in addition, a variety of recommendations of how we could tighten up the process for exporting these kinds of items.

This National Defense Authorization Act had a very specific provision about the export of computers. But President Clinton, as he was leaving the White House, loosened significantly the export controls on high-performance computers significantly. Under President Clinton's guidelines, computers with a processing speed of fewer than 85,000 million theoretical operations per second—or MTOPS—no longer require a license for export to military organizations in so-called tier III countries, countries such as Russia, China, India, and Pakistan. By contrast, in 1997, computers with processing speeds above 2,000 MTOPS were barred from export for military end-users or users in tier III countries.

Now, to contrast: 85,000 MTOPS computers are extremely powerful. As a comparison, in 1997, some of the initial computers developed in the United States under our Stockpile Stewardship Program's Accelerated Strategic Computing Initiative, the so-called ASCI—and the specific project was called ASCI Red and ASCI Red/1024; very sophisticated computing programs—these programs had processing speeds of 46,000 and 76,000 MTOPS, respectively. These computers were used for 3D modeling and shock physics simulation for nuclear weapons applications; in other words, the best we had just 3 years ago, used in the most sophisticated analysis in which our country is involved right now, and these are computers with less capability than those that are now off the list for control with respect to export to countries such as China.

Under this bill, there are two major exemptions created that permit this to

happen. One is the so-called foreign availability, and the other is the mass market status exception. Both of these would effectively prevent the Federal Government from regulating the export of many sensitive technologies that could be used to threaten U.S. security. Under these provisions, if a product is available from a foreign supplier or is widely available in the United States, it is very unlikely that the President could meet the standards in the bill necessary to maintain export controls on the item.

We all know trade is vital to the United States, but I hope that most of us would agree that national security concerns do trump trade if there is an irreconcilable conflict; at least it should. U.S. national security interests dictate that there are some goods which should not be sold in some markets. Again, I think all of us would agree to that proposition, hypothetically at least. The fact that some Western European firms, for example, helped Libya construct a chemical weapons production complex should not justify the involvement of United States companies in similar ventures. If we don't want that complex to be built, then the United States should not sanction the export of U.S. products which help to develop that chemical weapons production complex. Nations which threaten our security interests should not be armed by the United States. The fight against proliferation and rogue regimes must include some degree of self-discipline within our own borders.

The bill also weakens current export controls by making it very difficult to control the export of a sensitive item if it is incorporated or embedded into a larger product.

(Mr. CARPER assumed the chair.)

Mr. KYL. For example, the bill prohibits export controls on items that contain controlled components comprising less than 25 percent of the total value of an item and sets an extremely high standard for the President to meet in order to control such items. Nations such as Iran and Iraq spend millions of dollars to establish elaborate procurement companies with front companies and shadowy middlemen in order to obtain items that in some cases really only cost a few thousand dollars. These nations could easily take advantage of this by purchasing the larger items that contain the desired part.

There are a lot of examples of this, where you purchase the larger item, and all you want is the little piece embedded in it. That is what you need for your particular nuclear program or missile program. We all know that the particular item is highly sensitive, that it has military application. But in the bill, if it is only 25 percent of the total value of the overall item, then it goes, notwithstanding the fact that it can be easily taken apart, that the sensitive item can be pulled out and put onto a missile or a nuclear weapon or

whatever the use of it might be. That doesn't make sense.

Finally, the current bill weakens current controls by treating export controls adopted for foreign policy reasons as a sanction. The bill's provisions in this area subject such export controls to a process that is intended to make it as difficult as possible for either the President or the Congress to impose or maintain sanctions. And it requires that all such export controls sunset every 2 years.

Let me describe a little bit further the problems with the foreign availability and market exemptions. As I said, the bill calls for the creation of an office at the Commerce Department charged with performing studies of whether products controlled for export by the Federal Government are available from foreign suppliers or are widely available in the United States. At least at first blush it would make some sense that if you can get this thing anywhere, then why should the United States punish its own people for exporting the item, but there is more here than meets the eye.

The President may only maintain export controls on an item if he certifies—and I am going through the bill—one, that the absence of an export control on the item would be detrimental to the United States national security and, two, there is a high probability that the foreign availability of an item will be eliminated through multilateral negotiations within a reasonable period of time. Furthermore, the President may only maintain controls on an item for 6 months at a time, up to a total of 18 months, if he has not reached some agreement with the foreign suppliers to limit availability of the item.

The President of the United States, the ultimate person in our country charged with our national security responsibility, is limited by this legislation to only provide three 6-month extensions of a limitation on the export of an item under this provision of the law. Otherwise, after that, it goes.

The bill has a provision that says the President has an opportunity to try to negotiate with the foreign supplier a limitation on the export of the item to a third country. Why would any country have any incentive to negotiate that when they know that after 18 months the lid is off? It seems to me that it is very important for us to try to change provisions such as this in the legislation to try to tighten up the situation in which there is a finding of foreign availability but there is an important reason for the United States to restrict the transfer of an American component.

One example of this has to do with comparable quality. There is nothing in the legislation as it is written right now that requires there be comparable quality between the products. You can easily have something called a computer that is available from two or three countries on the foreign market

and a computer that is available in the United States. They may be roughly the same price and they may have roughly the same capacity, but that doesn't mean they are equal in quality in the least.

There are many qualitative factors that differentiate products. One reason why people want to buy American products is because of that built-in quality. Maybe the United States product is less prone to break down. Maybe it has better service contracts. Maybe it is more robust, it can stand more hustle and jostle.

The fact is, there are a lot of different reasons why two roughly comparable products may be of substantially different quality. When we go to the auto dealer to buy a car, some of the things we look at are: how will it stand up? What is its service record? How much do the repairs cost? All of these different things have to do with quality. Yet there is nothing in this legislation that permits anybody to look at the quality aspect. So a company in the United States says: Look, one of our foreign competitors is beating us out here; they are selling a product that is roughly comparable to ours in price and capability so lift the restriction on us. There is a matter of foreign availability involved.

Somebody in the United States needs to say: Yes, there is a matter of foreign availability. But the reason you are being undercut is because that is a product they can sell cheaper than countries will buy because it is of lesser quality, but the fact is, they would rather have your product because they know the quality is better.

We can deny them the quality of the United States product for their military use if we have serious export controls. If we have nothing but this test of foreign availability, then the sky is the limit.

The standards in the bill for maintaining controls on a product are also very difficult to reach. The President may only maintain export controls if "decontrolling or failing to control an item constitutes a serious threat to the national security of the United States, and export controls on the item would be likely to diminish the threat to, and advance the national security interests of the United States." There are a lot of items on the list. For the President to have to go through every one and try to justify meeting a standard such as that is unrealistic.

By incorporating into law the foreign availability and mass market criteria that ignore both our moral responsibilities and our vital if, for proprietary reasons, difficult to articulate technological advantages, this legislation would open the floodgates to an outpouring of highly sensitive goods. Foreign countries want American technology. The fact that they can purchase roughly comparable items elsewhere does not detract from the fact that we are the world leader in most key technologies and that the United

States and its corporations should not be in the business of advancing the military capabilities of potential enemies of the United States.

This matter of foreign availability is going to be forever subject to interpretation. It is my view that the Department of Defense should have a lot more in the way of a seat at the table to influence this process.

The best example—at least one good example—of this situation is the export of high-performance computers. Our technology exceeds that of all foreign competitors. Yet our companies are asking for more liberal controls on this basis of foreign availability. As I said before, the Clinton administration, for all practical purposes, eliminated restrictions on the sale of these computers. But because of the 18-month limitation I cited before, the reality is there is almost no way to control, at least after 18 months, the export of these items. It is a very dangerous situation.

The Wisconsin Project on Nuclear Arms Control to which I referred before addressed this issue. Let me quote one paragraph:

This [foreign availability] pushes export control down to the level of the worst abuser.

Let me restate that:

This [foreign availability] pushes export control down to the level of the worst abuser. Germany sold Iraq more pieces of dangerous equipment before the Gulf War than all other countries combined. If American policy had been as lax as Germany's, Saddam's bomb program would have advanced much faster. And for exports to Iran, U.S. policy would now have to be relaxed because of sales by Germany, Japan and Switzerland. Moreover, U.S. officials acknowledge that estimates of foreign availability are too imprecise to dictate export policy.

That is from the Wisconsin Project on Nuclear Arms Control. They are interested in trying to limit the export of this kind of technology that would spread nuclear technology around the world, nuclear weapons technology. Their point is that the United States should not be dragged down to the least common denominator. Simply because a country in the world is willing to sell a rogue nation whatever it wants doesn't mean that the United States should permit that same kind of export.

More important is the fact that under this bill if Iraq or Iran or North Korea, for example, seek to sell China high-technology items that can be used in constructing weapons of mass destruction and their means of delivery, then U.S. companies would be similarly free to sell such items to China.

The bill does nothing to prevent such a situation from occurring. So here you have a case where it is not one of our allies such as Germany; it is North Korea, Iran, or Iraq. If they are willing to sell an item to a country such as China, the provisions will say the United States must be willing to do so, too. With Iraq and China's penchant for constructing these well-configured

front operations to conceal their activities, it is not outside the realm of possibility that they could surreptitiously attain high-tech items to be "sold" to China. Indeed, countries such as Germany and France that have sold weapons of mass destruction capabilities to Libya and Iraq should not be setting the tone for U.S. export control policy either.

If China sells dual-use items to Pakistan, does that qualify as "foreign availability" under this bill? Yes, it does. Is that the test we want to apply here—if a country such as China sells a dual-use item to Pakistan, therefore it is available on the foreign market?

