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PROLIFERATION AND U.S. EXPORT CONTROLS

HEARING

BEFORE THE

SUBCOMMITTEE ON INTERNATIONAL SECURITY, PROLIFERATION, AND FEDERAL SERVICES

OF THE

COMMITTEE ON GOVERNMENTAL AFFAIRS
UNITED STATES SENATE

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PROLIFERATION AND U.S. EXPORT CONTROLS

WEDNESDAY, JUNE 11, 1997

U.S. SENATE,
SUBCOMMITTEE OF INTERNATIONAL SECURITY,
PROLIFERATION, AND FEDERAL SERVICES
OF THE COMMITTEE ON GOVERNMENTAL AFFAIRS,
Washington, DC.

The Subcommittee met, pursuant to notice, at 9:40 a.m., in room SD–342 Dirksen Senate Office Building, Hon. Thad Cochran, Chairman of the Subcommittee, presiding.

Present: Senators Cochran and Durbin.

OPENING STATEMENT OF CHAIRMAN COCHRAN

Senator COCHRAN. The Subcommittee will please come to order.

Let me first welcome everyone to today's hearing of the Subcommittee on International Security, Proliferation, and Federal Services of the Governmental Affairs Committee.

The topic of today's hearing is Proliferation and U.S. Export Controls.

The Subcommittee has previously held hearings on Chinese and Russian Proliferation. Today we will examine how U.S. dual-use export control policies may be promoting military modernization in other nations, principally Russia and China, and the extent to which this modernization helps these nations continue their proliferant activities.

With the end of the Cold War came the need to reexamine American export control practices, especially with respect to goods having both military and civilian applications, goods commonly referred to as dual use. During the latter stages of the Cold War, approximately $100 billion per year worth of exports required an export license.

In 1996, the Commerce Department licensed for export $4.9 billion worth of dual-use technology, while our total export volume of goods and services amounted to $846 billion. The licensed exports comprised just under six-tenths of one percent of total U.S. exports in 1996.

Or, if you wish, look at American export controls in another way. Less than ½ of 1 percent of the U.S. economy is covered by export controls. Of that, more than 95 percent of export license requests are approved.

President Clinton entered office promising to liberalize U.S. export controls. He restated this promise in a September 1993 letter to Edward McCracken, Chairman and CEO of Silicon Graphics,

when he said that he is "personally committed to developing a more intelligent export control policy, one that prevents dangerous technologies from falling into the wrong hands without unfairly burdening American commerce."

I am concerned that President Clinton's relaxed export control policy on supercomputers has accomplished precisely the opposite of his stated intention of "preventing dangerous technologies from falling into the wrong hands."

According to Victor Mikhailov, Russia's Minister of Atomic Energy, we now know that five American supercomputers—four of which came from Edward McCracken's Silicon Graphics—reside in Russia's premier nuclear weapons design labs. We also know, from Secretary Reinsch's testimony to the House of Representatives in April, that 46 American supercomputers are in the People's Republic of China, at least one of which was sold to the Chinese Academy of Sciences by Silicon Graphics. And these 46 may be only the tip of the iceberg.

We know some other things, too. We know, of course, that Russia's nuclear weapons labs design nuclear weapons. We also know that the Chinese Academy of Sciences is a key participant in Chinese military research and development, and has been for a long time, working on everything from the DF–5 ICBM—which is capable of reaching the United States—to uranium enrichment for nuclear weapons.

According to the Chinese Academy of Sciences, its new Silicon Graphics "Power Challenge XL" supercomputer provides the Academy with "computational power previously unknown" which is available to "all the major scientific and technological institutes across China."

The good news is that some of these "major scientific and technological institutes across China" may not be involved in developing weapons of mass destruction and missile delivery systems for China and its clients, but some surely are, and they're doing this work courtesy of what appears to be, at best, a deeply flawed U.S. export control policy.

Today the Subcommittee will examine what the dual-use technology export control policies of the United States are, how they are working, and to what extent these policies need revision.

Our witnesses today are well-qualified to assist in the examination of these questions. We will hear first from William Reinsch, Under Secretary of Commerce for Export Administration, who worked previously on Capitol Hill and, today, oversees export control policy for the Commerce Department, and Dr. Mitchel Wallerstein, who as the Deputy Assistant Secretary of Defense for Counterproliferation, is the Defense Department's most senior official with responsibility for these issues.

Our second panel is comprised of Dr. Stephen Bryen, President of Delta Tech and a former Defense Department official with the responsibility for export controls, and Dr. William Schneider, a former State Department official who is currently a Hudson Institute Fellow and also the chairman of the State Department's Defense Trade Advisory Group.

The Cold War's end does not decrease the need for the continued safeguarding of sensitive American dual-use technology. While

there may no longer be a single, overarching enemy of the United States, there is little doubt that many rogue States, and perhaps others, have interests clearly inimical to those of the United States. Helping these nations—or helping other nations to help these nations—to acquire sensitive dual-use technology capable of threatening American lives and interests makes no sense.

I am going to ask Secretary Reinsch to proceed with whatever comments or statements he would like to make. We have a copy of a statement, which the Committee has received, which we will print in the record in full, and then we will hear from Dr. Mitchel Wallerstein, and then have an opportunity to discuss your testimony.

Secretary Reinsch, you may proceed.

TESTIMONY OF WILLIAM A. REINSCH, UNDER SECRETARY FOR EXPORT ADMINISTRATION, DEPARTMENT OF COMMERCE

Mr. REINSCH. Thank you very much, Mr. Chairman. It is a pleasure to be back in this room. On the whole, I think I would rather be back up there sitting behind you, but that is all right. I am looking forward to the dialogue.

The President considers an effective strategic trade export control program to be a critical element of our overall national security posture and, as you noted, he has directed us to regularly update our system so that it focuses on the new threats we face today.

Since the end of the Cold War, crafting export control policy has become more difficult because the world is more complex and the battle lines between competing interests less defined. The Cold War had a certain elegant simplicity. The United States and its allies had a clear enemy, and we largely agreed on how it should be contained. Economic sacrifice was often asked and usually made by countries and companies in the name of containment, and that was a policy that worked.

That structure, though, has now been replaced by less-defined and more ambiguous threats no longer confined to a handful of relatively predictable actors. The immediate threats are now terrorism and the proliferation of weapons of mass destruction to a handful of smaller, geographically diverse rogue States.

At the same time, the rapid spread of advanced technology in a globalizing economy has made critical items widely available—including some of the ones that we will be discussing today—and it has greatly increased the number of nations capable of producing advanced technology.

As a result, the United States does not have a monopoly on these items, if it ever did, and it has become harder to reach international consensus on what threats we face and harder to enforce any agreements that we do reach. For many nations, economic objectives are now paramount as they seek to penetrate new markets. Yesterday's adversaries are today's customers, and yesterday's allies are today's competitors.

Even when a policy is clear, our ability to implement it is not. The world abhors chemical and biological weapons, for example, but they can be produced with 40-year-old technologies using feedstocks and equipment found in hotel kitchens, breweries, universities and even high schools all over the world.

Building a nuclear weapon, as you know, Mr. Chairman, does not require sophisticated computers.

The administration's response to these changed circumstances is based on four major principles.

The first is reforming the export licensing process so that all relevant agencies can bring their expertise to the table in a timely manner. This allows for comprehensive interagency review of sensitive transactions while ensuring that the process does not put U.S. exporters at a disadvantage.

Second is streamlining controls so they focus on items that pose the greatest threat to our security;

Third is clarifying our regulatory regime so that exporters know what their obligations are and know how to improve their internal compliance programs; and

Fourth is strengthening the multilateral systems.

With regard to process reform—and I think this is important in light of the discussion that we'll have today—we have revamped the licensing process, via Executive Order, so that all relevant agencies can review all export license applications if they wish. In return for that expansion of review authority, the other agencies have committed to Commerce to conduct their reviews within strict time limits, to provide a statutory or regulatory basis for their views, and to participate in a dispute settlement process at appropriate political levels.

It is important to note in that process that some 96 percent of the applications that we review are resolved by interagency consensus at the working level. Those were there are differences of opinion are by far the minority and they are worked out in the dispute settlement process that I referred to that is implemented in the President's Executive Order of December 1995. Thus far all specific license disputes have been settled and have not had to be escalated beyond the Assistant Secretary level.

With respect to streamlining, we have updated controls on a wide variety of equipment, including high-performance computers, in order to reflect rapid technological advances that have made previously controlled items old technology widely available from numerous foreign sources.

Let me say a couple words about computers, if I may, Mr. Chairman, in view of your remarks.

In 1992, we treated a computer capable of running at 195 Million Theoretical Operations per Second or MTOPS as a supercomputer subject to strict controls. Today, personal computers that exceed this level of performance are being sold for less than $2,000 at retail stores such as Best Buy, and Radio Shack, and through mail order catalogues.

Not having seen your back room in a while, Mr. Chairman, I suspect the computers that are in there are supercomputers, according to the 1995 definition, and I suspect the ones in your personal office are in that same category.

When President Clinton took office, he was urged by Congressional leaders of both parties to make long overdue reforms in this area, and I believe our efforts to do that have been a model of good government decision making. The President's 1995 decision was the result of a joint interagency recommendation based on work

that various agencies, including the Defense Department, did internally as well as a private sector study. The studies came to similar conclusions—that advances in computing technology were making ever-higher performing computers widely available internationally to the point where controls on them would be ineffective. In addition, they concluded that the level of computer power needed for a number of activities, including nuclear weapons development, was already widely available abroad. Other functions, which we wanted to protect, required performance levels well above the levels that the President ultimately set in his decision of October of 1995.

It is also worth noting that none of these studies took full account of the rapid development of semiconductor technology that has permitted significant upgrading of existing machines by adding processors, as well as taking into account parallel processing, the linking together of many smaller computers to achieve the same effect as a much larger machine.

Both of these developments have had an enormous impact on making high-performance computers essentially commodity products. In 1996, for example, the average—not the highest, but the average performance level for a multiple processor was 6,923 MTOPS, and that is forecast to rise to well over 10,000 MTOPS this year.

The average level for a single processor this year is 655 MTOPS; in other words, a single processor is now over the level of what we considered a supercomputer 5 years ago, and that level is forecast to rise to 1,135 next year, and the level of the highest-performing single processor right now is higher than 1,135 MTOPS.

I make these points, Mr. Chairman, to illustrate, first of all, the rapid pace of technological development in this field and, second, to point out that this is the real issue when it comes to the availability and the ubiquity of this technology. It is not primarily a question of whether the Indians or the Russians or the Chinese are developing indigenous computers on their own. What they are doing is demonstrating what everybody else in the world was demonstrating, which is their ability to string lots of small computers together or to buy commodity chips and build advanced computers through upgrades and through parallel processing. This is, from the standpoint of people who are concerned about this technology getting out there, not good news, but the fact is it is out there and, in fact, it has been out there for a good while.

Our regulations and our policy prohibit the export under a license exception, which means without advance approval by the government, of computers that the exporter knows will be used to enhance computational power above the eligibility limits allowed for particular countries.

Beyond that, controlling computers today with complete effectiveness would really mean individually licensing computers down to the level of those in your office, which would be absurd administratively and would be disastrous economically for this sector and all of the secondary and tertiary sectors of our economy that depend upon it.

The President's policy is a reflection of the reality of computer technology today. It is available abroad and is rapidly increasing in power and speed. Controls on all but the highest levels have lim-

ited utility, and efforts to control at lower levels will not only be unsuccessful, they will limit our ability to widely disseminate American standards, American software, and American hardware and, thereby, damage our companies economically.

There has already been considerable consolidation within the high-performance computing industry. These companies depend significantly on their exports for their survival, and their survival, I would argue, is essential not only to our economic health and growth, but also to our own national security.

In the area of regulatory reform, for the first time in over 40 years, we clarified and simplified our regulations through a comprehensive rewrite that made them more user friendly and easier to enforce. All of that was in line with the goals set by the Trade Promotion Coordinating Committee, which is an organization that the Congress authorized, actually, while I was still here in 1992.

With respect to multilateral cooperation, the administration has worked hard to establish the Wassenaar Arrangement, which deals with multilateral controls on exports of conventional arms and sensitive dual use equipment. This is a particularly important development as we transition from East-West Cold War controls to a regime that focuses upon transfers of equipment and technology that could enhance conventional military capabilities in destabilizing ways or increase the access of rogue nations to weapons of mass destruction or the means to deliver them.

I also want to note, Mr. Chairman, that one of the most important things I think we have done and one of the least heralded is our work with many of the newly independent States of the former USSR and Central and Eastern Europe to help them develop effective export control systems.

These initiatives are particularly important since many of these countries possess strong technical capabilities which can support weapons proliferation programs. They've got a lot of equipment, they've got a lot of scientists, but they don't have a lot of experience with border controls. And what we have done, what Defense has done, what the Customs Service has done, what the State Department has done is to work with these countries to train their personnel to supply them with the equipment that they need to maintain competent export control systems, and in some cases to help them write their laws and also to help them write their regulations.

This is a slow process, but the result is countries that are newly independent are developing competent export control systems for themselves and are learning to appreciate the importance of those systems, particularly if they want to ultimately join the Wassenaar Arrangement, as some of them have—Russia and Ukraine—or other multilateral regimes that are out there.

We think this is a very important program which, incidentally, was funded with Nunn-Lugar money through the appropriation and authorization proves that the Congress undertook in past years. We think it is clearly in our national interest to work closely with these countries and to help them develop these procedures.

In all of these initiatives, I also want to mention, Mr. Chairman, in view of your reference to a couple of cases, our enforcement program at the Bureau of Export Administration plays a key role, par-

ticularly as we focus more on specific end-users and end-uses, and I am glad to point out that Congress has supported these efforts through additional funds, particularly in view of your status as a senior member of the Appropriations Committee. I always like to have the opportunity to talk to you about how important enforcement is and how important adequate resources to do it are.

We have, in recent years, undertaken the criminal prosecutions of persons who illegally exported zirconium for Iraqi munitions, unlicensed equipment for India's missile program, brokerage services for Iraqi rocket fuel, and gas masks to suspected Aum Shinrikyo terrorists in Japan, just to name a few.

These investigations also included the first civil charges and penalties for alleged unlicensed exports of biotoxins which are controlled to prevent proliferation. Just 2 weeks ago we executed a search warrant on a firm that apparently shipped software for integrated circuit design to China without the proper license.

BXA prohibits export of items that would make material contributions to proliferation projects abroad, regardless of whether such items are specifically listed on our Control List in our regulations. Using the Enhanced Proliferation Control Initiative provisions of our regs, an exporter must apply for a license when he or she knows or is informed by BXA that the end-use of an item may be destined for a project or activity of proliferation concern. Our regs also prohibit any person from supporting proliferation projects in any way, even when there are no U.S. products or no export transactions involved.

As an example, following a joint investigation of several agencies, a Long Island resident pled guilty to violating the EPCI provisions of our regulations by brokering the sale of Chinese-origin ammonium perchlorate, which is a rocket fuel ingredient, for shipment to Iraq. The shipment was stopped. The individual was apprehended.

In order to save a little time, let me skip some comments in my formal remarks, Mr. Chairman, and make a few brief comments on Russia and China, which I know are countries of concern to you.

Russia is continuing to develop its own export control system and is in the early stages of participating in International Export Control Regimes. As I mentioned, it is a member of Wassenaar. It is a party to major nonproliferation treaties and agreements. It has signed but not yet ratified the Chemical Weapons Convention.

We are encouraged by these developments and hopeful that they will enable us to work out problems in a cooperative way, including cases of diversion or illegal purchases.

At the same time, as Mr. Einhorn reported to you last week, although Russian policies with respect to the development and export of weapons of mass destruction are encouraging, actual events from time to time are not consistent with those policies. Until we see greater consistency between Russian policy and practice, including a Russian export control system that is more reliable and fully harmonized with our own—and we are working with them on that and that of our other Wassenaar partners—we will continue to maintain appropriate controls on exports to Russia.

Finally, on China, let me close with a brief note. The administration policy toward China, as you know, is one of constructive en-

gagement. We seek to engage with China to strengthen cooperation in areas where we agree and resolve differences where we do not.

Our overall goal is to encourage China to become integrated into the world system and to meet international norms of behavior in nonproliferation, in export controls, as well as other areas. We believe that expanding trade, business, academic, and government contacts with China supports this goal.

The administration rejects the view that China is an enemy that must be contained. Our export control policy toward China seeks to support our engagement strategy and the creation of higher paying export-based jobs in the United States while denying licenses for items whose export would pose significant national security risks to the United States.

For this reason, the vast majority of U.S. exports to China proceed with no objections by the U.S. Government. However, we scrutinize carefully exports which might raise national security concerns. We also continue to maintain Tiananmen Square sanctions, which limit the items that can be licensed for China. Where appropriate, we impose sanctions on Chinese entities for proliferation or other activities consistent with U.S. law.

I would also note in passing, Mr. Chairman, as an example of the scrutiny that we provide, the licensing data that we have for China suggests that over the last several years the denial rate has tripled compared to previous years. We are spending a great deal of time on Chinese license applications and examining them very carefully.