China's record as perhaps the worst proliferator in the world does not detract from its value as a market. It will receive dual-use technologies under the export regime established by this bill. The risk of those technologies ending up in countries such as Iraq should not be ignored.

The bill contains a provision, section 301, that would prohibit the President from placing controls on "the export from a foreign country (whether or not by a United States person) of any item produced or originating in a foreign country that contains parts or components produced or originating in the United States."

Section 301, which is the principal foreign policy control provision of the bill, places unreasonable standards for controlling the item of technology for foreign policy purposes. By statutorily requiring a finding that a "serious threat"—not just a "threat"—would be posed to U.S. interests by the export of the item in question, the bar has been raised very high indeed.

What to do, Mr. President? We are going to offer suggestions how to improve the bill. Some changes have been made based on suggestions we made, but there is far too much that has not been done in response to the concerns we have raised. By "we," I don't hesitate to note that we are talking about the chairmen, primarily, of the committees of jurisdiction with a concern of national security—chairman of the Armed Services Committee and Ranking Member WARNER, the ranking member of the Intelligence Committee, the ranking member of the Foreign Operations Committee, the ranking member of the Government Operations Committee, I chair a Subcommittee on Terrorism and am a member of the Intelligence Committee and Senator MCCAIN, the ranking member on the Commerce Committee. These are people who have expressed concerns about provisions of the bill, as I have today.

We have tried to get some changes made in the bill. We will continue to work with the sponsors of the bill and the administration to try to make some additional changes that are a little bit more in line with what we believe are true national security interests and closer to the version passed by the House of Representatives.

Eventually, there is going to have to be a compromise between the House

and Senate. We have amendments we would like to offer. One I will describe briefly. I will offer it later on, unless we can work this out. There is a possibility that we can work it out. It has to do with the question of how you verify an agreement with another country to inspect after the transfer has been made, to make sure that the shipment has gone to the place they said it would go. Remember, we are talking about dual-use technologies. They say: We want to buy item X to use in our commercial sector. And you say: If you use it in the commercial sector, that is OK, but it is not OK to use in your defense establishment. They agree, so the item is shipped. Somebody needs to go check to make sure the use is indeed in the commercial sector, that they haven't surreptitiously sent it across the street to the defense plant to be used for illicit purposes.

Under regimes that exist with China today, there is very little postshipment verification permitted by China. If we are going to have a trusting set of export controls, as we have in this legislation, we need to have some way of enforcing the agreement these other countries make when a limitation is placed upon a license that it must be used for commercial, nondefense purposes.

The bill, right now, doesn't provide an enforcement mechanism with respect to these countries. It does with respect to companies but not countries. But in the case of China, for example, which has permitted less than one-fourth of the transfers with respect to satellites to have postshipment verification, notwithstanding its agreement in 1998 that it would do so, we need to have some kind of enforcement that, in fact, when we sell them something for commercial purposes, that is what it will be used for.

The only way to do that is to change a provision of the law which would enable us to go in and inspect—not have the Chinese do it for us, which is sometimes what they do today. They insist on doing their own inspection. We need to verify postshipment that the item went where it was supposed to go. If a country such as China does not permit that, or we find they have violated the terms of the agreement, then we have to have the ability to say no to future licenses.

Under the bill, the only thing you can say no to is that same kind of item. Clearly, the U.S. Government needs a broader authority. If the Chinese are cheating on satellites, for example, and then they want to buy nuclear components ostensibly for a powerplant, but we also know it has nuclear weapons capability, we want to have the ability to say no until they show us they are abiding by the agreement with respect to satellites; we are not going to export something that could be used militarily by their armed services for a nuclear program.

I have suggested language to the proponents, and I hope they will be recep-

tive to a change that would give the U.S. the ability with respect to subsequent license decisions to say no if, in fact, the U.S. believes there is a lack of cooperation by this country.

There is so much detail one could get into here, and there are so many changes I think we should make. I hesitate to go further with the description. I have tried to generally describe some of the aspects we think are wrong. I think it is important for us to have the ability to offer some amendments, describe specifically the improvements we think should be made in the bill, and hopefully throughout the course of the proceedings we will be able to come to some agreement that will make the bill a little better so we can get on with the work of dealing with the House of Representatives so we can conclude work on this legislation.

I know it is important to the administration. I don't want to hold it up because of that. If the President says he wants to have a bill on this subject, that is good enough for me. I am willing to try to have that happen. We hope we can get work done on improving the bill in the next day or two. Assuming that we can, my guess is that consideration of the legislation will go more quickly.

I appreciate the indulgence of my colleagues. Later, I will discuss the specific amendments I think would be appropriate—not in detail, but by general subject matter—and that will enable us to decide how we can move forward on the legislation at this time.

The PRESIDING OFFICER. The Senator from Wyoming is recognized.

Mr. ENZI. Mr. President, I thank the Senator from Arizona for his comments. I feel compelled to comment on a couple of the items he raised. There were several mentions of jurisdiction in there. I know there has been some jurisdictional friction during this entire time that we have worked on the bill over the last 3 years. I hope the Senators feel they have been included in discussions. We have lists of a lot of meetings in which we participated. We mentioned the 59 changes that have been made in the bill as a result of those meetings, probably the most significant of which is the enhanced powers. We mentioned foreign availability.

I have to tell you that the foreign availability in this bill was in the 1979 act, but it has gotten some attention because we put in mass market this time.

Because of comments raised by the Senator from Arizona and several of his colleagues, we have a provision in here that provides for some Presidential enhanced powers that trump all of that. We hope the President won't trump all of that. We hope the President will work to have some multilateral controls over these foreign availability items instead of just the unilateral system that we are working now. "Unilateral" means we are letting the rest of the world sell this stuff to anybody they want. "Multilateral" means

we work together to make sure anybody who makes that item doesn't sell it to the bad guys.

We have to have the multilateral control. Unilateral doesn't work. Unless we put the foreign availability in there with a suggestion—and it becomes a suggestion because of the paragraph we put in at your suggestion with the Presidential enhanced powers—it is only a suggestion because the President can trump that, but hopefully he will work with these other countries and see, if a product that ought to be controlled is made in a foreign country, if we can get the foreign country to agree on who the bad guys are and agree they will not sell it to them.

I appreciate the Senator's suggestion on that. I think it is the most dramatic change that is in the entire bill.

On the jurisdictional question, the 1979 act was written by the Banking Committee. It was their jurisdiction back then. It has been advanced a number of times since then, each time by the Banking Committee.

Of course, everybody recognizes the world is considerably different now than it was in 1979. We do not have some of the same capability because COCOM, which was a multilateral agreement, no longer exists. It is now a voluntary agreement instead of an enforced agreement.

Throughout that whole uncertain time from 1979 until the Iron Curtain came down, the Banking Committee held the jurisdiction over export controls—not arms controls but export controls. Under the committee's oversight, the EAA and its predecessor, the Export Control Act, served as the key export control authority throughout the cold war and I think significantly contributed to its demise.

In fact, the Banking Committee has long had broad national security jurisdiction which has been rivaled by few other committees. Among the laws within its jurisdiction are the Trading with the Enemy Act, the International Emergency Economic Powers Act, the Defense Production Act, the Exon-Florio amendment, the Iran and Libya Sanctions Act, the Export Administration Act.

Rule XXV of the Standing Rules of the Senate makes clear that the Banking Committee has sole jurisdiction over dual-use export controls. Paragraph (d)(1) states explicitly that "all proposed legislation, messages, petitions, memorials, and other matters relating to" export controls shall be referred to the Banking Committee. Nowhere else in the rules is there any mention of export controls with regard to any other committee.

The Banking Committee's jurisdiction over export controls is fully authorized and appropriate. That is why we have been doing the work on this bill.

The act has expired a number of times. When it expires, the only action that can be taken is an Executive order

by the President under the International Emergency Economic Powers Act. That just does not cut it, and I think everybody agrees that does not cut it. We need to do something a little more dramatic than that.

We can go back to that act of 1979, but pretty much everybody agrees that is inadequate at this point in time and that there should be some differences made. There have been a number of studies done on that—one of them was quoted yesterday—that Secretary Rumsfeld participated in before he became the Secretary.

Yesterday we presented a letter showing that Secretary Rumsfeld thinks this bill is an improved version of the 1979 act and will solve the problems about which we have been talking. There are things that need to be done in addition to this.

I do think continual review of our export policy is necessary. I appreciate the suggestion of the blue ribbon panel. It has some capability to take a look at this in the interim while we operate under this new act so we have something substantial in place that will protect us beyond an Executive order or even beyond the extension of the 1979 act. I will have additional comments later. I did want to clear up those things because we debated them a bit yesterday. There is some foreign availability, but we have a Presidential trump done at the Senator's suggestion and, again, a number of other changes.

I yield the floor.

The PRESIDING OFFICER. Who seeks recognition? The Senator from Tennessee.

Mr. THOMPSON. Mr. President, I will take a couple of minutes, if I may, to make brief remarks in response to my friend's statements.

Foreign availability, one might say, was in the 1979 act, but foreign availability has been greatly expanded in this act. In the 1979 act, foreign availability was allowed to be considered as one of several factors in determining whether or not to issue a license. That is perfectly appropriate.

In the current legislation, foreign availability is set up as a total distinct category of items, whereby if there is foreign availability, it is totally decontrolled as determined by the Department of Commerce. That is a major difference.

Obviously, the proponents of this bill are going to prevail on the notion that this is a good idea, but let's not deceive ourselves into thinking we are just continuing on the 1979 policy. We are greatly expanding the 1979 policy on foreign availability.