We are proud in this administration of our Strategic Trade and Non-proliferation record. We think we have developed an effective interagency process that facilitates legitimate trade, while restricting transfers that are inimical to our national interests. We have strengthened our enforcement capabilities with your support, and we have worked effectively with the business community to enlist their support for our control initiatives, which is absolutely critical.

In the years ahead, we will continue to try to do exactly those same things. We also look forward to working with the Congress more closely even than we have to those same ends.

Thank you.

[The prepared statement of Mr. Reinsch follows:]

PREPARED STATEMENT OF UNDER SECRETARY WILLIAM A. REINSCH

CLINTON ADMINISTRATION STRATEGIC TRADE AND NON-PROLIFERATION CONTROL AGENDA

INTRODUCTION

I am pleased to be here today to discuss the Clinton Administration's strategic trade control program and to explain how it addresses the proliferation and other security threats we face in an era of major geopolitical transformation. The President considers an effective strategic trade control program to be a critical element of our overall national security posture, and he has directed us to constantly update our system so that it focuses on the new threats we face today.

Since the end of the Cold War, crafting export control policy has become more difficult because the world is more complex and the battle lines between competing interests less defined. The Cold War, as long and costly as it was, had a certain elegant simplicity. The United States and its allies had a clear enemy, and we largely agreed on how it should be contained. Economic sacrifice was often asked and usually made by countries and companies in the name of containment, and that worked.

Now that familiar structure has been replaced by less defined and more ambiguous threats no longer confined to a handful of relatively predictable actors. The im-

mediate threats are now terrorism and the proliferation of weapons of mass destruction to a handful of smaller, geographically diverse rogue states.

At the same time, the rapid spread of advanced technology in a globalizing economy has made critical items widely available, and it has greatly increased the number of nations capable of producing advanced technology. As a result, the United States does not have a monopoly on these items, if it ever did, and it has become harder to reach international consensus on what threats we face and harder to enforce any agreements we do reach. For many nations, economic objectives are now paramount as they seek to penetrate new markets. Yesterday's adversaries are today's customers, and yesterday's allies are today's competitors.

Even when a policy is clear, our ability to implement it is not. The world abhors chemical and biological weapons, for example, but they can be produced with forty-year-old technologies using feedstocks and equipment found in hotel kitchens, breweries, universities and even high schools around the world. Building a nuclear weapon does not require sophisticated computers. The Administration's response to these changed circumstances includes basing its program on four major cornerstones:

(1) Reforming the export licensing process so that all relevant agencies can bring their expertise to the table in a timely manner. This allows for comprehensive interagency review of sensitive transactions while ensuring that the process does not put U.S. exporters at a disadvantage.

(2) Streamlining controls so they focus on items that pose the greatest threat to our security.

(3) Clarifying our regulatory regime so that exporters can better understand their obligations and improve their internal compliance programs.

(4) Strengthening multilateral control systems.

PRINCIPAL ACCOMPLISHMENTS

With respect to *process reform,* we have, through Executive Order, revamped the licensing process so that all relevant agencies can review all export license applications, if they wish. In return for that expansion of review authority, the other agencies have committed to Commerce to conduct their reviews within strict time limits, to provide a statutory or regulatory basis for their views, and to participate in a dispute settlement process at appropriate political levels.

Thus far, this system appears to be working. Agencies are taking their responsibilities seriously, and processing times are down, except for licenses that formerly were not reviewed by other agencies. Commerce has sought and will continue to seek delegations of authority from the other agencies narrowing the scope of licenses they wish to see.

It is important to note that some 96 per cent of the applications we review are resolved by interagency consensus at the working level. Those where there are differences of opinion are by far the minority of what we consider, and they are worked out in the dispute settlement process I referred to. Thus far all specific license disputes have been settled and have not had to be escalated beyond the assistant secretary level.

With respect to *streamlining,* we have updated controls on high performance computers, semiconductors and semiconductor manufacturing equipment, Beta-test software, telecommunications equipment, and chemical mixtures, among others. These changes reflect rapid technological advances that have made previously controlled items "old" technology widely available from numerous foreign sources.

For example, in 1992 we treated a computer capable of running at 195 Million Theoretical Operations per Second (MTOPS) as a supercomputer subject to strict controls. Today, personal computers that *exceed* this level of performance are being sold for less than $2000 at retail stores such as Best Buy and Radio Shack and through mail order catalogues.

When President Clinton took office he was urged by Congressional leaders of both parties to make long overdue reforms in this area, and I believe our policy has been a model of good government decision making. The President's 1995 decision was the result of a joint interagency recommendation based on work that various agencies, including the Department of Defense, did internally, as well as a private sector study. The studies came to similar conclusions—that advances in computing technology were making ever-higher performing computers widely available internationally to the point where controls on them would be ineffective. In addition, they concluded that the level of computer power needed for a number of activities, including nuclear weapons development, was already widely available abroad. Other functions, which we wanted to protect, required performance levels well above the levels the President set.

It is also worth noting that none of these studies took into account the rapid development of semiconductor technology that has permitted significant upgrading of existing machines by adding processors as well as parallel processing—the linking together of many smaller computers to achieve the same effect as a much larger machine. Both of these developments have had an enormous impact on making high performance computers essentially commodity products. In 1996, for example, the *average* performance level for a multiple processor was 6923 MTOPS, forecast to rise to well over 10,000 this year. The average level for a single processor this year is 655 MTOPS, forecast to rise to 1135 next year.

Our regulations prohibit the export under a license exception of computers that the exporter knows will be used to enhance computational power above the eligibility limit allowed for particular countries. Beyond that, controlling computers today with *complete* effectiveness would really mean individually licensing computers down to the level of those in your office, which would be absurd administratively and disastrous economically.

The President's policy is a reflection of the reality of computer technology today—it is available abroad and is rapidly increasing in power and speed. Controls on all but the highest levels have limited utility, and efforts to control at lower levels will not only be unsuccessful, they will limit our ability to widely disseminate American standards and software and damage our companies economically. There has already been considerable consolidation within this industry, and these companies depend on exports for their survival.

In the area of *regulatory reform,* for the first time in over 40 years, we clarified and simplified the Export Administration Regulations through a comprehensive revision and reorganization, making them more user-friendly and easier to enforce. As a result, exporters have a better understanding of their obligations. All of this has been done in accordance with the goals set by the Trade Promotion Coordinating Committee (TPCC) in 1993.

With respect to *multilateral cooperation,* the Administration has worked hard to establish the Wassenaar Arrangement, which deals with multilateral controls on exports of conventional arms and sensitive dual use equipment. This is a particularly important development as we transition from East-West Cold War controls to a regime that focuses upon transfers of equipment and technology that could enhance conventional military capabilities in destabilizing ways or increase the access of rogue nations to weapons of mass destruction or the means to deliver them. We continue to work in Wassenaar to build consensus with our new partners on strategic controls and sales of military equipment.

The Administration has also worked to strengthen other multilateral nonproliferation regimes such as the Australia Group, the Missile Technology Control Regime and the Nuclear Suppliers Group by further harmonizing implementation procedures and expanding membership when possible. These actions not only advance our non-proliferation objectives but also enhance U.S. exporters' ability to engage in legitimate trade and compete worldwide on a level playing field. Finally, we have worked with many of the newly independent states of the former USSR and Central and in Eastern Europe to help them develop effective export control systems. These initiatives are particularly important since many of these countries possess strong technical capabilities to support weapons proliferation programs. It is clearly in our national interest to work closely with them as they develop the legal, regulatory, administrative and enforcement capabilities they need to control sensitive exports.

In all of these initiatives BXA's enforcement program plays a key role in protecting our national security and foreign policy interests, particularly as we focus more on specific end-users and end- uses, and Congress has supported these efforts through additional funds. Through our nonproliferation, counter terrorism, and national security export enforcement programs, we have conducted hundreds of investigations over the last four and a half years. These have led to the criminal prosecution of persons who illegally exported zirconium for Iraqi munitions, unlicensed equipment for India's missile program, brokerage services for Iraqi rocket fuel, and gas masks to suspected Aum Shinrikyo terrorists in Japan, just to name a few. These investigations also included the first civil charges and penalties for alleged unlicensed exports of biotoxins which are controlled to prevent proliferation. Just two weeks ago we executed a search warrant on a firm that apparently shipped software for integrated circuit design to China without the proper license.

BXA prohibits exports of items that would make material contributions to proliferation projects abroad, regardless of whether such items are specifically listed on the Commerce Control List in the Export Administration Regulations (EAR). Under the Enhanced Proliferation Control Initiative (EPCI) provisions of the EAR an exporter must apply for a license when he or she knows or is informed by BXA that the end use of an item may be destined for a project or activity of proliferation con-

cern. In addition, the EAR prohibits any US person from supporting proliferation projects in any way—even when there are no U.S. products or no export transactions involved. For example, following an investigation by Commerce, Customs and FBI, a Long Island resident pled guilty to violating the EPCI provisions of the EAR in that he brokered the sale of Chinese-origin ammonium perchlorate, a rocket fuel ingredient, to Iraq. The shipment was stopped. This "catch-all" control regime is comprehensive and provides an important underpinning to our overall strategic trade control program.

FUTURE TRENDS

Chemical Weapons Convention

The Chemical Weapons Convention represents a critical step forward in our effort to counter the proliferation of weapons of mass destruction by establishing an international norm whereby nations agree to ban an entire class of weapons. BXA will focus on two major areas—obtaining data declarations from about 2000 non-governmental plant sites and coordinating international inspections of those facilities. Our objective is to ensure compliance with U.S. treaty obligations in a manner that minimizes costs of compliance for US industry and maximizes protection of confidential business information.

FURTHER EXPORT CONTROL LIBERALIZATIONS WILL BE LIMITED

We are down now to less than 9,000 licenses annually, and, increasingly, they are limited to items that are multilaterally controlled or items that are controlled to terrorist or other rogue states where our policy is unlikely to change in the short run. Accordingly, we are not likely to see many dramatic control list modifications in the near term. Nevertheless, we have an ongoing need to keep our controls up to date with advances in technology and spreading foreign availability. In sectors like electronics, where product life cycles are short, we need to review our policies regularly to make sure we are not continuing to control old generation items that are now widely available from other sources.

I know that at least two nations are of particular interest to this Committee with respect to our export control efforts—Russia and China. Let me comment briefly on each.

Russia

Russia is continuing to develop its own export control system and is in the early stages of participating in international export control regimes. It is a member of Wassenaar and just signed the NATO-Russia Founding Act which provides a framework for a new substantive relationship between NATO and Russia. It is a party to major non-proliferation treaties and agreements. It has signed but not yet ratified the CWC, as the Russian Parliament still has the CWC before it. BXA is active in providing direct training and support to working with Russian (and NIS) trade and export control officials under our Nonproliferation Export Control Cooperation program. We are encouraged by these developments and hopeful that they will enable us to work out problems in a cooperative way, including cases of diversion or illegal purchases. At the same time, as Mr. Einhorn reported to this Committee last week, although Russian policies with respect to the development and export of weapons of mass destruction are encouraging, actual events from time to time are not consistent with those policies. Until we see greater consistency between Russian policy and practice, including a Russian export control system that is more reliable and fully harmonized with our own and that of our other Wassenaar partners, we will continue to maintain appropriate controls on exports to Russia.

China

Let me close by briefly addressing our licensing policy toward China. The Administration policy toward China is one of constructive engagement. We seek to engage with China to strengthen cooperation in areas where we agree and resolve differences where we do not. Our overall goal is to encourage China to become integrated into the worls system and to meet international norms of behavior, in nonproliferation and export controls, as well as other areas. We believe that expanding trade, business, academic, and government contacts with China is supportive of this goal.

The Administration rejects the view, held by some of our critics, that China is an enemy that must be contained. Our export control policy toward China seeks to support our engagement strategy and creation of higher-paying, export-based jobs in the U.S., while denying licenses for items whose export would pose significant national security risks to the U.S. For this reason the vast majority of U.S. exports

to China proceed with no objections by the U.S. Government. However, we scrutinize carefully exports which might raise national security concerns. We also continue to maintain Tiananmen sanctions, which limit the items that can be licensed for China. Where appropriate we impose sanctions on Chinese entities for proliferation or other activities, consistent with U.S. laws.

CONCLUSION

The Clinton Administration is proud of its strategic trade and non-proliferation record. We have developed an effective interagency process that facilitates legitimate trade while restricting transfers that are inimical to our national interests. We have strengthened our enforcement capabilities, and we have worked effectively with the business community to enlist their support for our control initiatives. In the years ahead, we will continue our efforts to work closely with the Congress so that we can present a united front to the world community on nonproliferation and counter-terrorism.

Senator COCHRAN. Thank you very much for your comments and for your statement, which we have put in the record in full.

We will now go to Dr. Wallerstein for his comments. We have a copy of your statement, Dr. Wallerstein, and we will put that in the record in full and encourage you to make such summary comments as you think would be helpful to the Subcommittee.

You may proceed.

TESTIMONY OF MITCHEL B. WALLERSTEIN, DEPUTY ASSISTANT SECRETARY FOR COUNTERPROLIFERATION, DEPARTMENT OF DEFENSE

Mr. WALLERSTEIN. Thank you, Mr. Chairman. I am pleased to do so.

Secretary of Defense Cohen stated in his 1997 annual report that technology security and export controls are an important element in strengthening the preventive defense pillar of U.S. defense strategy. Secretary Cohen emphasized that DOD's technology security efforts serve two main purposes; first, they seek to prevent the proliferation of nuclear, biological, and chemical weapons—what we refer to as NBC weapons—and their means of delivery, which are primarily ballistic and cruise missiles.

Secondly, export controls seek to preserve U.S. military technological advantages by controlling conventional arms and sensitive dual-use goods, services, and technology.

Proliferation threatens U.S. national security interests. There is certainly no question about that. It can exacerbate regional instabilities and increase the threats to U.S. interests worldwide, particularly in regions where we may be likely to deploy forces, such as Northeast Asia and the Persian Gulf.

DoD believes that this proliferation threat can be effectively addressed through support for nonproliferation regimes, promotion of effective national export controls, and close export control cooperation with foreign governments that are responsible members of the world community and that share our concerns regarding proliferation.

We know that carefully targeted and rigorously enforced export controls can and do dramatically slow the pace of proliferation and raise the cost to potential proliferators.

We also believe that it is important to continue to carefully regulate exports of potentially destabilizing conventional arms and sensitive dual-use technologies. It is no coincidence that the countries

seeking NBC weapons and missile delivery systems are also simultaneously attempting to build up their conventional weapons capabilities.

Let me also note that the Department of Defense sees no signs that the underlying forces, which are causing NBC weapons proliferation and destabilizing conventional arms build-ups is abating. The post-Cold War era is characterized by global diffusion of technology and increasing indigenous expertise, which contributes to more widespread production of high technology goods in many regions.

That production, in turn, makes possible the application of advanced civilian technologies to military users.

DoD has special responsibility to provide our Armed Forces with the best and most technologically advanced equipment for fighting future conflicts and for protecting the safety of these men and women. Our fighting men and women performed brilliantly in Desert Storm in large measure because they had the most advanced technology, which they needed to maintain conventional superiority on the battlefield.

We must continue to provide the most advanced equipment to our fighting forces and ensure that this equipment is superior to that of any foe. Export controls are essential in maintaining our technology lead in key military systems.

Let me emphasize a few major principles that I believe should be kept in mind in implementing export controls.

First, is the need for a strong policy on which to control and, as required, to impose conditions or to deny sensitive exports to any destination for reasons of national security or foreign policy.

Second is the need to retain substantial administration flexibility in both establishing and implementing controls.

And third is the need to maintain a sufficiently broad basis for imposing unilateral controls under certain limited conditions, while we endeavor at the same time to make such controls more fully multilateral in their impact.

I believe that we have already moved effectively to implement these principles by improving the efficiency and the transparency of the U.S. Government export control process.

As Under Secretary Reinsch has noted, in a recent Executive Order, the President has directed that there will be appropriate interagency review of all dual-use export licenses, thereby addressing a Congressional concern that the Department of Defense has on occasion in the past not been afforded the opportunity to review certain dual-use exports.

The Executive Order also imposes, as Under Secretary Reinsch said, rigorous time constraints that allow us to account for national security concerns while still providing for expeditious review of license applications.

The new Executive Order is an example of this administration's efforts to streamline the export control process, to tighten controls where necessary, but still to ensure that U.S. exporters remain competitive in the world market.

At the same time, multilateral export control frameworks have been enhanced by the establishment of theWassenaar Arrangement on export controls for conventional arms and dual-use goods and

technologies. This Wassenaar Arrangement—which, by the way, the name derives from the town outside The Hague in the Netherlands where the agreement was negotiated—compliments other existing multilateral nonproliferation regimes specifically directed at curtailing the spread of weapons of mass destruction and their means of delivery. This includes the Nuclear Suppliers Group, the Missile Technology Control Regime and the Australia Group.