Secondly, I had not mentioned anything on jurisdiction. Apparently my friend from Arizona did and Senator ENZI just did. There is no question that the Banking Committee has jurisdiction. Since the subject has been brought up, I find it somewhat odd that we as a body have decided to take legislation whose purpose is to restrict the export of items that would con-

tribute to the military potential of countries so as to prove detrimental to the national security of the United States, and legislation designed to stem the proliferation of weapons of mass destruction and place that in the Banking Committee. We have done it. There is no question about it.

I find that kind of odd. The House did not do it. It is not in the Banking Committee on the House side, but it is in the Senate. I do not know whether anybody wants to take a look at that. They are welcome to, and it will be a fruitless exercise. But since the subject has been brought up, I find it somewhat odd that we would choose to take legislation designed to protect our country from proliferation of weapons of mass destruction and place that jurisdiction in the Banking Committee.

I yield the floor.

The PRESIDING OFFICER. Who seeks time? The Senator from Maryland.

Mr. SARBANES. Mr. President, I know the able Senator from Utah has been waiting to speak. If he will indulge me a couple minutes, I want to get something into the RECORD in light of the comments that were made by the Senator from Arizona.

One of the difficulties I am having, as I hear the critics of this bill outline their concerns, I frequently find myself sharing their concerns but then not understanding why they fail to perceive the bill addresses their concerns. In other words, we have tried to cover this matter.

The Senator from Arizona has spent a good deal of time talking about foreign availability but, in fact, the legislation specifically provides a whole procedure whereby the President can set aside a foreign availability status determination. That is in section 212. There is a detailed process by which he can set that aside.

Furthermore, and much more importantly in a sense, in response to some of the points that were raised, we give the President in section 201(d) enhanced control authority.

Let me read that authority:

Notwithstanding any other provisions of this title, the President may determine that applying the provisions of section 204 or 211—

And 211 is the foreign availability mass marketing section—

with respect to any item on the National Security Control List would constitute a significant threat to the national security of the United States and that such item requires enhanced control. If the President determines that enhanced control should apply to such item, the item may be excluded from the provisions of section 204, section 211, or both, until such time as the President shall determine that such enhanced control should no longer apply to such item.

No wonder the administration is supportive with that kind of blanket authority placed in the hands of the President. I wanted to underscore that.

The other point was raised about ascertaining end users.

On page 295 of the legislation, I am going to take a moment to read the

provisions because the Secretary shall target postshipment verification to exports involving the greatest risk to national security. Refusal to allow postshipment verification, which the Senator from Arizona was just talking about, if an end user refuses to allow postshipment verification of a controlled item, the Secretary shall deny a license for the export of any controlled item to such end user until such postshipment verification occurs.

Let me state that section again. If an end user refuses to allow postshipment verification of a controlled item, the Secretary shall deny a license for the export of any controlled item to such end user until such postshipment verification occurs.

Furthermore, the point was raised, suppose the country refuses. Again, if the country in which the end user is located refuses to allow postshipment verification of a controlled item, the Secretary may deny a license for the export of that item or any substantially identical or directly competitive item or class of items to all end users in that country until such postshipment verification is allowed.

So the problem was raised, but in my view the bill clearly addresses the problem. Furthermore, the bill goes on to say on this specific issue—I could do a similar exercise with other points that were made or issues that were raised, but I am not going to take the time to do that, and the Senator from Utah is being very patient and generous in allowing me to proceed.

Let me just close with again discussing the end-use verification because we recognize it is an important challenge, and we need to deal with it. We are not contending it does not need to be addressed. We are simply asserting there are ways we have addressed it in the bill, and we think these ways of addressing it deal with the problem.

End-use verification authorization: There is authorized to be appropriated for the Department of Commerce \$4.5 million and such sums as may be necessary to hire 10 additional overseas investigators to be posted in the People's Republic of China, the Russian Federation, the Hong Kong Special Administrative Region, the Republic of India, Singapore, Egypt, and Taiwan, or any other place the Secretary deems appropriate for the purpose of verifying the end use of high-risk, dual-use technology.

Then there is a provision for a report to the Congress from the Secretary on the effectiveness of the end-user verification activities.

There is a further provision, in addition to the authorization provided in paragraph 1—that is, the \$4.5 million I just mentioned—there is authorized to be appropriated for the Department of Commerce \$5 million to enhance this program for verifying the end use of items subject to controls under this act. So there is an additional \$10 million we are putting into this specific purpose.

Mr. THOMPSON. Will the Senator yield for a question?

Mr. SARBANES. Yes.

Mr. THOMPSON. Will the Senator agree the issue is whether or not it is good policy to require the Secretary to cut off an end user, if postshipment verification is not allowed, but would give the Secretary discretion to cut off or not cut off a country that denies postshipment verification? It seems that is the issue.

The point my friend from Arizona was making was in some cases you have a country, such as China, where we have a situation with them where we request postshipment verifications for various sites, and they agree to a few and remain silent on the rest. They never say no; they just never say yes. This is a country decision.

Under the legislation, the Secretary does have the discretion, and I can see an argument for giving him discretion, but I can also see a very good argument, and more persuasive, that as it makes good policy sense to require the Secretary to cut off, as a matter of national policy, an end user if they behave in such a way, that the same logic would make it good policy to cut off a country if they are, in fact, calling the shots, as is often the case.

Mr. SARBANES. There is some weight to the point the Senator is making, but it seems to me cutting off the country has a broad range of implications and consequences. Those have to be taken into consideration and, therefore, giving the Secretary a "may" authority rather than a "shall" requirement probably makes sense in that instance. The counterargument can obviously be made that then you may confront a situation in which, because of the host of considerations that are involved, you do not want to actually exercise the authority, but the statute would require you to do so.

The way it is worded, the authority is given, it is there to be exercised, but exercising is not compelled. We came down on that side of it. We are trying to give authority to the executive branch but give them a certain amount of flexibility to deal with the problem.

The Senator himself yesterday referred to the unintended consequences of consideration. As I commented yesterday, that was a very apt perception and, again, we are trying to deal potentially with what might be an unintended consequence.

Mr. President, the Senator from Utah has been extremely generous, and I yield the floor.

The PRESIDING OFFICER. The Senator from Maryland yields the floor. The Senator from Utah is recognized.

Mr. BENNETT. Mr. President, I thank the Chair and I thank my colleagues for an illuminating debate. With some trepidation, I am going to take a page out of the book of the senior Senator from West Virginia and talk about Roman history for a moment because I think it is appropriate in this circumstance.

The Roman Empire was the dominant military power for many centuries, and it was the dominant military power for two reasons: one was technology and the other was training.

In order to become a Roman legionnaire, I understand it took 14 years of training to learn the technology. Now, it may sound strange in today's world to call "technology" what the Romans used in their military, but the Romans carefully studied the art of war and came up with a technology that was new and unique in their time.

They had a large shield with which they could protect themselves against the initial blow of the enemy, and then they devised a short sword which could go around the shield and into the back of the soldier with whom they were involved in close combat. They found the short sword was technologically better than the long sword, and the combination of training with the shield and the short sword gave the Roman legions military dominance over all the world.

Why is that relevant? We are talking about technology. We are not talking about training. We are not talking about the ability of the American military and the American planners to use the available technology better than other people can use it. It is a point which must be made as we go through this debate because we are having the debate as if the technology by itself constitutes military superiority, as if a single export of a single item of technology to a country that wishes us ill would automatically and immediately change the military balance between us and that country. That simply is not true.

The American military is not at risk because of the potential export of computing power from American firms. The American military is as powerful as it is because of the combination of the technology that it employs plus the strategic expertise, the military doctrine and the training and implementing of that doctrine that goes on in the American military and that requires years to implement, just as it did back in the days of the Roman Empire and the training of a legionnaire.

The barbarians in Roman times could easily duplicate a short sword. That was technology that they could reproduce in their own foundries. They didn't quite know how to use it. They didn't know how to use it in conjunction with the shield. The possession of the physical attributes of the shield and the sword did not create a military that could attack and destroy the Roman legions.

The same is true of computer power today. The mere possession of computer power by a nation that wishes us ill does not automatically mean they have the power to take on the American military establishment and defeat it. The other factor here that is different from the Romans that we have to focus on has to do with the speed with which technology is changing. The Romans dominated the world for

centuries with the shield and the short sword. But the Senator from Arizona has bemoaned the fact that computer power that would have been improper, indeed illegal, to export just 3 years ago, is today being exported all over the world. Three years constitutes two cycles in what is known as Moore's law. Computing power doubles every 18 months. That means that which was considered to be a supercomputer just 3 years ago has been replaced in the normal course of industrial technology by a computer that has doubled and then doubled again, four times as powerful, so that which is now being allowed to be exported without controls, which would have been controlled 3 years ago, is not only being exported, it is obsolete. Nobody wants it, except in a way I will describe in just a minute.

This is the rate of the marketplace in which we are living today. It is not slowing down. If anything, it is accelerating.

I quote from President Bush: The existing export controls forbid the sales abroad of computers with more than a certain amount of computing power. With computer power doubling every 18 months, these controls have the shelf life of sliced bread. They don't work.

It is interesting the most powerful computer available now in the standard marketplace—and even this statement is now obsolete; it was true maybe 6 or 9 months ago—the most powerful computer available to the general public came from Japan, not from America, and was available in a toy, PlayStation 2. The computing power of PlayStation 2 was sufficient to drive the entire missile control system of the Chinese military as it existed at the time of the Cox report.

Are we going to say we would prohibit American firms from exporting computers that have the same power as the toy PlayStation 2, in an effort to deny that ability to the Chinese, when they can walk into Toys R Us, anywhere in the world, and pick it up for a few hundred dollars.

That is what is happening in this world of technology. We turn our backs to that reality if we say somehow we must prevent the Americans from exporting this kind of thing even though the foreigners are producing it and selling it all over the world.

John Hamre, the Deputy Secretary of Defense, said to me in a conversation about this, toward the end of his term with the Department of Defense, and I am paraphrasing: My realization that we are on the wrong side of this issue came when it suddenly occurred to me that if we continue to prevent Americans from being in the world market, we are hastening the day when the American military will have to go to foreign suppliers for the latest technology because American suppliers have been damaged.

The Senator from Arizona said we must not arm our enemies or that our enemies should not be armed by the United States. I say we should not get

ourselves into a position where the United States must go to foreign sources for the technology it needs to arm itself.

But if we say to American manufacturers, you cannot play in the world market except on a time-delayed basis, you cannot compete with companies in Germany, Britain, Japan, and, yes, China because there are computer manufacturers that are making machines with high levels of MTOPS in China trying to get into the international market—if we say to the Americans, you cannot compete in the international market with these foreign firms except with a delayed time fuse created by the government, we are saying, ultimately, that the leadership of technology will go from the United States overseas, and the American military will be faced with a very difficult situation, a very serious Hobson's choice. They will have to decide either we use American technology that is behind the curve because the American firms have been damaged by their inability to compete in the international marketplace and thereby to sell in a larger marketplace and thereby to cut their costs by virtue of increased sales or we have to go overseas to buy that technology.

That is not a choice I want the Secretary of Defense 5 or 10 years from now to have to make. I want the Secretary of Defense 5 to 10 years from now to be in the position he is now, to say the leading technology sources are American and that is where I will go to buy.

The days are over when American technology companies manufacture solely for the Defense Department. They manufacture for dual use everywhere. I remember a time when the telephone system in the Pentagon was completely secure because it was run entirely by the Defense Department. Those days are over. When the Secretary of Defense picks up the telephone now he is connected to Verizon. Why is that the case? Because Verizon has developed better technology using the marketplace of both the military and the private sector. It is more reliable than the old defense system was, and it is cheaper.

When the Defense Department goes out to buy computer chips, they don't buy them from a source solely dedicated to defense contracting. That was the norm in the 1950s and the 1960s. I remember giant corporations that produced nothing but defense technology. They did all of their research for the Defense Department. They had only one customer and that was the Defense Department and everything was focused there. It was also very expensive.

Now when they develop a new chip or a new technology they offer it to the Defense Department the same time they offer it in the civilian market. It is the profits they make in the civilian market that subsidize the work they do for the defense market, bringing costs down for everybody, and increasing the

technical ability of the products they make.

If we say to them, artificially, you cannot sell these products anywhere but in the United States, even though your principle competitors in the borderless economies of the world are selling their products everywhere else, as well as in the United States, we are handicapping these American firms to a point that will ultimately become a national security issue for the United States, that will ultimately take us to the situation that Secretary Hamre was worried about where the Defense Department will have to choose between American manufacturers forced to be behind the curve internationally or foreign manufacturers located offshore.

We may not like this situation but that is where we are and we are not going to go back. The borderless economy is a reality of the future. It cannot be turned back. We have to accept this new reality and say the best national security step we can take is to keep American technology firms absolutely in the forefront, and the best way to keep them in the forefront is to give them the opportunity to compete in the largest possible market that they can.

That is why this bill is so important. That is why this bill has significant national security implications that cannot be ignored. But, once again, let us remember as we get concerned about the military applications of this technology in other countries, that the American military is as strong as it is not solely because of its technology but because of the entire structure of technology, strategy, and training that has been built around it.

There are others who recognize that everything is changing in the way that I have described. We have the letter from Secretary Powell, from Secretary Rumsfeld, as well as Secretary Evans, all three of them saying this is the new reality and endorsing the bill.

But let me describe how the new reality comes along to make these past controls obsolete. This information is available everywhere in the world. Once again, it is a borderless economy. We cannot keep it secret. This is published in Scientific American, an article of August of 2000. It is called "The Do-It-Yourself Supercomputer."

Scientists have found a cheaper way to solve tremendously difficult computational problems: connect ordinary PCs so that they can work together.

It is a wonderful story. The authors of the article describe how they created what they called the stone soupercomputer, only they spelled it S-O-U-P-E-R, after the old fable about stone soup. We all remember hearing that as children: two fellows come to town and they are going to have a big bowl of soup, and they get a big caldron, put water in it and then put stones in it. The villagers gather around and ask: How are you going to get soup out of stones?

Oh, they say, this is wonderful. We will have the most wonderful soup in the world. Do you want to contribute something to it?

Someone says: Is it really going to be that good?

Oh, yes. We'll give you some of it.

So someone puts in a little carrot to see if that will help the stone soup. And someone says I have a little bit of beef that I can put in. And at the end you have the wonderful soup that, frankly, didn't cost the makers of the soup anything.

They talk about the stone soupercomputer because they were faced with a computing challenge that would require traditional supercomputers and they could not afford a supercomputer. So they thought, what if we took existing computers and linked them together, like the villagers bringing their various vegetables and linking them together? Could we create a supercomputer? If I can quote from the article:

In 1996 two of us (Hargrove and Hoffman) encountered such a problem in our work at Oak Ridge National Laboratory in Tennessee. We were trying to draw a national map of ecoregions, which are defined by environmental conditions: All areas with the same climate, landforms and soil characteristics fall into the same ecoregion. To create a high resolution map of the continental United States, we divided the country into 7.8 million square cells, each with an area of 1 square kilometer. For each cell we had to consider as many as 25 variables, ranging from average monthly precipitation to the nitrogen content of the soil. A single PC or work station could not accomplish the task. We needed a parallel-processing supercomputer—and one that we could afford.

So there is the problem. It is the kind of daunting problem that we have learned to solve with computers. What did they do? Going back to the article:

Our solution was to construct a computing cluster—

If I can interpolate, listen very carefully to what they used here, in view of the comments of the Senator from Arizona about the necessity of quality.

Back to the quote:

... using obsolete PCs ... that would otherwise be discarded. Dubbed the Stone SouperComputer because it was built essentially at no cost, our cluster of PCs was powerful enough to produce ecoregion region maps of unprecedented detail. Other research groups have devised even more capable clusters that rival the performance of the world's best supercomputers at a mere fraction of their cost.

So here is a situation where they not only used PCs rather than a supercomputer, they used PCs that were obsolete, that would otherwise have been discarded. But they were able to string them together in such a way as to duplicate the power of the supercomputer.

I ask unanimous consent the entire article be printed in the RECORD at the conclusion of my remarks.

The PRESIDING OFFICER. Without objection, it is so ordered.

(See exhibit 1.)

Mr. BENNETT. How would you feel if you were the manufacturer of a computer that could compete internationally with the best the Japanese, the Chinese, the Germans, the Dutch or the British could offer and you were told: No, you cannot export that until this long regime of analysis has gone on because it might be used to duplicate the outcome of a supercomputer, and you saw that people were using obsolete computers to produce the same result?

The reality is, we find ourselves in an age that, as recently as 5 years ago, and certainly as recently as 10 years ago, we could never have imagined.

This bill before us is an attempt to bring the law into some kind of congruity with reality and say we have to make the opportunity for American computer and high-tech firms to compete in the world marketplace and thereby prosper as friendly as possible.

We have a national security obligation to see to it that the American firms retain their lead, the lead that has been established at great expense and great effort by American research firms, by American universities, by the inventiveness of American entrepreneurs and American programmers. We must not deny them the opportunity to compete in the world market on the same basis as every other country's entrepreneurs can compete because, if we do, we run the risk of having them fall behind to the point that America will ultimately end up being as dependent on foreign technology as we are currently dependent on foreign oil.

That is not something we want to have happen. That is something that has been driving me, at least, in my analysis and sponsorship of this kind of effort.

I congratulate my friend from Wyoming, Senator ENZI, for the leadership he has taken in the Banking Committee to pull together the concepts that are involved in this into a piece of legislation that will do the job.

I have no doubt that we are going to have to visit this again, maybe within 3, 5, certainly 10 years. Because the technological landscape is going to change just as dramatically in the next 10 as it has in the last 10. But I listen to those who are opposed to this bill recite circumstances that are 3 years old, 5 years old, 8 years old. I do not challenge their motives, their patriotism, or their determination to do the right thing. They are as determined to do the right thing as I hope I am. But I do think that the world is changing so rapidly around us and this portion of the economy is changing so rapidly that we must recognize that and respond appropriately and accordingly.

Finally, in the report from the General Accounting Office that came in December of 2000, which was stimulated by the concerns of the Senator from Tennessee, with whom I worked to see that the GAO would give us this report, we read the following:

The current system of controlling the export of individual machines is ineffective in

limiting countries of concern from obtaining high performance computing capabilities for military applications. In addition, . . . using MTOPS to establish export control thresholds is outdated and no longer a valid means for controlling computing capabilities.

That summarizes my position.

We are ineffective with the controls that exist now in limiting rogue countries from getting the technologies they would need. Our security is dependent not on this ineffective kind of control; our security is dependent upon the overall expertise of the American military, which, as the Roman legions, is dependent on training and strategy every bit as much as the technology they have.

For that reason, I will support this bill as it stands and resist amendments to it. I appreciate the efforts on the part of the Senator from Wyoming and the Senator from Maryland as they work to see that this bill becomes law. I yield the floor.