In sum, Mr. Chairman, proliferation is a multifaceted challenge that spans the full spectrum of conflict and threatens peace and stability at different levels—globally as well as regionally. It is not a challenge that will soon go away. For this reason, it is appropriate and necessary to use a wide range of national and international resources, including effective export controls, in our attempts to control the proliferation of nuclear, biological, and chemical weapons, missile delivery systems, as well as the dual-use goods and technologies that contribute to them.

I will conclude my statement there and am happy to respond to your questions.

[The prepared statement of Mr. Wallerstein follows:]

PREPARED STATEMENT DR. MITCHEL B. WALLERSTEIN

Thank you, Mr. Chairman, for the opportunity to testify on the topic of proliferation and U.S. export controls.

Secretary of Defense Cohen stated in his 1997 annual report that technology security and export controls are an important element in strengthening the preventive defense pillar of U.S. defense strategy. Secretary Cohen emphasized that DOD's technology security efforts serve two main purposes. First, they seek to prevent the proliferation.of nuclear, biological, and chemical (NBC) weapons and their means of delivery—primarily ballistic and cruise missiles. Second, export controls seek to preserve U.S. military technological advantages by controlling conventional arms and sensitive dual-use goods, services, and technologies.

Proliferation threatens U.S. national security interests. It can exacerbate regional instabilities and increase the threats to U.S. interests worldwide—particularly in regions where we may be more likely to deploy forces, such as Northeast Asia and the Persian Gulf. DOD believes that this proliferation threat can be effectively addressed through support for nonproliferation regimes, promotion of effective national export controls, and close export control cooperation with foreign governments that are responsible members of the world community and that share our concerns regarding proliferation. We know that carefully targeted and rigorously enforced export controls can and do dramatically slow the pace of proliferation and raise the cost for potential proliferators.

We also believe that it is important to continue to carefully regulate exports of potentially destabilizing conventional arms and sensitive dual-use technologies. It is no coincidence that countries seeking NBC weapons and missiles are also simultaneously attempting to build up their conventional weapons capabilities.

Let me also note that DOD sees no signs that the underlying forces which are causing WMD proliferation and destabilizing conventional arms build-ups are abating. The post-Cold War era is characterized by global diffusion of technology and increasing indigenous expertise contributes to more widespread production of high technology goods in many regions. That production, in turn, makes possible the application of advanced civilian technologies to military uses.

Because of the increasingly diverse regional threats to our security interests particularly in regions where U.S. forces are now or may be deployed, the U.S. must demonstrate leadership, in part, by maintaining a strong, effective export control system as one element of a broader nonproliferation and regional strategy. DOD supports effective export controls not only on armaments, such as advanced weapons platforms, but also on enabling dual-use goods and technologies, such as advanced machine tools and high performance computers (including supercomputers) that are needed to manufacture, maintain, and use these arms.

In this regard, DOD has a special responsibility to provide our armed forces with the best and most technologically advanced equipment for fighting future conflicts and for protecting their safety. Our fighting men and women performed brilliantly

in Desert Storm, in large measure because they had the advanced technology needed to service and maintain conventional superiority on the battlefield. We must continue to provide the most advanced equipment to our fighting forces, and ensure that this equipment is superior to that of any foe. Export controls are essential in maintaining our technology lead in key military systems.

Let me emphasize a few major principles that I believe should be kept in mind in implementing export controls. First is the need for a strong policy basis on which to control and, as required, to impose conditions or to deny sensitive exports to any destination for reasons of national security or foreign policy. Second is the need to retain substantial Administration flexibility in both establishing and implementing controls. Third is the need to maintain a sufficiently broad basis for imposing unilateral controls under certain circumstances, while we endeavor at the same time to make such controls more effective by multilateralizing them to the greatest extent possible.

I believe that we have already moved effectively to implement these principles by improving the efficiency and transparency of the U.S. Government export control process. In a recent Executive Order the President has directed that there will be appropriate interagency review of all dual-use categories of licenses, thereby addressing Congressional concerns that the Department of Defense has, on occasion, not been afforded the opportunity to review certain sensitive dual-use exports. The Executive Order also imposes rigorous time constraints that allow us to account for national security concerns, while still providing for expeditious review of license applications. The new Executive Order is an example of the Administration's efforts to streamline the export control process, tightening controls where necessary, but still ensuring that U.S. exporters are competitive in the world market.

I also would like to point out that the multilateral export controls framework has been enhanced by the establishment last year of the Wassenaar Arrangement on Export Controls for Conventional Arms and Dual-Use Goods and Technologies. The Arrangement complements other existing multilateral non-proliferation regimes specifically directed at curtailing the spread of weapons of mass destruction and the means to deliver them (the Nuclear Suppliers Group, the Missile Technology Control Regime, the Australia Group). The Wassenaar Arrangement has 33 founding members, and it is intended to increase transparency and responsibility on worldwide transfers of munitions and sensitive dual-use goods. Members include traditional U.S. allies, Russia, Ukraine, and other countries of the former Warsaw Pact as well as select countries from Asia and Latin America. A principal objective of the new regime is to identify and block potential security problems before they become major threats. As the first effort to establish worldwide restraints on arms exports, the Arrangement is intended to prevent acquisition of conventional weapons by countries that threaten international peace and stability.

The Department of Defense also promotes more effective multilateral controls by, among other things, emphasizing U.S. Government efforts to help upgrade other nations' export control systems and to make more rigorous the rules and procedures of the nonproliferation regimes. The Administration has decided that dealing with the proliferation threat requires effective export controls worldwide. Through legislation such as the Freedom Support Act and subsequent funding appropriations (e.g., Cooperative Threat Reduction & Nonproliferation and Disarmament Fund) the Congress has also made the establishment of worldwide effective export controls a priority of U.S. foreign policy. Consequently, DOD directly supports the Administration's and Congress's goals in this area.

In sum, proliferation is a multi-faceted challenge that spans the full spectrum of conflict and threatens peace and stability at different levels—globally as well as regionally. It is not a challenge that will soon go away. For this reason, it is appropriate and necessary to use a wide range of national and international resources, including effective export controls, in our attempts to control proliferation.

Mr. Chairman, this concludes my formal statement. I would be happy to answer any questions that you or the other Committee members might have.

Senator COCHRAN. Thank you very much, Mr. Secretary.

Before proceeding with questions, I want to welcome our good friend from Illinois, Senator Durbin, and yield to him for any opening comments that you would like to make.

Senator DURBIN. I will just ask questions later.

Senator COCHRAN. Secretary Reinsch, in your comments that you made to the Committee, you talked about the fact that in this day of emerging technologies that they are much moreadvanced today

than they were even 4 years ago and, particularly, in computers, that there already is out there the capability to develop computers with the power that we used to call supercomputers that are now ordinary, everyday computers. But isn't it a fact that only the U.S. and Japan are the manufacturers who are capable of manufacturing the true supercomputers in today's jargon?

Mr. REINSCH. I would like to say that we cornered the market on that, Mr. Chairman, because I think that would be good news, and we have a study underway to determine the answer to that question.

Right now, based on the information available, I would say that is, by and large, correct, but it misses the point. As I said in my statement the real issue is upgrades, parallel processing, the ability to assemble computer power through work stations and the acquisition of single and multiple processors that are uncontrolled, and widely available, and those are widely produced in lots of other countries.

Senator COCHRAN. A General Accounting Office review of computer export data indicates that it is unlikely that Russian military and nuclear weapons laboratories had acquired computers capable of more than approximately 3,500 MTOPS—million of theoretical operations per second—due to a lack of known sales of computers above that capability from the United States or Japan, and then they say these are the only countries currently producing computers above that level.

Is that a correct statement? Is GAO right about that; that the United States and Japan are the only countries currently producing computers above the 3,500 MTOPS level?

Mr. REINSCH. I cannot, at this point, make a convincing case that that is wrong, Mr. Chairman. There was testimony on the House side on this point by Ken Flamm, formerly of the Defense Department and now at the Brookings Institution, that suggested that there were some other producers, but I don't have that information, and I am not prepared to put it forward. For purposes of this discussion, I am happy simply to assume that that is correct.

The question, of course, really is, though, what would the Russians have done or what would they have been able to do had an American company not sold them the computers that are at issue? Would they have been able to obtain comparable computing power through other means. I think the answer to that is yes. They didn't have to go down that road because the sale took place.

Senator COCHRAN. The policy that this administration now has, as I understand it, classifies different countries to which U.S. manufacturers are permitted to export comuters of certain capabilities. There are Computer Tier I countries, including Western Europe, Japan, Canada, Mexico, Australia, New Zealand. No license is required for supercomputer exports to or re-exports among those countries. So that is a license-free zone that we have described, as I understand it.

There is a second tier in the new policy, which includes South America, South Korea, the ASEAN nations, Hungary, Poland, the Czech Republic and others, where no license is required to export supercomputers with capabilities up to 10,000 MTOPS. Record keeping and reporting by the manufacturer, though, is required.

And then there are the Tier III countries, and those are the ones of particular concern that we are talking about today, comprised of India, Pakistan, all of the Middle East not included in other tiers, states of the Former Soviet Union, China, Vietnam, and the rest of Eastern Europe. Export requirements under this Tier III licensing requirements are somewhat complicated depending on who the end user is, military or civilian, and what the end use is, military or civilian. And the license applications, required, as I understand it, for these countries are supposed to be examined on a case-by-case basis, and these individual validated export licenses are required to export to or re-export among Tier III countries computers capable of greater than 2,000 MTOPS to military end users or end uses in these countries. This, of course, includes nuclear, biological, chemical, or missile-related end-uses.

Is that a fair characterization of our policy and the regulations that your office is responsible for enforcing?

Mr. REINSCH. Yes, it is, Mr. Chairman.

The only minor point I would make is with respect to Tier III and the Middle East. It is the non-embargoed Middle East. There is a Tier IV, which includes a number of countries in the Middle East, like Iran and Iraq, where the effective limit is six MTOPS, and it hasn't changed in years.

Senator COCHRAN. Right. Cuba, Iraq, Iran, Libya, North Korea, Sudan, and Syria.

Mr. REINSCH. Yes. They are in a sep——

Senator COCHRAN. There is another tier, Tier IV.

Mr. REINSCH. Yes. I wouldn't want anyone to think that they are in Tier III.

Senator COCHRAN. That is the embargo. No supercomputer sales are permitted to those Tier IV countries; is that correct?

Mr. REINSCH. Well, effectively. Our limit is six MTOPS, which eliminates everything.

Senator COCHRAN. That is a typewriter, isn't it? [Laughter.]

Mr. REINSCH. Yes. Approximately.

Your description of the Tier III policy, as I heard it, is correct.

Senator COCHRAN. Let me ask you this. If I am an exporter and I want to sell a supercomputer to one of these Tier III countries, China, for example, is there any way I can consult and get a list of suspected end users that would be prohibited under this policy? Can I consult with you so you can give me a list of those that I shouldn't sell to in China, for example, who are military end users?

Mr. REINSCH. There are approximately three things you can do. You can always consult with us, and people do that. Normally, that consultation takes the form of a company coming in and saying, "We intend to do business with X. Is that OK? What do you think of X? Do you have information about Entity X, whatever it is? Is that an end user that would require a license?"

We are prepared and have told the companies that we are prepared to answer those questions when they come in. We had a meeting with—this is a fairly small universe of producers, by the way, six or seven—and we had a meeting with them shortly after this policy became effective and went over the procedures that we wanted them to follow, the kinds of records that we wanted them

to keep, which they have been keeping, and the opportunities they had to consult. They can come in and do that.

In addition, second, we can inform them individually or collectively of end users that are problematical within the meaning of the President's policy or, alternatively, third, we can publish in the *Federal Register* the names of entities that we have identified as proliferation end users for which a license would be required.

We have begun to do that. We have not done it extensively so far. There are intelligence sources and methods issues that come up frequently, as well as some other considerations.

We have thus far published—and this is a policy that we adopted last year in terms of a mechanism for working these things through and making a decision—thus far we have published two names, and we expect, within the next week or so to publish a significantly longer list of more names that will include Chinese names. The two names that we published were in Israel and India.

Senator COCHRAN. It is my understanding that the Department of Commerce has refused up to now to make available any listing of military users in Russia or in China or in India or in Pakistan and that the only one, when asked, that was identified was in Israel. Is this sort of trying to shut the door after everything is already out?

Mr. REINSCH. This is a frustrating question, which I know has been the subject of some comment in the newspapers. The reason I am frustrated, frankly, Mr. Chairman, is because you are sitting here talking to the two people that have been trying to get this information out and publish this information for a long time.

The decision to publish information, however, is not one that resides exclusively in a single agency. This is an interagency decision. As I said, with virtually all of these matters there are sources and methods, and intelligence-related questions that have to be debated and considered, and sometimes we don't publish, frequently we don't publish for that reason, even though we have identified someone that, for other reasons, ought to be published.

Senator COCHRAN. The practical result has been to put the exporters on the honor system and to give them the responsibility for determining who is a military end user or what will be a likely military end use.

Mr. REINSCH. I don't agree with that, Mr. Chairman. I think that overstates it.

As I said, we have had a good bit of consultation with them, talking to them about what to look for, red flags, what kind of indicators they ought to identify in their customer business. We have invited them to come in and consult with us regularly. In the Russian situation, and I assume you are familiar with the facts of that, most of the companies in this universe of companies did come in and consult with us about the Russian end users and, in fact, they submitted licenses acknowledging that these were end users for which licenses needed to be submitted. We didn't publish those names, but they figured it out. It wasn't very hard to figure it out. They consulted with us.

We declined to approve those licenses. They got the message. There is a company that you mentioned that did not get that message, apparently, and undertook the sale, and that is a matter of

investigation right now with the Justice Department, and I can't comment further on the case.

But I would say that, by and large, these companies have not had a lot of difficulty figuring out who the military end users are and which are not.

Senator COCHRAN. There was some statement in your remarks about how many supercomputers have been purchased under this new policy by China. I think 46 is the number that I remember. You may have mentioned that in your testimony over on the House side at a hearing there.

Mr. REINSCH. That is what I said.

Senator COCHRAN. You told us a specific number of supercomputers that have been purchased in Russia and China. How do you know there aren't more than that in those two countries? How do you know there are just 46 in China, for example, and do you know where they all are?

Mr. REINSCH. The companies, under the President's policy, are required to keep records of all sales worldwide. They have done so. They have submitted those records to us. The numbers that I cited in that testimony were the numbers that we had available at that time that the companies had represented to us were the sum total of their sales.

Now, as with anything in life, there are two possibilities; one, they may have forgotten something, and in point of fact, we have got some additional ones dribbling in, only one additional one for China. But there is always that possibility as they go through their records and recalculate.

There is also the possibility, of course, that they are lying to us; that someone is engaging in fraud. That is an enforcement matter. That is why I have enforcement agents who do a variety of things that I would prefer not to get into publicly to test the validity of the information that we're given and to work with parties other than the companies themselves on those points.

We don't simply take their word for it. But that is where we begin.

Senator COCHRAN. Let me ask you this about the end uses to which the supercomputers have been put. Are you satisfied that none of the supercomputers have been used to upgrade the quality of nuclear weapons in China?

Mr. REINSCH. We have no evidence that any of them have been used for that purpose. We have a very high level of confidence on that point with respect to all but two, based on the kind of end user it is, and there are a couple where we are looking into the matter further, but that is not based on any evidence that there is a problem. It is based on our desire to learn a little bit more about the nature of the end user.

Senator COCHRAN. There have been published reports in the press that the Chinese Academy of Sciences is involved in assisting in the upgrade of nuclear weapons capability or missile technology in China. Do you agree with those press reports?

Mr. REINSCH. Mr. Chairman, that is something that the intelligence community has looked into in considerable detail. We have information on that, but it is classified and I can't provide it to you in open session.

Senator COCHRAN. Do you have any evidence that any of the supercomputers, which have been sold by U.S. firms have violated your export control policies that have not been reported in the press?

Mr. REINSCH. Well, I can't keep track of everything the press reports. There are three cases that are under investigation; the two in Russia, which have been reported in the press, and the single one that you alluded to with respect to China and the Chinese Academy of Sciences, which has also been reported in the press, is one that is being looked at.

Senator COCHRAN. And that is the one that is involving the Chinese Academy of Sciences?

Mr. REINSCH. That is correct. That is the one that was stated in the press.

Senator COCHRAN. Do you know whether Silicon Graphics has sold any high-performance computers to countries that are proliferation risks other than Russia and China?

Mr. REINSCH. We have their complete records, Mr. Chairman. I would have to look it up. I was focused on China for this hearing. We can find out.

Senator COCHRAN. I would appreciate your providing that for the record, if you could.

Does the Commerce Department have a list of the 1,100 high-performance computers which documents the end user, the speed of the computer, the date of export, value and the identity of the exporter?

Mr. REINSCH. Yes.

Senator COCHRAN. Could you furnish that to the Committee for our record?

Mr. REINSCH. I was afraid you were going to ask me that, Mr. Chairman. This is information that is protected by Section 12(c) of the Export Administration Act. Section 12 of the Export Administration Act requires us to provide this information to the Congressional Committees of appropriate jurisdiction and prohibits them from making that information further available except by a vote of the full Committee.