#### EXHIBIT 1

[From Scientific American, Aug. 2001]

THE DO-IT-YOURSELF SUPERCOMPUTER  
SCIENTISTS HAVE FOUND A CHEAPER WAY TO SOLVE TREMENDOUSLY DIFFICULT COMPUTATIONAL PROBLEMS: CONNECT ORDINARY PCS SO THAT THEY CAN WORK TOGETHER

(By William W. Hargrove, Forrest M. Hoffman and Thomas Sterling)

In the well-known stone soup fable, a wandering soldier stops at a poor village and says he will make soup by boiling a cauldron of water containing only a shiny stone. The townspeople are skeptical at first but soon bring small offerings: a head of cabbage, a bunch of carrots, a bit of beef. In the end, the cauldron is filled with enough hearty soup to feed everyone. The moral: cooperation can produce significant achievements, even from meager, seemingly insignificant contributions.

Researchers are now using a similar cooperative strategy to build supercomputers, the powerful machines that can perform billions of calculations in a second. Most conventional supercomputers employ parallel processing: they contain arrays of ultrafast microprocessors that work in tandem to solve complex problems such as forecasting the weather or simulating a nuclear explosion. Made by IBM, Cray and other computer vendors, the machines typically cost tens of millions of dollars—far too much for a research team with a modest budget. So over the past few years, scientists at national laboratories and universities have learned how to construct their own supercomputers by linking inexpensive PCs and writing software that allows these ordinary computers to tackle extraordinary problems.

In 1996 two of us (Hargrove and Hoffman) encountered such a problem in our work at Oak Ridge National Laboratory (ORNL) in Tennessee. We were trying to draw a national map of ecoregions, which are defined by environmental conditions: all areas with the same climate, landforms and soil characteristics fall into the same ecoregion. To create a high-resolution map of the continental U.S., we divided the country into 7.8 million square cells, each with an area of one square kilometer. For each cell we had to consider as many as 25 variables, ranging from average monthly precipitation to the nitrogen content of the soil. A single PC or workstation could not accomplish the task. We needed a parallel-processing supercomputer—and one that we could afford!

Our solution was to construct a computing cluster using obsolete PCs that ORNL would

have otherwise discarded. Dubbed the Stone SouperComputer because it was built essentially at no cost, our cluster of PCs was powerful enough to produce ecoregion maps of unprecedented detail. Other research groups have devised even more capable clusters that rival the performance of the world's best supercomputers at a mere fraction of their cost. This advantageous price-to-performance ratio has already attracted the attention of some corporations, which plan to use the clusters for such complex tasks as deciphering the human genome. In fact, the cluster concept promises to revolutionize the computing field by offering tremendous processing power to any research group, school or business that wants it.

#### BEOWULF AND GRENDEL

The notion of linking computers together is not new. In the 1950s and 1960s the U.S. Air Force established a network of vacuum-tube computers called SAGE to guard against a Soviet nuclear attack. In the mid-1980s Digital Equipment Corporation coined the term "cluster" when it integrated its mid-range VAX minicomputers into larger systems. Networks of workstations—generally less powerful than minicomputers but faster than PCs—soon became common at research institutions. By the early 1990s scientists began to consider building clusters of PCs, partly because their mass-produced microprocessors had become so inexpensive. What made the idea even more appealing was the falling cost of Ethernet, the dominant technology for connecting computers in local-area networks.

Advances in software also paved the way for PC clusters. In the 1980s Unix emerged as the dominant operating system for scientific and technical computing. Unfortunately, the operating systems for PCs lacked the power and flexibility of Unix. But in 1991 Finnish college student Linus Torvalds created Linux, a Unix-like operating system that ran on a PC. Torvalds made Linux available free of charge on the Internet, and soon hundreds of programmers began contributing improvements. Now wildly popular as an operating system for stand-alone computers, Linux is also ideal for clustered PCs.

The first PC cluster was born in 1994 at the NASA Goddard Space Flight Center. NASA had been searching for a cheaper way to solve the knotty computational problems typically encountered in earth and space science. The space agency needed a machine that could achieve one gigaflops—that is, perform a billion floating-point operations per second. (A floating-point operation is equivalent to a simple calculation such as addition or multiplication.) At the time, however, commercial supercomputers with that level of performance cost about \$1 million, which was too expensive to be dedicated to a single group of researchers.

One of us (Sterling) decided to pursue the then radical concept of building a computing cluster from PCs. Sterling and his Goddard colleague Donald J. Becker connected 16 PCs, each containing an Intel 486 microprocessor, using Linux and a standard Ethernet network. For scientific applications, the PC cluster delivered sustained performance of 70 megaflops—that is, 70 million floating-point operations per second. Though modest by today's standards, this speed was not much lower than that of some smaller commercial supercomputers available at the time. And the cluster was built for only \$40,000, or about one tenth the price of a comparable commercial machine in 1994.

NASA researchers named their cluster Beowulf, after the lean, mean hero of medieval legend who defeated the giant monster Grendel by ripping off one of the creature's arms. Since then, the name has been widely

adopted to refer to any low-cost cluster constructed from commercially available PCs. In 1996 two successors to the original Beowulf cluster appeared: Hyglac (built by researchers at the California Institute of Technology and the Jet Propulsion Laboratory) and Loki (constructed at Los Alamos National Laboratory). Each cluster integrated 16 Intel Pentium Pro microprocessors and showed sustained performance of over one gigaflops at a cost of less than \$50,000, thus satisfying NASA's original goal.

The Beowulf approach seemed to be the perfect computational solution to our problem of mapping the ecoregions of the U.S. A single workstation could handle the data for only a few states at most, and we couldn't assign different regions of the country to separate workstations—the environmental data for every section of the country had to be compared and processed simultaneously. In other words, we needed a parallel-processing system. So in 1996 we wrote a proposal to buy 64 new PCs containing Pentium II microprocessors and construct a Beowulf-class supercomputer. Alas, this idea sounded implausible to the reviewers at ORNL, who turned down our proposal.

Undeterred, we devised an alternative plan. We knew that obsolete PCs at the U.S. Department of Energy complex at Oak Ridge were frequently replaced with newer models. The old PCs were advertised on an internal Web site and auctioned off as surplus equipment. A quick check revealed hundreds of outdated computers waiting to be discarded this way. Perhaps we could build our Beowulf cluster from machines that we could collect and recycle free of charge. We commandeered a room at ORNL that had previously housed an ancient mainframe computer. Then we began collecting surplus PCs to create the Stone SouperComputer.

#### A DIGITAL CHOP SHOP

The strategy behind parallel computing is "divide and conquer." A parallel-processing system divides a complex problem into smaller component tasks. The tasks are then assigned to the system's nodes—for example, the PCs in a Beowulf cluster—which tackle the components simultaneously. The efficiency of parallel processing depends largely on the nature of the problem. An important consideration is how often the nodes must communicate to coordinate their work and to share intermediate results. Some problems must be divided into myriad minuscule tasks; because these fine-grained problems require frequent internode communication, they are not well suited for parallel processing. Coarse-grained problems, in contrast, can be divided into relatively large chunks. These problems do not require much communication among the nodes and therefore can be solved very quickly by parallel-processing systems.

Anyone building a Beowulf cluster must make several decisions in designing the system. To connect the PCs, researchers can use either standard Ethernet networks or faster, specialized networks, such as Myrinet. Our lack of a budget dictated that we use Ethernet, which is free. We chose one PC to be the front-end node of the cluster and installed two Ethernet cards into the machine. One card was for communicating with outside users, and the other was for talking with the rest of the nodes, which would be linked in their own private network. The PCs coordinate their tasks by sending messages to one another. The two most popular message-passing libraries are message-passing interface (MPI) and parallel virtual machine (PVM), which are both available at no cost on the Internet. We use both systems in the Stone SouperComputer.

Many Beowulf clusters are homogeneous, with all the PCs containing identical compo-

nents and microprocessors. This uniformity simplifies the management and use of the cluster but is not an absolute requirement. Our Stone SouperComputer would have a mix of processor types and speeds because we intended to use whatever surplus equipment we could find. We began with PCs containing Intel 486 processors but later added only Pentium-based machines with at least 32 megabytes of hard-disk storage.

It was rare that machines met our minimum criteria on arrival; usually we had to combine the best components from several PCs. We set up the digital equivalent of an automobile thief's chop shop for converting surplus computers into nodes for our cluster. Whenever we opened a machine, we felt the same anticipation that a child feels when opening a birthday present: Would the computer have a big disk, lots of memory or (best of all) an upgraded motherboard donated to us by accident? Often all we found was a tired old veteran with a fan choked with dust.

Our room at Oak Ridge turned into a morgue filled with the picked-over carcasses of dead PCs. Once we opened a machine, we recorded its contents on a "toe tag" to facilitate the extraction of its parts later on. We developed favorite and least favorite brands, models and cases and became adept at thwarting passwords left by previous owners. On average, we had to collect and process about five PCs to make one good node.

As each new node joined the cluster, we loaded the Linux operating system onto the machine. We soon figured out how to eliminate the need to install a keyboard or monitor for each node. We created mobile "crash carts" that could be wheeled over and plugged into an ailing node to determine what was wrong with it. Eventually someone who wanted space in our room bought us shelves to consolidate our collection of hardware. The Stone SouperComputer ran its first code in early 1997, and by May 2001 it contained 133 nodes, including 75 PCs with Intel 486 microprocessors, 53 faster Pentium-based machines and five still faster Alpha workstations, made by Compaq.

Upgrades to the Stone SouperComputer are straightforward: we replace the slowest nodes first. Each node runs a simple speed test every hour as part of the cluster's routine housekeeping tasks. The ranking of the nodes by speed helps us to fine-tune our cluster. Unlike commercial machines, the performance of the Stone SouperComputer continually improves, because we have an endless supply of free upgrades.

#### PARALLEL PROBLEM SOLVING

Parallel programming requires skill and creativity and may be more challenging than assembling the hardware of a Beowulf system. The most common model for programming Beowulf clusters is a master-slave arrangement. In this model, one node acts as the master, directing the computations performed by one or more tiers of slave nodes. We run the same software on all the machines in the Stone SouperComputer, with separate sections of code devoted to the master and slave nodes. Each microprocessor in the cluster executes only the appropriate section. Programming errors can have dramatic effects, resulting in a digital train wreck as the crash of one node derails the others. Sorting through the wreckage to find the error can be difficult.

Another challenge is balancing the processing workload among the cluster's PCs. Because the Stone SouperComputer contains a variety of microprocessors with very different speeds, we cannot divide the workload evenly among the nodes; if we did so, the faster machines would sit idle for long periods as they waited for the slower machines

to finish processing. Instead we developed a programming algorithm that allows the master node to send more data to the faster slave nodes as they complete their tasks. In this load-balancing arrangement, the faster PCs do most of the work, but the slower machines still contribute to the system's performance.

Our first step in solving the ecoregion mapping problem was to organize the enormous amount of data—the 25 environmental characteristics of the 7.8 million cells of the continental U.S. We created a 25-dimensional data space in which each dimension represented one of the variables (average temperature, precipitation, soil characteristics and so on). Then we identified each cell with the appropriate point in the data space. Two points close to each other in this data space have, by definition, similar characteristics and thus are classified in the same ecoregion. Geographic proximity is not a factor in this kind of classification; for example, if two mountaintops have very similar environments, their points in the data space are very close to each other, even if the mountaintops are actually thousands of miles apart.

Once we organized the data, we had to specify the number of ecoregions that would be shown on the national map. The cluster of PCs gives each ecoregion an initial "seed position" in the data space. For each of the 7.8 million data points, the system determines the closest seed position and assigns the point to the corresponding ecoregion. Then the cluster finds the centroid for each ecoregion—the average position of all the points assigned to the region. This centroid replaces the seed position as the defining point for the ecoregion. The cluster then repeats the procedure, reassigning the data points to ecoregions depending on their distances from the centroids. At the end of each iteration, new centroid positions are calculated for each ecoregion. The process continues until fewer than a specified number of data points change their ecoregion assignments. Then the classification is complete.

The mapping task is well suited for parallel processing because different nodes in the cluster can work independently on subsets of the 7.8 million data points. After each iteration the slave nodes send the results of their calculations to the master node, which averages the numbers from all the subsets to determine the new centroid positions for each ecoregion. The master node then sends this information back to the slave nodes for the next round of calculations. Parallel processing is also useful for selecting the best seed positions for the ecoregions at the very beginning of the procedure. We devised an algorithm that allows the nodes in the Stone SouperComputer to determine collectively the most widely dispersed data points, which are then chosen as the seed positions. If the cluster starts with well-dispersed seed positions, fewer iterations are needed to map the ecoregions.

The result of all our work was a series of maps of the continental U.S. showing each ecoregion in a different color. We produced maps showing the country divided into as few as four ecoregions and as many as 5,000. The maps with fewer ecoregions divided the country into recognizable zones—for example, the Rocky Mountain states and the desert Southwest. In contrast, the maps with thousands of ecoregions are far more complex than any previous classification of the country's environments. Because many plants and animals live in only one or two ecoregions, our maps may be useful to ecologists who study endangered species.

In our first maps the colors of the ecoregions were randomly assigned, but we later produced maps in which the colors of

the ecoregions reflect the similarity of their respective environments. We statistically combined nine of the environmental variables into three composite characteristics, which we represented on the map with varying levels of red, green and blue. When the map is drawn this way, it shows graduations of color instead of sharp borders: the lush Southeast is mostly green, the cold Northeast is mainly blue, and the arid West is primarily red.

Moreover, the Stone SouperComputer was able to show how the ecoregions in the U.S. would shift if there were nationwide changes in environmental conditions as a result of global warming. Using two projected climate scenarios developed by other research groups, we compared the current ecoregion map with the maps predicted for the year 2099. According to these projections, by the end of this century the environment in Pittsburgh will be more like that of present-day Atlanta, and conditions in Minneapolis will resemble those in present-day St. Louis. [see Stone SouperComputer's Global Warming Forecast]

#### THE FUTURE OF CLUSTERS

The traditional measure of supercomputer performance is benchmark speed: how fast the system runs a standard program. As scientists, however, we prefer to focus on how well the system can handle practical applications. To evaluate the Stone SouperComputer, we fed the same ecoregion mapping problem to ORNL's Intel Paragon supercomputer shortly before it was retired. At one time, this machine was the laboratory's fastest, with a peak performance of 150 gigaflops. On a per-processor basis, the run time on the Paragon was essentially the same as that on the Stone SouperComputer. We have never officially clocked our cluster (we are loath to steal computing cycles from real work), but the system has a theoretical peak performance of about 1.2 gigaflops. Ingenuity in parallel algorithm design is more important than raw speed or capacity: in this young science, David and Goliath (or Beowulf and Grendel!) still compete on a level playing field.

The Beowulf trend has accelerated since we built the Stone SouperComputer. New clusters with exotic names—Grendel, Naegling, Megalon, Brahma, Avalon, Medusa and the Hive, to mention just a few—have steadily raised the performance curve by delivering higher speeds at lower costs. As of last November, 28 clusters of PCs, workstations or servers were on the list of the world's 500 fastest computers. The LosLobos cluster at the University of New Mexico has 512 Intel Pentium III processors and is the 80th-fastest system in the world, with a performance of 237 gigaflops. The Cplant cluster at Sandia National Laboratories has 580 Compaq Alpha processors and is ranked 84th. The National Science Foundation and the U.S. Department of Energy are planning to build even more advanced clusters that could operate in the teraflops range (one trillion floating-point operations per second), rivaling the speed of the fastest supercomputers on the planet.

Beowulf systems are also muscling their way into the corporate world. Major computer vendors are now selling clusters to businesses with large computational needs. IBM, for instance, is building a cluster of 1,250 servers for NuTec Sciences, a biotechnology firm that plans to use the system to identify disease-causing genes. An equally important trend is the development of networks of PCs that contribute their processing power to a collective task. An example is SETI@home, a project launched by researchers at the University of California at Berkeley who are analyzing deep-space radio

signals for signs of intelligent life. SETI@home sends chunks of data over the Internet to more than three million PCs, which process the radio-signal data in their idle time. Some experts in the computer industry predict that researchers will eventually be able to tap into a "computational grid" that will work like a power grid: users will be able to obtain processing power just as easily as they now get electricity.

Above all, the Beowulf concept is an empowering force. It wrests high-level computing away from the privileged few and makes low-cost parallel-processing systems available to those with modest resources. Research groups, high schools, colleges or small businesses can build or buy their own Beowulf clusters, realizing the promise of a supercomputer in every basement. Should you decide to join the parallel-processing proletariat, please contact us through our Web site (<http://extremelinux.esd.ornl.gov/>) and tell us about your Beowulf-building experiences. We have found the Stone Soup to be hearty indeed.

The PRESIDING OFFICER (Mrs. LINCOLN). The Senator from Tennessee.

Mr. THOMPSON. Madam President, let me make one thing clear. Those of us who are concerned about certain provisions of this legislation are not denying anyone the right to export. Those of us who have concerns about the direction in which we are going are not advocating that we in any way lessen the overall quantity of our exports in this country. The Senator from Utah very effectively constructed an elaborate straw man and has now beaten him to pieces.

We cannot take ourselves out of the world market. We cannot allow our exporters, the people who are producing high technology in this country, to be frozen out of the market and become insular. No one is advocating that. That is not the case now, and that would not be the case of every amendment we thought would be a good one and which passed.

The people who are advocating this legislation tell us—I am not sure these figures are precisely accurate—that something like 98 percent of all of these export applications are approved. It is not as if we are holding up anything, except in rare circumstances where there are national security considerations. The problem is not that our exporters are being frozen out of the market or that in some way they are victims of 19th century thinking; it is that they don't want to have to wait a few days to get a license.

We are not saying we need to shut down computer exports or even supercomputer exports. We are just saying that before they go out the door, somebody ought to take a look at it and make sure it is a good idea in terms of the nature of the equipment that is being sent, in terms of the end user, or in terms of the potential use of the entity to which it is being shipped.

This is not a matter of export versus nonexport or export opposition. As I say, the overwhelming number of applications have been approved, or will be approved, under any circumstance. The question is, Does the Department of Commerce predetermine broad cat-

egories of things that might prove to be dangerous without even going through a licensing process where somebody can take a look at it? That is what this is all about.

We heard yesterday in broad categories of items that I think the average time it took before the approval was made was 13 days. I have read otherwise where there are categories of items that required 40 days for the process to go through. I am sure the exporters would rather not wait 24 hours. But we are talking about matters of national security.

Why do we even have an export law? If in fact everything is out the door, the genie is totally out of the bottle, and we don't even need licenses for anything to anybody, why do we still restrict exports to Iraq? Why do we still restrict exports to Iran and Libya and North Korea? Wouldn't that be the logical conclusion of the position that everything is out there now and no one can restrict anything?

Our policy has been, and still is, and will be I think implicit based on the supposition and the assumption that in some ways, for some things, to some end users, we should and we must and we can exercise some degree of control. The question is, Where do you draw the line? You don't do it foolishly. You don't try to control things that are uncontrollable. You don't try to control things to your friends the way you would someone who is a potential enemy. But surely we are not saying that there is no degree of control, and no degree of supervision, where we ought to have somebody in our Government take a look at it for national security purposes. Otherwise, why have any restrictions to Saddam Hussein if he can go next door and get the same thing from somebody else? The answer is because we know that is not true. What this is all about is we have some exporters who are in business and who need to be in business. We are all for them. They don't want to have to go through a licensing process. That is what this is all about.