We have not yet made a judgment as to whether this is a Committee of appropriate jurisdiction. The main Committee of appropriate jurisdiction in the Senate is the Senate Banking Committee, which has not requested this information. I would have to consult with my lawyers, frankly. We have not had a request from your Committee before and haven't made a judgment on whether you fall within the meaning of 12(c).

Senator COCHRAN. Since the Nuclear Nonproliferation Treaty was signed, this Committee has had the responsibility of oversight of compliance with the terms of that agreement, and we annually review the status of that and the compliance with the treaty terms by signatories. I can recall when I first became Chairman of the Subcommittee that had jurisdiction over that subject, I met regularly with the ambassador, who is our delegate to the Vienna IAEA Conference on the subject of safeguards and compliance with safeguards.

Senator Chuck Percy had the responsibility of chairing this Subcommittee at one time. Other Senators have as well. Senator Scoop

Jackson at one time had responsibilities with respect to this subject. The Committee continues to exercise jurisdiction over this area of proliferation, and that is the responsibility that we are undertaking to discharge in the conduct of these hearings. So I think it is clearly established that here in the Senate the Subcommittee is the Committee of jurisdiction.

Having said that, I would be glad to take it up with the Chairman of the Committee and other members of the Committee for further discussion. But if it is determined that I am right about that, we will resubmit that question in writing and ask for you to produce that information. But we will be glad to explore that further. I respect your position that you are taking at this point.

Mr. REINSCH. You make a very compelling case, Mr. Chairman. I hope you can appreciate the situation that I am in. We have no reluctance to provide the information to the Congress, and we have told the Committees that clearly our—for example, our authorizing Committees who made a similar request—that we are happy to provide the information. So we don't have any problem with it coming to the Congress.

I have to defend the law as it's written, and I have to consult with my lawyers, but I certainly understand the strength of your case, and I understand, also, the very broad jurisdiction the Government Affairs Committee has.

Senator COCHRAN. Dr. Wallerstein, you mentioned that the Defense Department has concerns in this area and responsibilities as well, and with the interagency guidelines that have now been promulgated I assume that part of your responsibility is to assess the security risk of the exports of these over a thousand high performance computers that we know have already taken place.

Have you come to any conclusion about whether or not these exports do pose a new security risk to the United States?

Mr. WALLERSTEIN. Senator, we review each of these proposed exports on a case-by-case basis and provide our views back to the Commerce Department, in the case of dual-use licensing and to the State Department, in the case of licensing of munitions exports.

In some cases we recommend conditions be imposed on the exports; and that can be done, particularly for machines of higher capability. So that we may have a higher level of confidence that the machine is being used for the purposes that are proposed in the export license.

Based on our case-by-case assessment and on the conditionality that we have on occasion recommended, and that has been implemented, we have no immediate evidence to suggest that the exports to China or to any other country have been inimical to U.S. national security interests.

Senator COCHRAN. It is my understanding that the capabilities of these supercomputers are such that they can be used and may have been used to develop smaller nuclear warheads for missiles and to improve the accuracy of missiles that are used to deliver weapons of mass destruction.

Do you have any evidence to support the conclusion that some of these computers have been used in those ways?

Mr. WALLERSTEIN. Sir, I have no immediate evidence to document the assertion that you are making. That said, I would cer-

tainly acknowledge that, as Under Secretary Reinsch has already indicated, with the global diffusion of computing technology, there is wider access to more capable computers.

I am sure you have heard the assertion made that the original designs for the first U.S. nuclear weapons were done on slide rules or on very primitive calculating machines. There is no question that lower-powered computers can aid in certain kinds of military applications, but those computers have become commodities at this point in time in 1997.

What we have determined, and what was integral to the change in policy that was implemented in 1995, were that there were applications that were well above the levels that we permit to be exported without a validated license that are essential to U.S. national security, and we have safeguarded those applications.

Senator COCHRAN. Do you know whether our government, either the military or other agencies of our government, has conducted any analytical studies to try to assess the threat these supercomputers could present to our military or to our national security before concurring with the administration's assessment of essentially decontrolling as a matter of national interest the sale of supercomputers above the 2000 MTOPS threshold?

Mr. WALLERSTEIN. Senator, I have direct responsibility in the Department of Defense for this matter, and I can assure you that both in the 1993 computer policy change and, again, in the 1995 computer policy change, all elements of the Department of Defense were integrally involved. This included all parts of the Office of the Secretary of Defense as well as the Joint Chiefs of Staff and the services.

Senator COCHRAN. I have some more questions about China, and Russia, and also Iran, but I am going to defer to my friend, Senator Durbin, for any questions he might have at this point.

Senator Durbin.

Senator DURBIN. Thank you, Mr. Chairman. And thank you for this hearing. I think it is an important and fascinating topic.

I want to try to come to grips with an understanding about the current export policy that this administration has instituted. One of the critics of that policy has said that we have—I won't use his words, but I will say we have reduced export controls on strategic technology to one-tenth of what they were under the Bush administration. Under President Bush, no computer performing more than 12.5 million operations per second could be sold to Russia or China without a license. Now computers up to seven billion operations per second can go without a license if the sale is not to a nuclear, chemical missile or military site.

Is that a fair characterization of the change in export policy?

Mr. REINSCH. Yes. Strictly in terms of theoretical level of performance, yes.

Senator DURBIN. And, of course, then it raises the question if we are turning loose this level of technology, this expanding level of technology, what controls do we retain in that process? I think that is what this hearing is all about.

I am troubled by some of the things that have been said. The whole question of dual use assumes, does it not, some cooperation

on the part of the purchaser in terms of end use and disclosure of that end use?

Mr. REINSCH. Well, to grant a license the end user has to be identified, and we can make judgments about the nature of that end user. Those are, in part, made based on representations that the end user as well as the American or exporter applicant might make. But the licensing process is also informed by intelligence information, enforcement information, other things that we know about the end user that he or she may not tell us or may not want us to know.

Senator DURBIN. So we try, when we don't trust the purchaser, to verify the end use through our own surveillance within that country?

Mr. REINSCH. We have a variety of means. Prelicense checks is one of them, in which our posts abroad engage in, well, exactly what I said, a prelicense check of the facility. There have been a couple famous cases in the distant past in the 1980s, where people have gone out after the fact to look for the computer and discovered an empty building and the computer had been shipped off somewhere else or discovered that the company was a mail drop. There is a lot you can discover with prelicense checks. There is a lot you can discover just by wandering around a plant to determine the nature of their real business, which they may or may not want to tell you.

The fact is, at the same time, though, it is a reality that all exports, when they leave our shore, go into somebody else's hands, and we don't have control over them any more. It may be somebody in the UK, and you have a high level of confidence in what is going to happen. It may be somebody in China and you have a lower level of confidence about what is going to happen, but it is equally out of our control.

Senator DURBIN. Someone said earlier this century—I can't recall the exact source—that a capitalist will sell you the rope you will use to hang him.

I am just wondering, in this instance, whether or not we are keeping track of this rope appropriately.

Let's take one other aspect of this. Let's assume you have a conscientious business in the United states that doesn't want to get caught selling to someone who is going to misuse this product. From what you have said, if they come to their government and say, "Give us some guidance. We would like to know which customers to avoid in Russia or China or some of these other nations," I think your testimony was that there is a limited amount that you can tell them.

Mr. REINSCH. We can tell them a good bit. We can't tell them probably as much as they would like, and we can't always tell them as much as we know because sometimes we are constrained by the way in which we obtain the information from revealing even that we have it.

Senator DURBIN. Have we thrown in the towel when it comes to export controls? Are we assuming that there are so many sources of this technology around the world that we might as well let American exporters earn some money and hope that maybe at least we'll make a few bucks off of this deal?

Mr. REINSCH. No, we haven't thrown in the towel at all, Senator. I think the conversation is a bit skewed because we have been talking exclusively about computers, which is a technology that is uniquely difficult to control for the reasons I have said.

In a number of other areas, and I think Dr. Wallerstein can mention them, but areas like stealth technology, advanced materials, composite materials, very sophisticated electronics, chemical precursors, biotoxins, a whole host of things that we control, I think our system is very effective.

Senator DURBIN. But these ubiquitous computers that tend to be——

Mr. REINSCH. That is different. It is not unique, but it is different.

Senator DURBIN. We don't seem to have much of a handle on them. I just wondered why, under the 1995 policy as I understand it, most supercomputers sold for civilian purposes do not need to be licensed for export by the Federal Government and exporters, consequently, cannot be required to track how they are used. Is that a fair statement?

Mr. REINSCH. No. The exporters are required to keep records of every sale of high-performance computers.

Senator DURBIN. But I am talking about end use. They can certainly give the name of the nominal purchaser, but there is no way to track, and what you are suggesting is only through spy techniques can we attempt verification.

Mr. REINSCH. Well, they give us both the—they know both the name of the end user and the end use. They know why the machine is being is being bought. That is what they tell us. Now, if you are asking me how do they know 12 months down the road that the machine, A, is still there and, B, is still being used for that purpose, that gets back to the control question. Although, actually, in the case of computers there is a way to tell because these things, particularly the high-performance ones, need regular service. I wouldn't want to suggest they break frequently, but a standard part of this kind of transfer is an ongoing service, and supply, and parts and sometimes upgrade relationship with the vendor. So the manufacturers know and have an ongoing relationship with the buyer most of the time, and know whether the machine is still there and have a pretty good idea of how it is being used.

Senator DURBIN. So do we keep or does the company keep and file with the government a log, not only of sales and purchases, but continued maintenance and repair so that we can see if the end use is as it was stated at the originalpurchase?

Mr. REINSCH. They keep those records. They provide them to us on request. In this particular case, we have requested them and are receiving them.

Senator DURBIN. We have had a couple instances, have we not, in the last few months involving Silicon Graphics that suggests that computer sales were made in Russia and China that were at least suspect?

Mr. REINSCH. Yes. That is, as I said, under active investigation via the Justice Department. I don't want to go into a lot of detail that would prejudice that outcome, but I think that is a fair statement.

Senator DURBIN. I am not going to ask you to go into it, but I think it really tells the story about this new policy and the fact that we have surrendered control in a lot of areas that, for whatever reason. I don't know if it is our belief that the world market is so rife with these computers that we might as well get a piece of the action or whatever reason, but we seem to have taken a new approach to this, which is very porous and not very accountable, as I see it.

Mr. REINSCH. If I may, Senator. I am not here to tell you that is good news. I guess I am here to tell you that that is technological and commercial reality. The reason this is a ubiquitous technology is because of the chips. Semiconductor chips, single and multiprocessors, most of which now, as a single processor, function at a higher level than the entire computer that the Bush administration controlled, are out there. Lots of countries make them. Lots of countries make them in ways that will fit into American products. Upgrades are easy. You slide another board in, more chips, and you have got more capacity.

You can string these things together in parallel processing. We can export 40 Pentiums and you are at 6,000/7,000 MTOPS right there.

I can make it even worse for you. If I were the Chinese, to be frank, I wouldn't deal with exports. I would set up a front company in this country, buy one, and it wouldn't even be an export, and have them do all of the computation I wanted inside the United States and ship the data back.

Senator DURBIN. I think it is curious the date of this hearing, it's just 1963, June 10, 1963, that President Kennedy gave a speech at American University about his vision of the end of nuclear weapons in the world and hoped that we would reach it and all that has transpired since, including the end of the Cold War and a reduction in nuclear warheads. We seem to be on the right track there.

But as we are making tangible, measurable progress at that level, it is probably because we are stuck in the mind-set of the 1960s and the belief that this is the protection of our future.

It appears that the challenge for the new century is in technology, where the right computer can provide, from what I have read, as much or more information than nuclear testing used to provide in years gone by.

From what I hear and your testimony, this is not controllable. It is not a question of counting warheads. And there is such an easy commerce in this technology that holding out the prospect of controlling proliferation may be naive.

I don't know if our export policy makes sense. I have real serious questions when it comes to China and certainly as to Russia.

Would a flat prohibition on the sale of dual-use technology to countries who refuse end-use verification be effective?

Mr. REINSCH. Not in the computer area, no, for the reasons that you and I have both said.

Senator DURBIN. They will buy it from someone else.

Mr. REINSCH. Sure. But let me not leave you—I mean, you have made some very thoughtful observations, Senator, but let me not leave you with as little hope as you have suggested by observing that the computer is neither the beginning nor the end nor the

larger part of our proliferation policy. You can, as Dr. Wallerstein said, design a nuclear weapon without one, but even if you designed one, you need a lot of—to build a bomb, to build a missile you need a lot of things besides a computer.

You need a lot of special materials, beginning with uranium or plutonium. You need to be able to have a continuous supply of that. There are a lot of other special materials, including special steel, that goes into the making of the bomb. A missile has all kinds of electronic systems, special materials and other things that are an integral part of making it function.

These things we control, and we control them very effectively, and they are not ubiquitous technologies in the way that computers are. So I would not, while I am gloomy in the sense about the utility or the possibility really of controlling a technology that is widespread with respect to software and the intellectual [inaudible] computer you can export over the phone. Think of the enforcement problems associated with that. While I am gloomy about that, I am not gloomy about our ability to deter proliferation because there are so many other pieces of the puzzle where I think what we are doing is very effective.

Mr. WALLERSTEIN. Senator, let me pick up specifically on the nuclear aspect of this, which you were just addressing.

As you know, the other part of President Kennedy's famous statement in 1963 was that he predicted there would be over 20 nuclear capable States in the 1970's. Of course, that never came to be; in part, because, as Under Secretary Reinsch has indicated, we control effectively a range of technologies. We also have participated and have increased the robustness of the Nuclear Suppliers Group and the effectiveness of IAEA.

The other point to make here is that, while it is certainly or it may be the case that some elements of our computer policy have had to reflect the growing worldwide availability of computers, the level of computational capability that is required to run the very sophisticated models that are involved in nuclear safety and surety are well above those that we were talking about earlier; that is, the 7,000 MTOP threshold. Moreover, the states that have signed the CTBT will not be doing any further testing. And any state that would test which is not a member we would have other means to address that, and we are certainly not selling advanced computers to those countries.

So I think that with respect to your concerns about nuclear safety, and nuclear security, and nuclear nonproliferation that our policy is in tune with those concerns and that we still have the ability to control these higher level machines. As we have said, we do not allow exports to military or defense end users and we would, in any case, require a validated license.

Senator DURBIN. I would be remiss if I didn't at least ask the follow-up question if the same response would apply when it comes to biological and chemical weapons, since we have, as you have indicated, some elements involved in nuclear weaponry that can and are carefully monitored. Can the same be said of the biological and chemical weapons?

Mr. WALLERSTEIN. Well, of course, with the advent now of the Chemical Weapons Convention, we have a very, very large number

of countries in the world, including the United States, which are now committed to restrict the export of chemical precursors and other elements that are required for the production of chemical weapons to states that are nonsignatories.

We also have the Australia Group, which controls the export of both chemical precursors and biological agents that are necessary for CW and BW weapons.

I would also note, however,that these are classically dual-use technologies. We have to remain very vigilant here because, particularly with biological weapons, there is an ease of concealability problem; due to the fact that these kinds of weapons can be manufactured inside of pharmaceutical facilities that are also producing for legitimate civilian civil end-use. So we do need continued vigilance, but we feel that, again, with our controls and with our multilateral commitment, through the Australia Group, the Chemical Weapons Convention, and the Biological Weapons Convention, we are addressing that.

Senator DURBIN. Thank you. Thank you, Mr. Chairman.

Senator COCHRAN. Thank you, Senator.

I am told that Russia's Minister of Atomic Energy made a surprising announcement in January that his ministry had purchased five American supercomputers; four from Silicon Graphics and one from IBM for two Russian nuclear weapons design labs; Chelyabinsk-70 and ARZAMAS–16.

The minister's announcement was particularly shocking, given the Commerce Department's decision not to approve export license applications for similar supercomputers to the Russian Ministry of Atomic Energy in the fall of 1996. The press publicized this nonapproval to Hewlett-Packard and IBM.

Secretary Reinsch, if the Russian Government can obtain from the United States without an export license supercomputers for its nuclear weapons design labs, how can you say that the administration's new export restrictions on high-performance computers is serving its intended purpose?

Mr. REINSCH. Well, these are cases, as I said, that are under investigation.

Senator COCHRAN. This is the first time I have mentioned these. You hadn't responded to this question before.

Mr. REINSCH. I mentioned the Russian cases before. This is a situation in which we thought we had done a very effective job publicly and privately. I have to be careful because, as I said, there is a Justice Department investigation going on here, Mr. Chairman, and I don't want to interfere with it.

We thought we had done a very effective job publicly and privately in indicating to the companies in this small universe what was appropriate with respect to those institutions and what was not. We have the obvious fact that one or more companies didn't get that message. I think that will play out in the criminal justice system. I don't think that is a question of policy, frankly.

Senator COCHRAN. So this involves Silicon Graphics as well then.

Mr. REINSCH. Yes, as reported.

Senator COCHRAN. You mentioned that the Justice Department was investigating Silicon Graphics.