I think it is true that the key to our success in the future is not going to be totally reliant on some kind of export control. The more important part is going to be our ability, as they say in the business, to run faster. We must keep our technology at a level that outstrips all the rest. We should stay ahead. In order to do that, we need vibrant industries. I agree with all of that. But it doesn't totally answer the question. The rest of the question is whether or not we are doing what we need to do to help others run faster in significant ways.

Pick a country of concern—a country that is on the upswing economically, a country that is rapidly building up their military, a country that has already been known to use our technology for its military purposes. Is it wise policy to have no consideration for how rapidly they may be able to use our technology for their purposes? I am

not saying that is an easy question. Do you slow them down by an hour or do you slow them down by a year?

Those are important answers that I don't have. It would depend on the circumstances that would hopefully be considered by our Government when a license is on the table and people are sitting around the table asking, Is this a good idea or not?

Under this bill, if they are foreign available as determined by a technician over in the Department of Commerce, or if they are mass-marketed under the same determination, you don't have to go through that process; I don't have to wait for 13 days, or the 40 days, or in some cases longer, I am sure, but an average of numbers that we have used here. That is the question.

It is true that nowadays you can cluster computers to boost the MTOPS power. I, for one, have changed my view somewhat about the efficacy of regulating, controlling computers based on MTOPS. The GAO report also said there are possible other ways of controlling computing power that might be questionable, that have never been explored, and that have never been tried. And goodness knows, there is no one outside of Government who has any motivation to explore or try those other methods.

They also demonstrated that while you can cluster computers to reach high MTOPS levels, those clustered computers cannot be used in the same way that another, shall we say, unclustered computer could be used with the same MTOPS level. If you want to use a clustered computer situation for research, or something like that, it is perfectly suitable. If you want to use it for military purposes, it is much more questionable.

So these are complex issues that have complex answers. And I don't think anybody has all the answers. But we do know that technology is expanding, it is more accessible. That is not the issue; everyone understands that. But I hope everything we are doing—and the purpose of this legislation; it is in the bill—is premised on the notion that we can, by legislation, do something to assist in curbing the proliferation of weapons of mass destruction. That is what this is all about. If we do not believe we can do that, if technology is such and the world has changed as such that we can have no control over anything at any time for any period of appreciable time, then we might as well do away with the legislation altogether.

Our legislation, our policy, is premised on the contrary. So it is not black and white. It is: Where is the balance? And who decides? That is the issue. Where is the balance between, we can't do anything, so let's eat, drink, and be happy, and make our money while we are arming our adversaries, or that we need to build a wall around the country and not give anything out? Where is the balance? And who decides?

Well, we have decided, so far, in this country that the people whose business it is to promote commerce essentially decide. In some ways, in some instances, they have to get the approval of or consult with others, but in many important respects we have decided—I think mistakenly in this legislation and as a matter of policy—that the Department of Commerce makes these important national security decisions.

Now we are going to be deciding, when we pass this bill, that the Department of Commerce will not even get to take a look at things that have been deemed to be mass marketed or foreign available. So be it. But let's not fool ourselves into thinking that this is an all-or-nothing situation or that someone is suggesting that we not export computers or that we isolate ourselves in that regard or that we blind ourselves to the technology revolution. That is not the case at all. We are just trying to reach some kind of a reasonable, measured way in which we can do what is doable.

My basic problem with all this is that we do not know to what extent we may be making a mistake. We do not know to what extent some of this is controllable, as the GAO has pointed out. The GAO listed in its report, I think, about a dozen potential ways supercomputers can be limited in ways that other people did not have them and also pointed out that they have not been tried, they have not been attempted.

Our law required, in the 1998 Defense authorization bill, that there be a national security assessment, as we were in the process of totally decontrolling computers. I would not cite the Clinton administration as having good policy in that regard, but I must confess, this administration is picking up where the Clinton administration left off in that respect. The law required that we have a national security assessment. It has never been done.

So I have one opinion and my colleagues—a clear majority of them—have another opinion about the effect of what we are doing with this legislation, but the fact of the matter is, nobody knows. And that concerns me. It concerns me greatly because it is going to be some time now before we know the effect of this. We should have been studying this issue. We should have had a blue ribbon commission. We should have had a group of objective people who are unaffiliated with people who are in the export business—which is hard to come by on this subject, by the way—to make an objective assessment.

I am hoping before this debate is over with we can, at least after the fact, move in that direction. I may be wrong about some of my concerns, but I can afford to be wrong. As to those who say there is no problem, we cannot afford for them to be wrong because that would mean matters of national security would be implicated.

So I am hopeful we will be able to move in that direction, the direction of

really doing an objective assessment as to where this balance is and to who ought to be making the decisions.

I yield the floor.

The PRESIDING OFFICER. The Senator from Wyoming.

Mr. ENZI. Madam President, I thank my colleague from Tennessee for his concern and his consideration and, again, for all of the effort he has put into this bill. He has been responsible, along with several others, for a number of the changes that have been made in this bill.

But there are a couple of things I need to emphasize based on the comments he just made. One of them is in relation to the comment that there should have been somebody studying the issue. There have been people studying the issue. There have been a lot of people studying the issue, not to mention all of the Senate and House hearings that have been held, particularly since 1994.

When the Export Administration Act expired, we began a study. And one of the things this town is not short on is documentation. We document everything. That gives you a chance to go back and look at what everybody thought in the history of this country, but particularly on the history of this issue. It was an opportunity to go back and see what kinds of problems there were and what the pitfalls were that kept the reauthorization from happening again, what kept the updates from happening. We have been very close, throughout this whole process, of having it happen again.

We talked about balance. One of the balance things that happens in this bill is that the Department of Defense, the Department of State, and the intelligence community get a greater say through this bill than they had under the Export Act of 1979, that got reapproved through 1994. There is more balance in this bill if you want Defense, State, and intelligence to have more of a say. They have more say under this bill than they had before.

There is a continuation of a lot of the things they had before, but that is because they all agreed on them. But what we have is an endorsement from State and Defense on this particular bill saying this is a better situation than what we are operating under now. So we are trying to get that done.

In relation to the applications, actually, 99.4 percent of the applications get approved, only .6 percent get denied. So what does that tell you? A thing that it does not exactly say is that on the 99.4 percent that get approved, a lot of those have conditions. What this committee gets to do is put conditions on the application. But there is still a vast number that are readily approved.

Why are we making the licensing application folks take all of their time on items that will be approved that are routinely, regularly approved at the present time? Without this bill, we are forcing them to concentrate the bulk

of their effort—probably about 90 percent of their time—on items that do not need to be considered, where all of these agencies say: This is an automatic for us, but there is no way for us to kick this automatic out of the process. We have to spend the bulk of our time working on things that are absolutely routine. Wouldn't it be nice if we could concentrate on the 10 percent of the things that really need some conditions, that really need some concentration, that perhaps need to be denied?

During this process, I had an enforcement officer on exports assigned to my office because I wanted a greater understanding of how the enforcement process worked. That includes the postshipment verifications. I have had people assigned to my office who worked with the applications, and we went to the different agencies to see how they participated, how they wanted to be able to participate, and whether their rights and abilities were being stomped on by the old process.

I think we have arrived at a bill that the agencies agree they have a say and that they can do a better job of enforcing those things that need to be enforced.

Senator KYL mentioned there were some arms control problems, probably a nuclear gun. That sounds like arms control which is not export control. Maybe somebody was trying to fudge it in there.

I have to mention that there is a very small provision in this bill—actually a big provision—where we provide additional resources to people doing the enforcement. One of the specific things we put in there is some training for freight forwarders. These are the people who look at those 30-foot long cylinders and say: What the heck is in here; could it be something damaging to the United States? That is going to be some enforcement that we haven't had before that will help solve the situation.

When we are talking about who ought to be looking at these things, we are assuming that we ought to be looking at them from the worst possible standpoint. That is probably true. So maybe what we ought to have is the IRS auditors checking the capability on all of these licenses.

The reason Commerce gets the main say in this situation is that we are talking about commerce. We are talking about the economy and what we export. The Department of Defense and the Department of State handle the arms export. That is the really dangerous stuff. There is some stuff that can be dangerous. There is always a secondary use for anything. You can pick up a brick and you can hit somebody over the head. That makes it a weapon. But it is primarily a brick.

The factory that designed that brick probably used a computer to design the factory, but that doesn't make them an arms designer. That makes them a computer designing brick factory.

One of the reasons that Commerce has the main control is that it is com-

merce, and it is kind of the old story: If all you have is a hammer, everything looks like a nail. If you give it to Defense, then it all looks like weapons. Commerce gets to have a say in this, but with this bill we give greater authority to Defense, State, and the intelligence community.

We are not just talking about computers in this legislation. We are talking about a lot of small companies in this country that could compete more effectively if they could get contracts more readily. During that process of getting the 99.4 percent licensure, people lose contracts or they are not asked to participate in a bigger contract at all. From Wyoming, I have some of those folks.

There is an outfit called Hi Q technology. They make tachometers. I love this little success story. This guy used to have the parts manufactured in Taiwan and the parts assembled in Taiwan. He said: Wait a minute. Wyoming has some great folks who could put these things together. I bet they could put them together more carefully, make a better machine that would have less errors than the Taiwanese. So he started to have the parts shipped back to the United States and made in Powell, WY. He now makes the best tachometers in the world and ships them around the world in competition with Taiwan.