Mr. REINSCH. As publicly reported, the sales to Russia were units by Silicon Graphics and one by IBM, and those are the investigations that are underway right now. They have both been referred to the appropriate Assistant U.S. Attorney.

Senator COCHRAN. There was published by the Department a Russian Defense Business Directory indicating Russia's military sites in order to acquaint potential exporters of the fact that they shouldn't export or they should obtain permission to export before they sold anything. Why is it that you published the Russian Defense Business Directory to acquaint people with potential illegal or improper purchasers but didn't publish a similar guide for China? Was there any reason for that?

Mr. REINSCH. Yes. That wasn't the purpose of the directory, Mr. Chairman. That directory was funded by Nunn-Lugar funds, and our activities in this area were restricted to Russia, Ukraine, Kazakstan, and Belarus under the Nunn-Lugar formulation. The purpose of that directory—and we publish directories for several of those other States, too—was to assist in defense conversion in those countries; that is, trying to get Russian or Belarussian or Ukrainian or whatever defense companies out of the missile or defense or weapons business and into other businesses, and we were trying to help American companies understand what kind of capacity there was over there for joint ventures or other kinds of trade or deal-making in civilian areas. That was the purpose of the directories.

Senator COCHRAN. The Russian minister, Mikhailov, made it clear that Russia intended to use the supercomputers to design new nuclear weapons. If the Defense Department or if Commerce had known this at the time, would it have supported an export license request to sell computers for that purpose, Secretary Wallerstein?

Mr. WALLERSTEIN. Senator, our policy is clear and unequivocal. We do not support the export of any computers that would assist the Russian nuclear weapons design, safety or surety program.

Mr. REINSCH. And as you noted we did not support it when we were presented with applications to send similar machines to the same places 3 months earlier.

Senator COCHRAN. I have been told that Silicon Graphics has indicated an intention to upgrade the computer that it sold to the Chinese Academy of Sciences. If that is true, Dr. Wallerstein, is it your opinion that the Department of Defense would object to any license for that purpose?

Mr. WALLERSTEIN. Senator, I would have to see the details of the specific proposal and refer to our technical experts within the Department to determine the nature of that application and whether we could agree to that license, or if we would require additional conditions on the license.

Senator COCHRAN. Secretary Reinsch, do you know whether Silicon Graphics has actually made application for a license to upgrade the computer that it sold to the Chinese Academy of Sciences?

Mr. REINSCH. Not that I am aware of, Mr. Chairman. As far as we know, no, they haven't. I would like to say, just to go back to something I said very early on this point, Mr. Chairman, it might be fruitful for us, and I think I can do this because it is not 12(c)

information, although it is classified, we might want to find a way to share with you our evaluation of the Chinese Academy of Sciences. You might be interested in that.

Senator COCHRAN. We may very well do that then.

With your consent to appear, we can make available a time that is mutually convenient for the Committee and for both of you, and we can hear that in a classified session. We have done that with other witnesses on other subjects as a part of this series, and I think that is a good idea, for us to have the full story.

Let me just say, to further elaborate on this issue about the jurisdiction of the Committee, I omitted to say that Senator Glenn, of course, has been Chairman of this Committee, too, and this Subcommittee as well. And in a letter from Acting Under Secretary Barry Carter, February 16, 1994, providing information on the nuclear referral list and information that had been requested in a letter from Senator Glenn, he says this on page 2 of his letter, "We are providing this licensing information to you as the Chairman of the Committee on Governmental Affairs pursuant to the confidential provisions of Section 12(c) of the Export Administration Act of 1979, as amended."

We are that Committee. That is the Committee.

Mr. REINSCH. It sounds like my predecessor already made that judgment, which is nice to know.

Senator COCHRAN. Yes. So there is precedent.

Mr. REINSCH. I wouldn't want to be inconsistent with my predecessor, particularly because of the respect I have for him, Mr. Chairman.

Senator COCHRAN. I am just saying this for the benefit of your lawyers, who didn't particularly do much research, I think.

Mr. REINSCH. No. My lawyers have not given me an opinion.

Senator COCHRAN. Oh. Oh, I thought you said your lawyers have cautioned you about giving us——

Mr. REINSCH. They have not given me one, and I will make sure they are apprised of this. The only distinction I would make is that there is—and we have made this distinction on the House side with respect to this same material—there is a distinction between the full Committee and the Subcommittee, which probably doesn't make any practical difference who signs the letter.

Senator COCHRAN. I said I was going to ask you a question about Iran, and I am.

The issue that I want to ask you to tell me your views about involves the possibility of using this new policy to sell supercomputers, 7,000 MTOPS, to a country in the Middle East, who could then transfer the equipment or make the sale to Iran. For example, the United Arab Emirates is a Tier III country under the administration's policies on decontrolling U.S. high-performance computer sales. U.S. supercomputer manufacturers, then, could sell to buyers in Dubai without an export license, providing it's a civilian buyer for civilian use up to 7,000 MTOPS. It is a fact that Iran imports more goods through Dubai than through its own ports because of Dubai's trans-ship to Iran. There is nothing to prevent the supercomputers from going on to Iran or anywhere else, for that matter from Dubai.

The General Accounting Office found in 1994 that the Commerce Department system of post-shipment verifications was ineffective. Dr. Wallerstein, last week Deputy Assistant Secretary of State Einhorn expressed his concern in testimony before this Subcommittee about Iran's ongoing pursuit of weapons of mass destruction and ballistic missile delivery systems.

Does the Defense Department share this concern and do you also share the concern that there is inadequate safeguard to prevent trans-shipment of supercomputers under these new policies?

Mr. WALLERSTEIN. Senator, we certainly do share the State Department's concern about the general pattern that we see emerging with respect to Iran and its attempts to acquire nuclear, biological, chemical weapons and missile delivery capability. We see a widespread and fairly sophisticated effort underway to evade the controls that are in place, and we are in regular contact—we, that is, the U.S. Government is in regular contact with our key allies and other major exporters to try to assure that they will not be successful.

Certainly, as we have already indicated in this hearing, there is a lot of material out there in world markets, particularly in the computing area, which is beyond control. So there is no way that this can be airtight. But it is a concern, and we are concerned about Iranian and WMD development.

Senator COCHRAN. I am going to ask you and also Secretary Reinsch if you know whether any of the over 1,000 high-performance computers exported from the United States since the administration adopted this new policy have been shipped to Dubai or anywhere else in the United Arab Emirates and whether or not any of these computers has made its way to Iran.

Mr. REINSCH. Let me say first, Mr. Chairman, that if they did make their way to Iran that would be a violation of U.S. law. I would want there to be no doubt about that. And that makes it for me an enforcement question, which has some of the difficulties that both you and also Senator Durbin had mentioned earlier.

We have a complete list of where they were sent. As I said, in preparing for this hearing I focused on China and Russia. I didn't bring the whole list with me. We can certainly find out.

It would not be a violation of U.S. law to export one to Dubai, and I can easily find out if any were shipped there and we have, as I said, means of determining whether they are still there or not.

Senator COCHRAN. I am curious to know in your enforcement activities whether or not you have undertaken to investigate whether any of these supercomputers in the Middle East have been transshipped to Iran.

Mr. REINSCH. We are looking at all of them right now. I wouldn't say that we have an investigation of a specific one under way. We are examining all of the records that we have obtained and other information to determine whether there is any evidence that warrants any investigation.

As Dr. Wallerstein and I both said beforehand thus far—well, you've raised Iran. I guess our response was on China—but thus far we have no evidence that anything like that has happened. If we obtain any evidence then we will proceed with an investigation. We are actively looking for it.

Senator COCHRAN. One question about the efficacy of these new policies is the assumption that the administration seems to be making that everybody can piece together small computers and make these giant high-performance computers, 7,000 MTOPS and higher, but I come back to this testimony that our General Accounting Office gave in April that the United States and Japan are the only countries in the world that can produce high-performance computers operating faster than 3,500 MTOPS.

The White House, when it issued its fact sheet in October of 1995 announcing this new policy said, in support of President Clinton's statement, that "we conservatively judge that computers up to 7,000 million theoretical operations per second will become widely available in open commerce within the next 2 years."

Is that borne out by the facts today or was that just flat wrong?

Mr. REINSCH. I would say two things, Mr. Chairman.

First of all, we have another study underway to determine a definitive answer to that question, which is why we have made clear that we don't intend to take further liberalizing action in the computer sector until a new study and further work is completed, which may or may not recommend any further actions. That study is not due to be completed until the end of the year.

I would say, based on what we know and also looking at what we are informed by industry in terms of technological advances, that the 1995 study was somewhere between right on and conservative in its predictions of what was going to happen.

And I would really recommend, Mr. Chairman—I don't want to insert it in the record because that would kill several trees—but I really recommend that you and/or your staff take a look at the study. I think that it will make a persuasive case that the issue in this area is not what GAO said it was in the sense that it is not whether the Indians are building a machine. It is not whether the Russians are building a machine. It is the kind of processors, multiprocessors and work stations that are out there via a whole range of producers that is the issue.

I think, in that regard, the study, if anything, underestimated what has happened in the last 2 years. But as I said, we will see. We are doing a new study, and we will be guided not only by that, but partly by that when it is done.

Senator COCHRAN. I understand that you did base your decision on a study, but that the study said that some of its conclusions were based on "conjecture" and not hard evidence. Is this the Goodman Study that you are referring to?

Mr. REINSCH. It's the study that I am referring to. I don't recall the study saying it was based on conjecture, but I will make a deal with you. If you will read the whole thing, I will re-read the whole thing, and we can make a decision.

Let me say also that was, by no means, the sole basis on which we did this. Each of the agencies involved, and Dr. Wallerstein, I think, wants to comment, did their own internal work on this subject.

Mr. WALLERSTEIN. Yes. Let me add a few comments, if I may.

Senator COCHRAN. Please.

Mr. WALLERSTEIN. First of all, with respect to the assertion about the 3500 MTOP cut-off, you put your finger on what the dra-

matic changes that are now underway. Up until the 1995 time period, we were able to measure the power of these machines because they were so-called single vector processor machines; that is, these were large boxes that had enormous number-crunching capability. But now we are moving into a new era, which is characterized both by massive parallel processing and by clustered work stations.

So whole new strategies or architectures are evolving, which change fundamentally the nature of the control problem. This is, in part, what the new study will look at.

Our position has been—and this is a governmentwide position since 1993—that we need to look at this approximately every 18 months, not necessarily to change the policy, but at least to determine where the technology and the markets have gone in that time period, and that is what we have done and will continue to do.

As Under Secretary Reinsch has already said, we are going to look at it again. We may determine that the market has not evolved that fast and, we need to look at where the controllability thresholds are. And the report that he referred to does talk about this notion of controllability thresholds. So I do also commend it to your attention.

Part of what we did in 1995 was an internal DOD assessment of the applications that we use computers for within our the defense community. We discovered that there were clusters of applications; one around 10,000 MTOPS, another above 20,000 MTOPS.

I might note, also, Mr. Chairman, that the most powerful machines now are in excess of 100,000 MTOPS. So when we talk about this range of 2,000 to 7,000 MTOPS, we are way down at the lower end of a range that goes up to over 100,000 MTOPS.

Senator COCHRAN. And that is the market that I think you were referring to, Secretary Reinsch, when you said we have cornered the market on those high-performance computers. Is that correct? We are the country that manufactures——

Mr. REINSCH. I certainly hope so, yes.

Mr. WALLERSTEIN. These were highly sensitive——

Senator COCHRAN. What are your rules on that? Do we sell those to anybody who has got the money to buy them or do we have a list of prohibited purchasers?

Mr. REINSCH. Well, you have articulated the policy, Mr. Chairman. With respect to Tier I countries, which are essentially our NATO allies and a few others, we don't have a limit. We do have a record keeping requirement. With respect to Tier II, anything over 10,000 requires a license. I would just say in passing, as evidence of what Dr. Wallerstein said, in the first 3 months of this calendar year, we got more license applications for computers above 10,000 than we had received in all of 1996. And so this is a steadily and very quickly growing field.

The processor data that I showed you, that I think I mentioned in my testimony—I was going to blow these charts up, but I think you can see them. This is the estimated performance curve for single processors. Where we are on the curve right now is this year. These are the industry projections for where a single processor is going to be by the Year 2000. 2,615 MTOPS estimated in the Year 2000. That is one processor. That is not even a computer.

I have got similar data for multiprocessors.

And then, to me, the most interesting one is they did a little upgrade chart; that is, a look at the extent to which you could upgrade the existing box by adding new processors, sticking in new boards. This year the range of upgrades that you can undertake for computers, existing machines, ranges from 504 MTOPS to 122,000 MTOPS. I mean, this is mushrooming.

You may remember from hearings that I am sure you participated in with respect to high technology Moore's Law, which is computer speed doubles every 18 months to 2 years, and this has been an axiom in the industry for I think about 15 years. I periodically ask industry people, "Where is the end? When do we cap? When can you not grow anymore?" and they continue to say never.

Now, I don't know whether I believe them, but every curve we have seen from everybody suggests that that is the way this industry is going very quickly, and it is going in exactly the way Dr. Wallerstein said; clustered work stations massively parallel processing. The big box is not what is happening any more.

Senator COCHRAN. One question with respect to the fact that your policies are based upon a definition of civilian use as opposed to military use in determining whether or not a sale would be permitted to a Tier III country. An export requires our individual validated license if over 2,000 MTOPS, and can be denied, if it's going to be for a military end user or for a military purpose.

How can you tell in a country like China, for example, where you have a mix of civilian and military activity at a research lab like the Chinese Academy of Sciences, that the supercomputer is not going to be used for military purposes in some way or that any entity that is subject to influence by the central government to share its technology with a military entity is not going to be in a position to have to comply with that?

It strikes me as very risky business, indeed, to permit the sale of these highly sophisticated state-of-the-art supercomputers to entities in China, which can easily pass on the technology or share that with others in that country for military purposes.

Are you satisfied that this is really serving our national security interests? I am sure it is serving our economic interests to permit these sales. But it seems to me that it is putting our security interests at risk by carrying through with this flawed policy.

Mr. REINSCH. I think you were right, Mr. Chairman, that in China, not uniquely, but peculiarly, it is hard to tell the military from the civilians, not because they hide it but because the PLA has its fingers in a lot of civilian pies, as it were, hotels, restaurants, things like that.

We rely on a lot of information. A lot of it is intelligence based, and is based on information that we have compiled through other enforcement activities over the years, as well as the representations of the end users as well as prelicense checks and a variety of other devices to make the best judgment we can.

Now you have a colleague in the House, I know, who has stated on the record in the hearing that we had on this subject over there that, from his point of view, all Chinese end users are bad because the PLA presumably is in a position to access any computer shipped to anybody in China.

Well, of course, that is at least theoretically true in any country in the world. As I said to Senator Durbin, once it leaves our country, we lose control. Now, it is probably a bit more realistic to suspect that that would actually happen in China than it might happen in some other country. But if you want zero risk, then you make a fair point about our policy. And as I said in my testimony, the only way that you are going to get zero risk in the computer business is to license individually all PCs, including the ones in the back room, and deny them all to virtually everywhere because even if you deny them all to China you have got the secondary market and you have got re-exports. If you are talking about thousands and thousands of low-level computers, there is very little you can do about it.

So we try to assess risk. We try to make our own independent judgment of when an end user is a bad end user or not. It is not our belief as an administration that all end users in China are, by definition, bad and that all of them are, by definition, under the thumb of the PLA, and we are prepared to permit the exports of these things to legitimate end users.

Now, I will also say that we have not approved any license applications for high-performance computers to China of over 7,000 MTOPS. Under our policy, all computers over 7,000 require a license. We have not approved any of those licenses. The entire discussion that we have had today has been in the 2,000 to 7,000 range, where we have a distinction between military and civilian.

You make a very good point. It is a very difficult judgment to make and we and the companies are drawing the line as best we can. I would never guarantee you that somebody isn't going to end up on the wrong side of the line at some point.

Senator COCHRAN. I am reminded, when Secretary Perry was here for his confirmation hearing in 1993, he was asked about how you control the sale of dual-use technology, and he said, "It is a hopeless task. It only interferes with a company's ability to succeed internationally trying to control the sales."

Do you agree with that view, Secretary Wallerstein? He's no longer the Secretary. You can disagree, you know. [Laughter.]

Mr. WALLERSTEIN. I sense a trap here, Senator.

I have had the privilege of working with former Secretary Perry on a number of studies before we both were in government, at the U.S. National Academy of Sciences, on this very subject.

Secretary Perry is among the most thoughtful individuals on this, both because of his defense expertise and because he is, by training, an engineer and mathematician.

I do not know the context in which that question was asked to him, but I do know that both in the studies that we undertook at the National Academy of Sciences, and during his tenure as Secretary, he supported carefully designed export controls on dual-use technology. In fact, he was a strong advocate for some of the policy changes that were undertaken during the first Clinton administration.

Senator COCHRAN. Secretary Reinsch, have you turned over to the Justice Department any evidence that would involve officials of the Commerce Department in facilitating the sale of these supercomputers to China that you think are illegal transactions?

Mr. REINSCH. I don't know how to answer that question, Mr. Chairman. Nobody has asked us for anything. The computers in question, the computers that are under investigation were all shipped without a license. There was no action by the Commerce Department to permit those to occur.

I don't know what evidence there would be. If there is any, I am happy to. Since we are not talking about licenses that were approved, we don't—it is like trying to develop documentary evidence on a negative. We don't have any information. They didn't come to us.

Senator COCHRAN. Well, there have been some suggestions that the Chinese Government has undertaken to try to influence policies of this government by various means and through contacts with various officials in our government, including some who worked at the Commerce Department. And so I am curious to know whether or not you have turned over the evidence of any such transactions to the Department of Justice for their review.

Mr. REINSCH. We've responded to every request and every subpoena that we have gotten on all of these matters as a department. The Bureau of Export Administration has gotten some requests for information primarily from the Committees in the Congress that are investigating the same issue. I don't recall offhand if we have gotten a request from the Justice Department or not, but we will certainly turn over to them whatever they want, and we have turned over to the Congressional investigators everything they have asked for.

The individual, I would just say in passing, the individual, if you are referring to Mr. Huang, about who many of the allegations have been made, was not part of the Bureau of Export Administration and didn't interact with the licensing process.

Senator COCHRAN. Senator Durbin.

Senator DURBIN. No questions.

Senator COCHRAN. Thank you very much for participating in the hearing and being here and sharing your testimony with us and for your statements and for the additional material that you may be able to give us to help us fully fill out our record.

Thank you very much.

Senator COCHRAN. Let me introduce our second panel as the Secretaries leave the witness table.

Dr. Stephen Bryen is the President of Delta Tech, Incorporated. He has considerable experience in the field of export control policy, having been the Deputy Under Secretary of Defense for Trade Security Policy from 1981 to 1988.

While at the Department of Defense, Dr. Bryen served as the first Director of the Defense Technology Security Administration.

Dr. William Schneider also has experience in export control policy, having served as Under Secretary of State for Security Assistance, Science, and Technology, from 1982 to 1986. While at the State Department, Dr. Schneider was the Chairman of the Senior Interagency Group on the Transfer of Strategic Technology. He currently serves as an advisor to the State Department, as the Chairman of the Department's Defense Trade Advisory Group.

Dr. Bryen, I am going to ask you to proceed first, if you will. We have statements which we will put in the record, and then we'll

ask Dr. Schneider for his remarks, and then we'll have an opportunity to discuss them with you.

Dr. Bryen, you may proceed.

TESTIMONY OF STEPHEN D. BRYEN, PRESIDENT, DELTA TECH

Mr. BRYEN. Thank you, Mr. Chairman. I will submit my whole statement for the record. I am going to touch on some of it by way of introduction of this subject.

But before that I thought it might be useful just to clarify a little bit what we are talking about, since there seems to be some confusion between PCs and supercomputers in the Department of Commerce, and since that confusion exists, I thought I would try my very best to clarify, if I can.

Senator COCHRAN. Would you pull the microphone just a little closer to you, so we can hear clearly?

Mr. BRYEN. I will do the best I can.

Dr. Wallerstein mentioned two of three kinds of supercomputers. There are three types known today and a fourth that may emerge. There is the Vector processor, which is the oldest type. The Cray computer is most famous as a Vector processor.

There are massively parallel processors that are called MPP computers, and then there is another type of parallel processing called Symmetric Multiprocessors. So those are the three kinds. PCs are not supercomputers and you can't stick them together to make them into supercomputers, not yet. There is work on clustered work stations, as Dr. Wallerstein mentioned, but so far, at least, the breakthroughs have not occurred and there is not that type of supercomputing available to anyone yet.

I have no doubt that it will be eventually available.

The Symmetric Multiprocessor machine, which is the Silicon Graphics type of machine that you have referred to, is one of the most popular ones, and it is more and more used in the Defense Department. And, in fact, in my testimony at the back I have taken a look at just one supercomputing center in the Defense Department. There aren't that many, but I took advantage of the fact that this one was pretty well documented on the Internet, and it became a convenient way for me to do my research.

I might mention parenthetically that there is a lot of information on the Internet these days, and it is one of the good sources of learning about what the Chinese have been buying in the way of supercomputers.

I would also like to make two ancillary points in respect to that. The first is before the administration decontrolled supercomputers—and this was about 18 months ago, I guess—the sales were very tightly regulated. And as far as I know, not one single supercomputer ever wound up in the wrong hands.

It's interesting that this new policy has caused a diversion—I recognize Secretary Reinsch said that there are at least two cases under active Justice Department investigation; one in Russia and another in China. And that one in China is the Chinese Academy of Sciences. So I have really very serious doubts that this policy is serving our national interest if this sort of thing goes on.

The U.S. Army site that I mentioned is very much like the site that has been put into place in China at the National Academy of

Sciences. It has more or less the same machines. So that is why I selected it. Other than the convenience of having these nice graphics on the Internet is the fact that we can take a look at what is going on there and the kind of work they are doing.

By the way, I just was selective. There was too much to fill up your book with, but if you would like to have all of it I would be glad to print out the rest of it. Because some of the work is in missiles, in-theatre missile defense, in particular. Some of the work is in biological and chemical defenses. Some of the work is in dealing with complex and difficult problems such as how you design a hypersonic vehicle. All of this is being done on this type of processor. This is not child's play. This is a serious effort that the Army is making to understand certain processes.

In one of the pictures you have is a re-entry vehicle. It is modeled on the supercomputer. The idea is to make this re-entry vehicle efficient and accurate so that it hits the target that it is intended to hit with a high degree of accuracy and that it doesn't fail in the process.

Another project going forward is studying how chemical weapons disperse and how you can decontaminate, because we faced that threat in the Gulf War, as you know, and, as everyone recognizes, we are going to face it again. So understanding how to deal with it is very important.

While they are looking at that, the Army is also looking at how you clean up a subway station. You know what happened in Japan. It could happen here.

This is the sort of technology that we are selling to China and to other countries.

I also want to say that you can't hook up a lot of PCs and get a supercomputer. I don't know where that idea came about. If you could do it, the Chinese would be more than happy to hook up a lot of PCs and not buy million-dollar supercomputers from Silicon Graphics or Hewlett-Packard or Digital Equipment or any other company.

The fact is, when the flood gates were open, they bought a huge number of supercomputers. Most companies that sell these things—they don't sell that many of them—most companies that sell these things are pretty proud of the sales, and they usually post them in their publicity. They put out a press release, "We just sold a supercomputer to this company or that company. Isn't it great?"

Silicon Graphics did that, and you can get on the Internet all of their sales up to the time of the decontrol when they stopped publishing the list. I think the answer is clear. Their biggest customer is probably China now, and they are not real proud of that or at least they don't want us to know too much about what's going on.

But what's going on is that a lot of technology is being transferred to China. I am very concerned about it. I think it is not in the national interest. I think that these machines can be controlled. I think that we could have a policy that is effective.

The other thing I would like to point out is that these machines are not standalone. They are not just being sold to an end user. This is a myth. It is total mythology. They are being sold and put into networks, hooked up to all kinds of institutes. Defense estab-

lishments I am sure are connected. Nuclear establishments I know are connected. Universities are connected.

More than that, these networks—by the way, the networking technology is also coming from the United States. From what we can determine, and this is from outside research, the networks are both public and private; that is to say, there is a classified portion to the networks that are being established. So that what you see is not what you get. What you see is the public part, but there is a private part, classified part, probably where most of the sensitive nuclear and other kinds of research is going on.

We know that China is pushing very hard to modernize its military forces and its nuclear weapons. I will just refer to two areas, but Secretary Albright also mentioned a third one yesterday, a new longer range ICBM that China is working on. But in addition to that, China is working on a MIRV capability, a Multiple Independently Targeted Re-entry Vehicle capability, and the ability to build small and compact nuclear weapons that can work in a MIRV missile.

Supercomputers will speed up the process of all of that and make it, I believe, possible for China to achieve that kind of capability very quickly.

In addition to that, China is working very hard on cruise missiles, and I am not completely sure in my own mind whether cruise missiles aren't worse in some ways than ICBMs. That is because you can't tell what kind of warhead they have. They could have a nuclear warhead. They could have a chemical or biological warhead or a conventional warhead. We used our Tomahawk cruise missile in the Gulf War, as you know, and after that, most recently, in a retaliatory attack with conventional warheads. But that same missile can carry a nuclear warhead.

And China can design the warheads and, in fact, a lot of the whole vehicle using supercomputers.

In addition to that, China is acquiring other technology from the United States, which is being approved by license by this administration, such as the Global Positioning System manufacturing technology, which enables China to have high-class guidance at a relatively low investment and to do it quickly.

I think the issue here is the speed at which China can modernize its military capabilities, and what we are doing is aiding and abetting the process of giving to China, selling to China, if you would like, these sorts of capabilities.

I think that this policy on supercomputers is a very dangerous one. You have had a chance to talk to the Secretary about that. He claims that the Commerce Department is intimately involved in all of these decisions, even though there are no licenses here that they consult with all of the companies.

I can't, for the life of me, understand how, for example, they would sell a supercomputer system to the Chinese Academy of Sciences. I have been there. I have seen their nuclear accelerator. They showed it to me. I know what kind of business they are in, and I think the administration knows what kind of business they are in.

Why we would sell supercomputing to them is hard to understand. It doesn't really make sense. And, again, their system is

part of other networks. All of this is tied together by fiber optic high-speed networks, again sold by the United States.

So it would seem to me that what really should be done is a pause, a halt. Such exports should be stopped for now. I have, at the end of my testimony, a number of recommendations. They are not my recommendations. There is an organization here in town called the Jewish Institute for National Security Affairs, which has, among its members, many retired military and flag rank officers who look at these questions, and their sense is, first, to suspend the current regulations on high-performance computers and require individual licenses for them. I am not saying you can't export them, but get a license like we have always done in the past. There aren't that many, 47 or whatever the number is not going to exactly strain the capabilities of the Defense Department or the Commerce Department to process licenses and to have real accountability on these transactions.

Secondly, let's get a full accounting of what is gone. I am far from convinced that 46—or now it is up one more officially—47, is the right number. I think it is a much larger number, but I can't say for sure, and I think that we are all owed an explanation as to what's actually transacted.

I know Commerce Department loves to wave the flag of the 12(c) Export Administration Act provision. We can't tell you about this. It is proprietary and all of that nonsense. Then just don't put the company names. Just tell us where they went, how many there are, what the speed of the processor, and then they are completely out from under 12(c). 12(c) is only designed to protect corporate proprietary information. So if you take away the name of the company there is nothing to protect, and they can provide that list today or at least what they have, and the Committee should have that, and the American people should have that, should know what's going on so that independent people can make an evaluation, since, quite frankly, the administration has not made any.

There is no study that I know of that has really looked at the military implications of any of this and, specifically, in relation to China. I don't know of any. I heard a lot of babble about that in the conversation today, but none was really referred to, and I don't think there is one, and that is very scary, very scary, and there should be one.

Third, we should have a study of the impact of computer sales both on our national security and on weapons proliferation. The proliferation issue is a very serious issue. China is a proliferant country. They have been selling missile technology to Pakistan. That has been the subject of quite a lot of controversy in the past few years. This is a serious matter. It has lots of consequences and surely we should try to understand what is going on and do so soon.

Fourth, using the CIA and the Defense Intelligence Agency, and I am more partial to DIA in this, let's see who is trying to get supercomputers and what their reasons are, what do they want them for.

Everyone talks about we're doing civilian research. What is that? I mean, what is really being—what are they really being used for? What kind of work are they being used for? Do we have any idea?

I think the intelligence community can tell us a lot about that if they put their mind to the task, and they surely should be tasked to do that soon.

And, finally, and most importantly, develop and propose an effective multilateral export control licensing system, not one that fails on the most crucial issues.

Again, I reiterate. We never lost a supercomputer before. This administration has lost at least two in Russia and one in China, which they admit to, and probably a lot more, and that's something that we should seek to prevent, and I believe that we can do that. But it is going to require cooperation.

As far as who owns this business, Senator, you are both quite right. It is really the United States. Japan has supercomputers, mostly the Vector type, but the real parallel processing type machines are being built here. So it is our technology, and I think we have the possibility of controlling it.

I should also add to that, that it's not just the hardware that is at issue. The software is very important because one of the things that we learned with respect to what the Russians were trying to do during the period of the Soviet Union is they were trying to get Western hardware, but they were also seeking to run Western software on it.

A lot of development work in software is very critical to how you build weapon systems and, consequently, I think you have to control the software as much as the hardware in some of these cases.

So that's my way of introduction, and I will be glad to answer your specific questions.

Senator COCHRAN. Thank you very much, Dr. Bryen.

[The prepared statement of Mr. Bryen follows:]

PREPARED STATEMENT OF DR. STEPHEN D. BRYEN

The sale or transfer of supercomputers is, and has long been, a sensitive national security issue. It is an issue that not only directly affects the United States, but also is of great importance to America's friends and allies. Ultimately, it is a subject that affects international security and world peace. In this connection I believe the sale of 46 or more supercomputers to China is a risk to American national security, and it is a threat to many of our allies and friends. This includes, but is not limited to, Japan, Australia, New Zealand, Taiwan, Singapore, the Philippines, Thailand, Malaysia, Indonesia, Korea in the Pacific region and our allies and friends in the Middle East, because of China's arms sales to Iran, Iraq, Pakistan and Syria.

My expertise is in technology policy. Technology policy considers how to enhance technology and America's technology leadership and also how to prevent the loss of technology to potential adversaries.

In my years of service in the Defense Department as the Deputy under Secretary of Defense for Trade Security Policy, and as the founder and first director of the Defense Technology Security Administration, I was closely involved in the issue of safeguarding supercomputers. I helped negotiate and implement the 1986 U.S.-Japan Supercomputer Agreement, which set up a system to carefully monitor and regulate sales of supercomputers.

It should be emphasized that regulations on supercomputers had nothing to do with the bold War. Our interest in working with Japan was to make sure that supercomputers were not used to help develop weapons of mass destruction. In the case of China I am convinced that U.S. supercomputer sales are being used precisely for this purpose.

Our policy of technology transfer to China is, in many respects, more extreme than what the Europeans and the United States did in transferring technology to Saddam Hussein before the Gulf War.

In the case of Iraq, Saddam got hold of nuclear technology, missile manufacturing know-how, and chemical and biological weapons from Western companies. The ac-

quisition of these capabilities made him much more dangerous than he otherwise might have been. In my Opinion, we were very lucky that Saddam jumped the gun and invaded Kuwait before his nuclear weapons capability was in place.

In the Case of China, we are transferring much. more sophisticated technology than anyone ever sold to Iraq. The consequence of this is that China's military will have greater sway over decisions in China that will affect American national security

China is seeking to enhance its nuclear weapons and their delivery systems. Examples include adding MIRV (multiple independently targeted reentry vehicles) capabilities to Chinese ICBM's and manufacturing small nuclear warheads for extended range cruise missiles.

Supercomputers are important for China to achieve these goals. Having them will enable China to speed up the design and development process by many years, to develop advanced weapons covertly and to build far more accurate nuclear systems that can be used against military targets.

China can use supercomputers to enhance many other weapons programs. For example, China can work out the best way to disperse chemical and biological weapons; can design advanced stealth aircraft and missiles, can improve its ability to detect submarines (enhanced ASW), and can intercept and crack encrypted communications. China has already been given enough supercomputer power to break any commercial encryption prom, such as those in use today by financial institutions. Giving China supercomputers also enhances her ability to use advanced information warfare techniques, such as attacking our own computer infrastructure.

Chinese acquisition of additional nuclear capabilities, and the more rapid modernization of her conventional systems, will make our ability to maintain peace in the region surrounding China more difficult. Chinese nuclear threats will have to be taken more seriously.

Last year during China's military exercise in the Taiwan straits, I was in Taiwan with former CIA Director Jim Woolsey and Admiral Leon "Bud" Edney. While China may only have been attempting to disrupt the Taiwanese elections, it was far from a sure thing that China would not expand its military exercise (which included live missile firings that closed off important parts of the Taiwan straits) into an actual attack on Taiwan. The dispatch of two of our aircraft carrier Task Forces to the Straits area acted as a deterrent to China—in fact, it shocked the Chinese. At one point a senior Chinese official, in reaction to the appearance of the Task Forces, threatened to incinerate Los Angeles in retaliation.

The sale of supercomputers to China should be regarded as a crazy policy. Logic dictates an urgent reevaluation of our technology transfer policy to China based on Chinese behavior in the Taiwan straits and its threats against Taiwan. But, instead of a reassessment, reckless transfers of supercomputers to China not only continue but have been stepped up.

It is even more shocking to realize that neither the Defense Department, the CIA nor the Commerce Department, which has licensing authority for supercomputers, had any idea where the supercomputers were going. "Ask me no questions, I will tell you no lies" seems to be the official policy.

Why did this happen? One reason is the Commerce Department set up a system to transfer supercomputers where reporting is not required. In fact, the only reason anybody bothered to find out what was going on was the public disclosure by the Russians that they had acquired supercomputers from the United States for two of their nuclear weapons facilities.