Do you know what he is going to do next? He is going to start having the parts manufactured in Powell, WY, too, because he can do that better with American labor. He can compete on the world market.

Now he can't, if every tachometer has to go through this licensing process. You can buy tachometers all over the world. You can't buy as good a quality tachometer as he has, but you can buy them anywhere in the world. They would like to have his, and he would like to sell them. If this licensing process stops him, he can't do that.

We have another fellow in Cody, WY, who invented a chest seal. If you get your chest punctured, if you get shot, fall on rebar or something like that, your lung will collapse unless somebody puts, in the old method, a credit card over it, which allows you, when you inhale, to inflate your lungs. Then they take it off when you exhale and it allows the blood and other stuff to come out. A Navy SEAL who now lives in Cody, WY, thought he could improve on that system.

He came up with a chest seal that is a Band-Aid about that big. You wipe off the chest and you apply the Band-Aid. The secret is right in the middle of it there is a thing that looks like the end of a balloon. When you breathe in, it pinches shut. When you breathe out, everything comes out. That is in military kits around the world now. It has saved a lot of lives on farms, ranches, and a lot of other places.

Sun screens and planes: There is a guy in Wyoming who figured out if these things work in cars, maybe they

would work in planes. And he started putting them in planes, specialized for the windows and stuff. During Desert Storm, one of our big problems was a recognition that instruments in Saudi Arabia in the planes were being damaged by the intense heat. Somebody said: Wait a minute, I know this guy in Wyoming. He makes this simple stuff that goes inside planes and keeps all of the instruments from deteriorating. And it saves about \$16,000 a year per airplane. It is used militarily, but it is not a military piece of equipment. It can be duplicated other places in the world. He kind of has the corner on the market, like Kleenex, because he thought of it and he does it better.

If he is prohibited from selling this, except to the military of the United States, he can't be in business or he would have to sell it for a lot more.

Another guy, in Sheridan, WY, a guy who has the Big Horn Valve Company, found a new way to do valves so that you don't have to have a T that will leak. It is always internal. The valve twists half a turn and shuts off. Any area in between gives some capability. How is it used? NASA uses part of this now. It is a disconnect on a missile. They can keep the fuel going into the missile the last possible moment. When that missile takes off, the valve separates and closes. Refineries use it because it doesn't leak like the old-fashioned valves.

Again, if he has to go through this licensing process, he can lose his international opportunity.

The times are changing, and I have to say, it is the young people who are changing it. Eight years ago my son was at South Dakota School of Mines. He played a little basketball there. And after the basketball game, I went back to his dorm to pick something up. By the time we had driven halfway across South Dakota to get back to his dorm, it was about 3 in the morning. We went into the dorm; the lights were on everywhere. There were kids, young engineers, taking computers apart. They were borrowing pieces of computers from each other, and they were making supercomputers. That was 8 years ago.

I have no idea what they are up to now, but I did read that these computers' best activity is math. The first thing they will do, because it is the best activity, is solve math problems. One of the new Internet problems this last week was people feeding math problems into the system and all of the computers concentrated on that. And the messages would not go through.

It is technology. We have to keep the technology going. I apologize for running over here in my excitement of being able to share a few Wyoming examples with everybody. I did that. I did want to emphasize why it is important that we streamline the licensing process, not to the point where it hurts our national security but where we can include some things that will enhance the national security by allowing some concentration.

I yield the floor.

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RECESS

The PRESIDING OFFICER. Under the previous order, the hour of 12:30 p.m. having arrived, the Senate will stand in recess until 2:15 p.m.

Thereupon, at 12:39 p.m., the Senate recessed until 2:15 p.m. and reassembled when called to order by the Presiding Officer (Mr. REID).

The PRESIDING OFFICER. The Senator from Vermont.

Mr. LEAHY. I ask unanimous consent that I be allowed to proceed as in morning business for 6 minutes.

The PRESIDING OFFICER. Without objection, it is so ordered.

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NORTHERN IRELAND

Mr. LEAHY. Mr. President, I want to discuss the most recent situation in Northern Ireland. All too often, I usually speak on the floor of the Senate about this issue after a bombing or bloody conflict between Republicans and Unionists. This time, however, I wish to address a situation that really has the potential to scar Northern Ireland more than any single bullet.

We have seen in our own country schoolchildren returning to classes this week. In Northern Ireland, schoolchildren are returning also. But, unfortunately, the week has been horrific for students at the Holy Cross Girls Primary School in Belfast. The students and their parents have faced a gauntlet of protesters on their way to school, many of whom pelted the girls with stones and spit at them.

Earlier today, a bomb went off addressed toward the schoolchildren. When I turn on the television and see pictures of these little girls, 6 and 7, 8 years old, crying in terror, being shielded by their mothers—what is their crime and sin? They are going to school. If there is ever anything that can help that troubled part of the world, it would be to improve the education of the young people and then allow them to go on to get jobs.

According to the press reports, the girls who attend this Catholic school have walked peacefully to and from their classes through a predominantly Protestant neighborhood for 30 years. Tragically, these children have been targeted to escalate already high tensions between Unionists and Republicans.

After more than three decades of violence in Northern Ireland committed by parties on both sides of the issue—and both sides are certainly responsible for violence—we sometimes become a bit callous about events in this conflict. But this latest situation of targeting children is truly reprehensible because it threatens to scar these children permanently.

The tragic situation at Holy Cross School has the potential to undermine any peace agreement that may be reached in the future. Negotiations will

continue this month on resuming the Northern Ireland assembly and further implementation of the Good Friday peace agreement. These efforts will be for naught if the children of Belfast, whether they are Catholic or Protestant, grow up in an environment where they think hatred and division are a way of life.

Let me take a moment to say, as I have in the past, that I have called upon Republicans and Unionists to abide by the Good Friday agreement. For those of us who have been involved in Northern Ireland over the years, we know that the hatred runs deep and the solutions are going to be complex. That is why I proudly support the U.S. commitment to the International Fund for Ireland. The Fund has promoted economic development in Northern Ireland across factional lines. I have supported it because the projects sponsored by IFI have been projects where Protestants and Catholics work side by side.

The situation at Holy Cross School is dangerous because it threatens to remove the most important characteristic that the Irish are blessed with, and that is hope.

I condemn efforts by people who are trying to take that hope away from these children and instill them with fear and hatred. That will simply perpetuate this conflict for years to come.

I recall going to Northern Ireland on President Clinton's last visit there. I had a police officer assigned to me in Belfast. He said to me: "Your President is a great man." I asked him why he said that. He said that before President Clinton came to Northern Ireland, the officer could not speak to somebody of the other faith. He told me which faith he belonged to but that is irrelevant since this was a statement that could have been made by either a Protestant or a Catholic.

He said: "Prior to that visit, I could not speak to someone of the other faith, but now I can work with them, I can be friends with them." He added: "The greatness of what your President has done and what the involvement of your country has been is that I no longer have to teach my children to hate."

Think of that. He was saying that prior to these efforts at a peace agreement, prior to the involvement of the United States and people such as Senator Mitchell and others, he felt that it was his duty to teach his children to hate. Unfortunately, this could have been heard on either side, but now he said he no longer had to do that.

I want to think that is the feeling of most people in Northern Ireland, Protestant or Catholic. But I despair when I see the pictures of these little children going to school. These girls are 6, 7, and 8 years old. Look at the terror in their faces. They are wondering what is going on.

Frankly, it brings back chilling memories of when I was in my teens and seeing the pictures in parts of our country where terrified African-American

schoolchildren were being escorted to school by marshals. Here are Irish children being escorted to school by the security forces.

There will not be peace in Northern Ireland, there will not be a promise for Northern Ireland until this sort of thing stops.

I commend the authorities who are protecting these children and pursuing the persons who threw the bomb. We can use law enforcement to stop the violence in the short term. In the long term people must look into their own souls and practice the religious principles that they espouse. They must practice these principles not only for themselves but for those who may not carry the same religion.

I yield the floor, and I suggest the absence of a quorum.

The PRESIDING OFFICER (Mr. BAYH). The clerk will call the roll.

The assistant legislative clerk proceeded to call the roll.

Mr. INHOFE. Mr. President, I ask unanimous consent that the order for the quorum call be rescinded.

The PRESIDING OFFICER. Without objection, it is so ordered.

The Senator from Oklahoma.

Mr. INHOFE. Mr. President, I ask unanimous consent to speak as if in morning business.

The PRESIDING OFFICER. Without objection, it is so ordered.

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MISSILE DEFENSE

Mr. INHOFE. Mr. President, as we are waiting for some things to happen right now, I am very distressed about some of the things we are hearing about a concerted effort to stop our missile defense language we have proposed for this year that the President has been very outspoken on, a recognition that we are in a very threatened position.

I think it is kind of a shock to many American people when they find out, and I say find out, not hear but find out, that we are in the most threatened position we have been in as a nation perhaps in the history of this country.

I can remember saying this back in 1995, and finally we had the Director of Central Intelligence about 2 years ago say that, in fact, we are in the most threatened position we have been in as a nation.

There is a current movie that people have gone to. I happened to see it on an airplane the other day. It is called "Thirteen Days." It is a story about the Cuban missile crisis of 1962, and some of us are old enough to remember the hysteria that hit the streets in the United States. People were going to the supermarkets and stocking up on things. They were digging storm shelters and telling their friends: Do not come to our house because we are digging a storm shelter. It was panic, and it was panic because they woke up one morning and found out there were Soviet missiles on the island of Cuba aimed at American cities, and that we