From what can be pieced together from public sources, the situation in China is much worse and far more dangerous.

Consider the supercomputer system sold to the Chinese Academy of Sciences. I understand this is a Silicon Graphics Challenge XL: supercomputer system made up of some 32 processors. According to public data, this single system is faster than two-thirds of the classified systems available to the Defense Department, including one NSA site, the U.S. Naval Underwater Weapons Center, U.S. Army TACOM, the Defense Science Organizations and the U.S. Air Force/National Test Facility.

The Academy of Sciences in China is deeply involved in nuclear programs. In fact, in 1987 when I was in China I toured one of the Academy's nuclear research facilities.

According to research done by an independent expert, the supercomputer system at the Chinese Academy of Sciences installation is sitting behind a firewall [1] (a Cisco

[1] A computer "firewall" is a security device that prevents an outsider from having access to all or part of a computer system. A firewall can be software, hardware or a combination of both.

router) Basically, it is set up so that many parts of the system are accessible only by computers and networks on the restricted side of the firewall.

The system has about a dozen SGI workstations that are clearly identifiable by names like "Indigo," and "Iris," which are particular SGI models. Then there are other workstations that use the names of flowers and animals. It would seem these other workstations are part of the hidden network of the supercomputer complex. The network is set up so that the public part of it can be connected to the outside world. The rest of the system is what we would call a "classified" system.[2] The outside has no access to it.

The computer networks in China are state of the art and are supplied primarily by the United States. They are supported by digital telecommunications systems.

It is United States policy to prohibit sales of supercomputers for any nuclear, chemical, biological or missile end use There is good reason to believe this prohibition has been effectively bypassed.

There is information that U.S. companies selling supercomputers understand they will be used for military and nuclear purposes. For example, one U.S. company marketing supercomputers is in a joint venture with a state-owned aerospace enterprise and focuses on selling high-end computers to the aerospace industry in China, much of which is involved in military work. Another distributor of supercomputers in China, Geotech, says that its target market for supercomputers includes "oil and gas [industries], research institutes and defense." And, in any case, all Chinese supercomputer assets are in networks and, as we have seen, major parts of these networks are closed.

There are those who say that supercomputers going to China are only for basic scientific research. But, as is well known and accepted, there is no need to have closed, secure network for basic research.

So far, the Department of Commerce has disclosed that 46 supercomputers have been sold to China over the past eighteen months. Actually, the number may be far higher. There are three reasons to distrust the Commerce Department's disclosure:

1. The Commerce Department only recently asked U.S. companies for data on supercomputers they sold to China. Not all the companies have reported yet.
2. Powerful computers slightly under the 2,000 MTOP (Millions of Theoretical Operations Per Second) threshold are supercomputers and perform the same way as those just above the 2,000 MTOP regulatory limit, are not counted by the Commerce Department.
3. Many of the less than 2,000 MTOP machines in China may have been upgraded by adding additional processors. Machines made by SGI, Convex (Hewlett Packard), Digital Equipment and others can be upgraded by adding additional processors.
4. Additional computing power can be obtained by special software for networking parallel-processor type machines.

It is important to know the real number of machines sold, the networks they are hooked into, and to determine how many are part of the classified system China is constructing. In addition, it is important to find out the types of software that have been sold for these computers, and the likely uses there may be for the software. Above all, it is vital to assess how these acquisitions will impact on U.S. defense programs and policies.

The Jewish Institute for National Security Affairs Board of Directors made the following recommendations earlier this month, which I support. They are:

1. Suspend the current regulations on High Performance Computers, restoring the previous validated licensing requirement for supercomputers.
2. Demand a full accounting of supercomputer sales under the current export regime.
3. Conduct a full assessment of the impact of computer sales on national security and on weapons proliferation.
4. Assess, using the CIA and Defense Intelligence Agency, who is seeking supercomputers and why they are wanted.
5. Develop and propose an effective multilateral export licensing system.

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[2] The classified networks in China are probably encrypted. The U.S. has sold encryption technology to China.

Senator COCHRAN. Dr. Schneider, welcome. You may proceed with your remarks.

TESTIMONY OF WILLIAM SCHNEIDER, JR., FELLOW, HUDSON INSTITUTE

Mr. SCHNEIDER. Thank you very much, Mr. Chairman. I appreciate the privilege of being able to appear before the Subcommittee today. I have prepared testimony, which I have already provided, and I will simply offer a few observations and also some suggestions for proposed reforms.

The administration has appropriately placed the counterproliferation struggle at the top of its foreign policy priority agenda. The problem I have is that the export control system, in parallel with diplomacy, are the front lines of dealing with the proliferation problem and are not likely to be effective in achieving the laudable counterproliferation aims of the administration. This is so not only with respect to weapons of mass destruction, but also to their means of delivery and advanced conventional weapons as well.

We know the threat of proliferation is a very serious one. Just to give the Committee a calibration point about how extensive the sweep of the decontrol on sophisticated technology is, is during my own service in the Department of State a decade ago, in the area of dual-use export licenses, approximately 150,000 licenses were issued each year during that period.

Now although the volume of trade has more than doubled since that period and the volume of high-tech trade has gone up several fold beyond that, we are issuing only 8,000 licenses per year. In other words, from 150,000 down to 8,000. It is a very substantial scope of decontrol.

A second point is it is important to take note of the changes in the way military technology is developing. Until the 1970s, military technology was fairly isolated. It was developed uniquely for military applications and it typically was at the cutting edge of the employment of modern technology.

The situation has changed very rapidly with advances in microelectronics computation, advanced materials, and so forth. Now the engine driving military performance is sophisticated civil sector technology. This is creating what I have described as a "new path to proliferation" compared to what we had anticipated a decade ago.

Rather than seeking to acquire information about the scientific trick, so to speak, to, say, produce nuclear weapons, which we have historically guarded very carefully by a statutory classification system. Now proliferation is a question of industrial processes. The scientific knowledge or secrecy surrounding the scientific knowledge no longer protects us from the proliferation of these advanced technologies. The proliferation of industrial processes is what is creating the problem.

Two recent examples: Iraq and China. In both cases, we have had a policy of not providing them with munitions list technology; that is, defense-related technology, but we did have, until the Gulf War, we did have a policy of allowing Iraq to have access to sophisticated civil technology.

The result was that they were able to produce not only weapons of mass destruction or move considerably towards that goal, but also ballistic and cruise missiles.

The case is even stronger with respect to China, where the United States and most of the European allies do not ship advanced munitions list technology. The access to sophisticated industrial technology, including computers, machine tools, software materials, et cetera, is accelerating the rate at which China is able to modernize its Armed Forces. Facilitating the modernization of China's Armed Forces is not U.S. public policy and, as a consequence, the aims of U.S. policy are being frustrated by the ineffectiveness of the export control system.

As a consequence, I have suggested a few reforms that might be considered by the Congress and, perhaps, by the administration as well. One is to refocus the policy on controlling exports to get at the proliferation problem. Decontrol has gone to the point where the export control system is, in effect, abetting proliferation rather than containing it.

The second is intelligence collection and processing. Intelligence collection and processing is essential to effective diplomacy in the counterproliferation field. The level of effort and the nature of intelligence support to the export control function has declined very substantially, and in order to reclaim the effectiveness of the export control system this needs to be changed.

The third point is an export control regulatory practice. The U.S. Government should be maintaining a data base on end users. The problem that Dr. Bryen mentioned in China is a serious one. The PLA owns more than 20,000 businesses and many of them are fronts for defense-related transactions, and this needs to be monitored.

Restoration of end user checks in China is another issue that should also be considered. I think this can be done without significant changes in appropriated funds. As I mentioned, the Bureau of Export Administration and the Department of Commerce has about 300 full-time equivalent personnel to process about 8,000 licenses.

The Department of State has munitions list licensing responsibility. They have 45,000 licenses, and they have less than 50 people processing the licenses. So I think there is enough in the way of head count in the Agency to support more end user checks to these sensitive destinations.

The fourth point is to increase diplomatic support for export control management. Dr. Bryen mentioned an effective multilateral regime. I think a dimension of this is effective diplomatic support to work with other countries that are becoming diversion channels for some of this technology or are in other ways abetting the diffusion of the technology.

The final point is interagency coordination. We found during the COCOM period where export controls were a high national priority that it was important to have effective senior-level policy coordination to make sure that all of the agencies were using their respective resources to bring the matter to closure. The decline in the importance of export control is reflected in the diminishing level of bureaucratic attention it's receiving, and I think the interagency process should be effectively reformed.

I am pleased to entertain any questions you might have, Mr. Chairman.

[The prepared statement of Mr. Schneider follows:]

PREPARED STATEMENT OF WILLIAM SCHNEIDER, JR.

Mr. Chairman and Members of the Committee: Thank you for offering me the privilege of testifying before this Committee today. I am William Schneider, Jr. I formerly served as Under Secretary of State (1982–86) in the U.S. Department of State where I had responsibility for the management of the Department's export control functions as well as interagency coordination of export control policy as Chairman of the Senior Interagency Group on Strategic Trade Controls. I subsequently served as Chairman of the General Advisory Committee on Arms Control and Disarmament (1987–93), a statutory advisory committee. My testimony will address the subject of the role export controls can play as a dimension of national policy to limit the risk posed to U.S. interests by the proliferation of weapons of mass destruction (WMD) and their means of delivery as well as a advanced conventional weapons.

The threat posed to U.S. interest by proliferation

The nature of the Cold War limited the potential for the proliferation of technologies associated with weapons of mass destruction and their means of delivery as well as advanced conventional weapons. The dynamics of U.S. and former Soviet Union's leadership role of competing ideological blocs established conditions which limited the degree to which the military application of advanced technologies was proliferated to non-allied states. The implementation of a successful multilateral export control regime (The Coordinating Committee on Strategic Trade—COCOM) limited the flow of advanced dual-use as well as munitions-list technology between the blocs, and in parallel, constrained access to this technology to many non-COCOM members as well. The limited counter-proliferation enforcement arrangements supporting the Nuclear Non-Proliferation Treaty of 1968 was supplemented by a U.S.-led Nuclear Suppliers Group which considerably improved the formal enforcement apparatus of the NPT. Somewhat similar arrangements were established under the Missile Technology Control Regime (for military missiles) and the Australia Group (chemical weapons).

The collapse of the former Soviet Union in 1991 materially changed the environment associated with the proliferation problem, both increasing incentives for proliferation and diminishing the role of the export control apparatus as the first line of defense against proliferation. The COCOM organization was disbanded in 1994, and replaced by a much less effective and far more narrowly focused entity known as the Wassenaar Arrangement. In parallel with the dismantling of the multilateral structure of export control coordination was the sharp decline in national controls. During the period of my service in the Department of State in the mid-1980s, nearly 150,000 validated export licenses for dual-use products were issued annually. Successive waves of decontrol have reduced the number of such licenses to less than 8,000 despite a much larger volume of trade. The virtual abandonment of dual-use export controls as an instrument of public policy has been matched or exceed by U.S. allies. As a result, the international structure of export controls for dual-use technologies has been largely disbanded as well. At the same time, the number of munitions licenses has declined only about twenty percent during the same period (to about 45,000 today) despite a 50% decline in the size of international arms market and total U.S. munitions list exports. This trend reflect an increase in regulatory activity in the United States concerning munitions list (i.e. defense products and services) exports.

An unanticipated consequence of the collapse of the former Soviet Union was the centrifugal forces in international affairs unleashed by the end of the Cold War. Regions of the World which were once primary sources of Cold War confrontation such as the Middle East became secondary security considerations for nations outside of the region. The loss of activism within the U.S. national security apparatus in the details of local security arrangements and the alliances such interests produced a result which has been reflected in the Post Cold War increase in the scale of the proliferation. Affected nations attended to their own security aims knowing that the end of the Cold War diminished the interest of extra-regional players in local or regional security. Indigenous arms development programs supplemented offshore procurements of defense products and services. Weaker nations sometimes turned to WMD and their means of delivery to achieve their regional security objectives. These developments in turn destabilized several areas of the world.

The best known events occurred in the Middle East. Both Iran and Iraq sought to develop their own military ballistic and cruise missiles as well as weapons of mass destruction. In conjunction with offshore procurements of conventional defense products, they produced formidable military establishments posing an overwhelming threat to U.S. allies. Iraq's invasion of Kuwait in 1990 required a vast multinational effort to reverse, but not before it had terrorized the region's population with ballistic missile attack and the prospective threat of weapons of mass destruction. According to the testimony of the head of the UN's Special Commission on Iraq (UNSCOM), despite an unprecedented UN mandate, and more than five years of UN inspections in Iraq, the international community has been unable to prevent Iraq from continuing its development of ballistic missiles and weapons of mass destruction. While UN sanctions imposed on Iraq continue, the threat posed to the region in the short term, and to the U.S. in the medium/long-term by Iraq's WMD/missile program endures. The loosening of the fabric of diplomatic obstacles and political incentives to proliferate WMD/missiles and advanced conventional weapons has produced an troublesome post-Cold War irony—the proliferation threat to the United States and its allies has become more serious following the Cold War than was the case during the Cold War.

Changes in the application of advanced technology for military purposes

Throughout much of the Cold War period, the imperatives of the military competition between the U.S. and Soviet blocs caused the military establishment to be at the leading edge of the development and application of advanced technology. Many developments such as high performance computers, advanced aircraft and propulsion systems, microelectronics, materials, signal processing, optics, space, and others found their most sophisticated and demanding applications in the defense sector. The underlying scientific and industrial technology supporting the defense industrial base was also at the cutting edge of advanced technology whose performance characteristics exceeded the needs of the civil sector.

Under these circumstances, the civil sector was the beneficiary of advanced technology developed for military purposes. Advanced aerodynamic and hot section metallurgy for example, developed for military aircraft and propulsion systems was a crucial factor in advances in civil aviation that propelled the United States to world leadership in the industry. The military requirements for the use of space for large communications, weather, and surveillance satellites created a space-launch services capability that was exploited by the private sector albeit slowly, during the 1970s and more rapidly during the 1980s. The military requirements in these and other fields of advanced technology skewed the availability of these capabilities, however. Military space launch demands limited the commercial sector to relatively large costly satellites in space. This pattern of military requirements produced a demand for advanced technology that was *subsequently* exploited by the private sector for civil applications.

This situation began to change in the 1970s, and accelerated rapidly since the 1980s. The driving force producing advanced military capabilities are the civil sector's demand for advanced technologies which are frequented exploited prior to the use of the technology in defense applications. The requirements for advanced civil applications of modern technology now regularly exceed—often far exceed—military requirements. As a consequence the defense sector is now the recipient of "trickle down" technology from the civil sector.

The change in the path of the development and application of advanced technology for military purposes has been recognized by the Department of Defense. A series of initiatives undertaken by former Secretary of Defense William Perry has put the Department on track to incorporate these trends into defense planning. Commercial technologies and practices will increasingly supplement, and perhaps eventually supplant the technologically isolated industrial apparatus surrounding DOD-unique military specifications. This has been reinforced by the results of the Quadrennial Defense Review whose report was published last month. The QDR envisions a future defense posture for the United States that will emphasize information-driven military capabilities largely derived from advanced technologies in the civil sector.

The new path to proliferation

The threat posed to American interests by the proliferation of WMD/missiles, and to a lesser extent advanced conventional capabilities has become widely understood. What is not so well understood is the changing process of applying advanced technologies for military purposes. In the past WMD technologies, especially nuclear weapons design, development, manufacturing, and test information was protected by the secrecy afforded by a unique security classification process established by stat-

ute (The Atomic Energy Act) for the military applications of atomic energy. Missile technology was more difficult to protect. Public policy embedded in the statute creating the National Aeronautics and Space Administration (NASA) made dissemination of space technologies an affirmative object of public policy. This produced a co-mingling of military and civil applications of space which has limited the success of the MTCR. Chemical weapons and the underlying technologies were already well known due to their employment on an industrial scale in World War I. Control efforts are largely focused on containing the transfer of precursor chemicals on an industrial scale to potential proliferators.

The leakage of nuclear weapons design technology over time has become a flood in recent years. A telling recent example has been a decision by the Department of Energy to release to the public most of the computer codes associated with nuclear weapon design (apart from weapon dynamics). These data can be purchased commercially on a single CD–ROM and will enable potential proliferators to overcome design problems in nuclear weapons when placed in the hands of experienced physicists. One experienced physicist was able to add a few hundred lines of computer code to the data released by the U.S. Government to replicate the information needed to produced advanced fission and thermonuclear weapons Thus, the problems facing potential proliferators has evolved from a problem of basic scientific design to one of industrial processes today. Access to advanced modeling and simulation and industrial production capabilities are now the pacing obstacles to proliferation. The crucial difference from the situation which obtained during much of the Cold War period is that the enabling technologies for proliferation are almost entirely found in the civil sector, not the defense sector.

We have two recent examples which underscore the manner in which the path to proliferation has changed as a result of the shift in the focus of advanced technology requirements from the military to the civil sector.

Iraq

The troublesome role of Iraq in Middle East security was widely understood during the 1970s and 1980s. Its support for international terrorism, its implacable hostility to Israel, and its Cold War affiliation with many of the aims of the former Soviet Union in the region made U.S. relations with Iraq an adversarial one. As a result, the U.S. Government declined to sell munitions list technology to Iraq, even during a brief period when U.S. and Iraqi foreign policy interests overlapped in the mid-1980s (preventing Iran's military domination of the Northern Gulf region). Although the former Soviet Union was a major supplier of conventional military equipment, with but a few exceptions, most U.S. allies agreed to abstain from providing Iraq with advanced conventional weapons technology.

However, no effort was made to prevent the sale of advanced commercial and industrial technology to Iraq; to the contrary, such sales were promoted. Indeed, the sale of such products was seen as offering an affirmative benefit to U.S. foreign policy in the late 1980s. Promoting Iraq's industrial and commercial development would produce a set of interests in Iraq some argued, that would ultimately undermine the military domination of Iraq's political culture. Providing commercial and industrial opportunities for Iraq's aspiring and politically moderate middle class would serve long-term U.S. interests.

Iraq was flooded with American, European, and Asian advanced commercial technology. This technology was diverted into a clandestine network within Iraq's defense industrial establishment. Advanced western commercial technology enabled Iraq to extend the range of its SCUD ballistic missiles to enable it to become a weapon of terror throughout the region from the Eastern Mediterranean to Iran. Reassuring "estimates" of Iraq's potential for deploying nuclear weapons of a decade or more were based on a belief in the success of NPT-derived export controls aimed at frustrating Iraq's ability to produce fissile material. MTCR controls were seen as effective because no state producing long-range (>500 km.) theater ballistic missiles had transferred such systems or components of systems to Iraq. Subsequent events affirmed the proposition that presumption is the mother of error.

Iraq's access to advanced industrial, not military technology from the West permitted it to become a major security threat to the United States interests in the Middle East. Rather than being a threat only to its contiguous neighbors, it was able to extend the reach of its threatening aspirations throughout the Middle East region. The decontrol of advanced civil sector ("dual use") technology among the industrialized nations of the world was the enabling policy change which contributed to Iraq's indigenous capability for WMD and military missiles.

China

Since mid-1989, the U.S. has declined to provide China with munitions list technologies. A parallel understanding with most U.S. allies (apart from Israel) has caused them to limit their own transfers of munitions list technology and equipment. China's acquisition of advanced military equipment and technology has been limited to two sources; Russia and Israel. Russia is the only nation providing China with integrated military end-items (e.g. *Kilo*-class submarines, Su-27 strike aircraft, etc.). Israel's cooperation according to press reports, is limited to providing advanced military subsystem technology which is subsequently integrated into end products by China defense-industrial establishment. Illustrations of this collaboration includes the avionics for China's F–10 aircraft now under development and Russia-Israeli cooperative program to produce an airborne early warning aircraft (a counterpart to the U.S. AWACS).

Despite the aim of U.S. policy to deny China advanced military capabilities through ban on the transfer of munitions list technology to China, U.S. exports of advanced civil sector (i.e. dual-use) technology to China have become the enabling feature of China's ability to modernize its armed forces. The U.S. is providing no military technology, but is providing China with the manufacturing capabilities to produce advanced military equipment based on military technology obtained from other nations. An irony of these circumstances is that because the U.S. is providing advanced civil sector rather than military technology, China's military modernization is proceeding more rapidly than would be the case had China been dependent on imports of U.S. munitions list technologies.

China's ability to do so is facilitated by the manner in which existing export controls are managed. End user verification—a routine feature of advanced technology exports to China in the 1980s—have been abandoned. This has permitted advanced technology imports to be routinely diverted from nominal civil application to defense product manufacturing processes. Moreover, the monitoring activities of the U.S. Government have abstained from a focus on the transfer of advanced civil sector technology to China's defense industry. The monitoring has focused instead on the production of military systems which often do not emerge until several years after the enabling manufacturing technology has reached its defense industrial establishment.

The recent case of the transfer of modern machine tools to China for the manufacture of aircraft to China underscores problems of policy, intelligence, and enforcement of the export control function. Advanced machine tools developed in the U.S. for the manufacture of military aircraft, but excess to the needs of U.S. industry were sold to China for civil aviation manufacturing purposes. China has refused to permit end-use verification making it infeasible for U.S. authorities to ascertain the use of this equipment. Subsequent evidence revealed that the machine tools and related equipment was transferred to a military aircraft production facility. This facility will produce advanced military aircraft derived from military technologies China has obtained from other suppliers. In the end, allied nations in Asia will face China's armed forces able to field advanced military capabilities in significant numbers because of manufacturing technology provided from the U.S. civil sector.

These two examples illustrate the path most likely to be adopted by potential proliferators; to acquire advanced civil sector (i.e. dual use) rather than military technology to permit the development, production, test, and support of advanced military capabilities. This approach is abetted by the process of decontrolling the export of a large fraction of modern technology pertinent to the production of advanced military capabilities. This result is an unintended consequence of current export control policy and regulation.

Recommendations for modernization of U.S. export controls

U.S. munitions list export controls under the Arms Export Control Act are effective in supporting the aim of public policy; assuring the congruence between U.S. foreign policy objectives and arms transfer policy. President Clinton's Conventional Arms Transfer policy promulgated in February, 1995 published general arms transfer policy criteria that has contributed to the effective management of arms transfer policy.

The more problematic area for public policy are export controls for dual use technologies, equipment, and services. Both the Clinton and Bush administrations have liberalized export controls on dual use technology, equipment, and services that has had the unintended consequence of facilitating the process of proliferating WMD and their means of delivery as well as advanced conventional weapons. Export control policy and regulation needs to be modernized to allow it to be brought into alignment with public policy relating to the management of problem of proliferation.

Export control policy

Current policy understates the relevance of dual-use technology to the problem of proliferation. This in turn has led to very extensive process of decontrol that has facilitated rather than limited the proliferation of WMD, ballistic/cruise missiles, and advanced conventional weapons technology. Export controls need to recapture dual use technologies, products, and services relevant to the development, manufacture, test, and support of WMD, ballistic/cruise missiles, and advanced conventional weapons. The aim of such a policy is to limit access of proliferation-prone end-users to dual use technologies, equipment, and services which abet proliferation.

Intelligence collection and processing

Effective intelligence collection and processing is crucial to successful constraints on the dispersion of advanced dual-use technologies pertinent to proliferation. Diplomatic coordination with nations allied with the U.S. in the counter-proliferation struggle depend on timely and precise U.S. intelligence information concerning-efforts by proliferators to obtain controlled dual-use technology, equipment, and services. Systematic collection and processing of pertinent information by the intelligence community for use by U.S. diplomats and law enforcement personnel can have a significant impact on the effectiveness of U.S.—counter-proliferation policy.

Export control regulatory practice

The international market for advanced dual-use technology is important to sustaining American industrial competitiveness. The management of export controls should not become an instrument for inadvertently frustrating legitimate exports because of poorly implemented regulations. Maintenance of a data-base on end-users, diversion channels, and the requirements of proliferation-prone end users can significantly facilitate the effective management of export controls without preventing legitimate commerce in advanced technology. Restoration of end-user checks for transactions involving a significant proliferation risk is an illustration of an important deterrent to diversion. This should be a practical measure to achieve since funding and numbers of Full Time Equivalent (FTE) personnel in the Bureau of Export Administration (BXA) in the Department of Commerce remains high despite low levels of export licensing activity compared to circumstances a decade ago. BXA has over 300 FTE to support the management of approximately 8,000 validated export licenses. The Department of State's Office of Defense Trade Controls issues approximately 45,000 licenses per year with fewer than 50 FTEs.

Diplomatic support for export control management

The disestablishment of the COCOM organization in 1994 eliminated the primary international organization to coordinate dual-use export controls on a multilateral basis with like-minded nations. The focus of the Wassenaar Arrangement on constraining (or in its presently limited role, monitoring) conventional arms transfers to sensitive destinations (primarily the "pariah" states such as Iran and Libya) makes it unlikely that this institution will be an appropriate venue for the coordination of multinational transfers of sophisticated dual-use technologies to proliferation-prone end-users. In the interim, a series of bilateral measures are the most likely to achieve success. If intelligence support for U.S. diplomacy is effective, direct bilateral diplomacy can be effective. An ability to provide timely and accurate information on impending dual-use transfers can contain covert procurements of controlled technology.

The expansion of dual use technologies controlled for counter-proliferation purposes should be included in national control lists managed by allied nations. In many cases, U.S. allies abandon most of their national export control apparatus when the U.S. decontrolled most advanced technology exports. Diplomatic efforts carried out on a bilateral basis can help rebuild a "virtual" multilateral export control structure despite the absence of formal institutions designed for the purpose. This aim is facilitated by the widespread consensus among most allied nations on the need to contain proliferation.

Enforcement and international sanctions

Sanctions against export control violations has proven to be an effective instrument to facilitate compliance in the case of munitions list controls. As it can be argued that the diversion of sophisticated dual-use technology, equipment, and services to proliferation prone end-users poses no less a long-term danger to American interests, sanctions for noncompliance with dual-use should be no less severe than for munitions list violations.

International sanctions for violations of export control violations are honored more in the breach than the observance. This has significantly diminished the credibility of sanctions. China's sale of cruise missiles to Iran in 1996 in explicit violation of

the Gore-McCain sanctions legislation approved in the aftermath of the Gulf War, for example, have not been imposed due to the conflict of sanctions with other U.S. policy objectives. The widespread practice of ignoring statutory sanctions requirements for munitions list cases makes it difficult for the U.S. to encourage allied states to establish effective enforcement of national export control regulations.

Interagency coordination

Post Cold War optimism about the impact of the collapse of the former Soviet Union on U.S. security interests abroad has led to a separation of U.S. advanced technology trade from security interests. Interagency coordination that would permit policy management of U.S. advanced technology trade pertinent to the proliferation problem has declined substantially from Cold War period practice. An appropriate interagency apparatus led at the Under Secretary level would provide a desirable balance between regular policy oversight and flexible and integrated management of the export control system to include all pertinent agencies including the Departments of State, Defense, Commerce, the NSC, the intelligence community, and other agencies as appropriate.

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Export controls are an important instrument of foreign policy in coping with one of the most enduring problems of national security—the ability of potentially hostile states to use international commerce to facilitate the creation of a security threat to the U.S. and its allies. I look forward to an opportunity to respond to your questions.

Senator COCHRAN. I appreciate very much both of you touching on not only your impressions of the comments that were made by the administration witnesses on this subject, but making some suggestions for reform and change in the policies and initiatives that have to be undertaken if we are going to protect our security interests in connection with the export of these dual-use technologies.

There was one suggestion that we heard that in the case of Russia one of the computers that they ended up with there ended up coming from a U.S. company in Europe. What can we do about that, the trans-shipment? I asked the witnesses about exports into the Middle East that could wind up in Iran. Of course they could end up in Iran from China, too, because not only has China sold missiles and technology to Pakistan, but it's also sold cruise missiles and other technologies to Iran as well.

How do we better protect ourselves from the trans-shipment of supercomputers? Is there any way to do that?

Mr. SCHNEIDER. Yes, there is, Mr. Chairman, and this is quite readily attended to if the product is licensed. This requires effective intelligence support to be aware of diversions if it is indeed a criminal diversion where the, say, a buyer in Europe is trans-shipping it to a bad end user, let's say, in Russia. If we know about it, the customs protocols are in place to enable us to stop that shipment, and this can be done, again, with effective diplomacy.

But as Dr. Bryen was suggesting, we have to have a licensing regime for these, otherwise it's not practical to effect those controls.

Senator COCHRAN. Dr. Bryen.

Mr. BRYEN. Well, I agree completely that the whole issue here is the administration is allowing companies to send these computers out of the United States without licenses—without licenses—and then you can't enforce anything. It is impossible to account.

Even the accountings they get are only first order; that is to say, where they think they went the first time. Where they end up, they have no idea. So you have to have individual validated licenses if you want to have any accountability. It is that simple.

Senator COCHRAN: What suggestions with respect to the definition of high computer technology? We were talking about these tiers and the tier that is described as being 2,000 MTOPS to 7,000 MTOPS. Is that relevant to anything? Is there any basis for the tier system and the definitions in terms of MTOP capacity?

Mr. BRYEN. I think the whole thing is totally synthetic, first of all. The three tiers or actually they call Tier IV—one is a "no" tier—but the three "yes" tiers consist of a grab bag of countries that are very peculiar, lumped together, and it doesn't make any sense. You have lots of little inconsequential countries in the second tier, for example. They can get very powerful machines. What they would use them for no one has any idea.

So this business of tiers, I think, is bizarre.

Secondly, the number, this 2,000 threshold number has been pulled out of someone's hat. I don't think it has any relevance to anything. You have to try and grasp, basically, two things; one, how machines would be used, what purposes will they be put to, and try to peg your controls on that information. If a 500 MTOPS machine is what you need to do good, solid nuclear work, then you should be controlling those, not 2,000 MTOPS machines. And I don't know that the Goodman Study or any other study has actually addressed that important issue.

So the first point is to try and figure out the end use and then try to peg your computer controls to that.

The second issue is the fact that parallel machines, particularly the symmetric ones, can be hooked together, and they become more powerful machines. This is a considerable concern. If you can sell four or six or eight or 10 or 20 machines that can be stuck together and it would be something else, then you have a real problem on your hands.

The current regulations don't distinguish the type of machine; that is to say, they don't deal with whether it is a parallel machine or a Vector machine or what kind of machine it is, whether it can be effectively coupled with another sister processor to make a more powerful unit, and I think the regulations there need changing. They need to reflect the real power—MTOPS is not enough. You have to have more about the way these machines work together, the different processors work together in order to make a judgment on how to handle this.

Senator COCHRAN. Dr. Schneider.

Mr. SCHNEIDER. Just a footnote to that is that the technology of networking the computers, in addition to the computers themselves and the associated hardware, should also be the subject of the control regime because they are increasingly crucial to the exploitation of these capabilities.

Senator COCHRAN. There was a question I asked of the administration witnesses about the evaluation or assessment that had been done by the military of the potential threats to our national security by reason of exporting supercomputers. I am curious to know what your information is about whether or not we have undertaken, to your knowledge, any such assessment of the threat to our national security from the sale of supercomputers.

Do you know of any that has been done by our military officials?

Mr. SCHNEIDER. No. The one study I am acquainted with, which was, I believe, done in response to a House National Security Committee request and legislation a year or so ago was done by a group at Stanford University. It was not done by the Defense Department itself. It was apparently contracted for study, but I don't know of one that has been done by the Defense Department itself.

Senator COCHRAN. But this is a recent study that was done for the Department of Defense; is that correct?

Mr. SCHNEIDER. Yes. It was done for the Department of Defense, but it had some limitations in the way the study was done, so it would not be able to respond to the questions you were asking.

Senator COCHRAN. Dr. Bryen.

Mr. BRYEN. I don't know of any Defense Department study that relates our national security to the sale of supercomputers. I don't think there is one.

There was an Energy Department study in the late 1980s, which assessed the importance of supercomputing to nuclear weapons development. That's a good study. The Committee ought to get one. It's not classified, and it makes some very telling points about how supercomputers are vital to the design and deployment of nuclear systems.

Senator COCHRAN. Based on what you know about our policies and about the emerging sophistication of weapons of mass destruction in both China and Russia, particularly, do you feel this is a situation where we ought to press the administration to make a change in its policy? Are we on the right track here in this hearing by pushing for this and urging that it be reconsidered?

Mr. SCHNEIDER. I believe so, Mr. Chairman. I think there is a wide consensus, not only within the Executive Branch, but between the Executive Branch and the Congress, about the aim of controlling proliferation. Export controls are a crucial aspect of it, and it is the part of the system that is broken.

Senator COCHRAN. Dr. Bryen.

Mr. BRYEN. I agree with that. I should also mention the administration is trying to decontrol even more supercomputers, and that is what the second study is all about that they are conducting at the moment. The word is, that I have heard, is that they want to set the base threshold at 10,000 MTOPS instead of 2,000 MTOPS, and they are trying to justify that. So anything you can do, Mr. Chairman to block progress in decontrolling even more sensitive technology would be very helpful at this stage.

I am very worried about this. This is I would call it reckless, sir.

Senator COCHRAN. Well, I appreciate very much your attendance at this hearing and your very helpful participation.

I am going to call on the General Accounting Office and request an additional study of the relationship between the dual use export control liberalization of this administration and our national security. They have had an opportunity, and I referred to a report that they had done already on this subject of export controls and supercomputers. But I think we need more information, and since we don't have it from existing sources, we'll ask GAO to do one.

I think this has been a most interesting and helpful hearing. It has also been disconcerting and alarming in many ways.

We are going to continue to pursue our interest in proliferation and our national security interests. Our next hearing is going to be on July 17 at 2 p.m., where we will review the ABM Treaty Compliance Review Process. Until then, the Committee is in recess.

[Whereupon, at 11:55 p.m., the Subcommittee adjourned, subject to the call of the Chair.]