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Report to the Chairman, Committee on Governmental Affairs, U.S. Senate

April 1994

NUCLEAR NONPROLIFERATION

Export Licensing Procedures for Dual-Use Items Need to Be Strengthened

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GAO

United States
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National Security and
International Affairs Division

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The Honorable John H. Glenn
Chairman, Committee on Governmental Affairs
United States Senate

Dear Mr. Chairman:

As you requested, we reviewed export licensing procedures for dual-use nuclear items. In this report, we discuss the nature and extent of such exports, how well the U.S. government is implementing policies and procedures to prevent exports that pose a proliferation risk, and the effectiveness of methods used to deter and detect diversion of such exports to foreign nuclear proliferation programs. We make several recommendations to improve export license review procedures and enhance the effectiveness of license checks.

Unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days after its issue date. At that time, we will send copies to the Secretaries of Commerce, Energy, State, and Defense; the Director of the Arms Control and Disarmament Agency; and other interested congressional committees. Copies will also be made available to others on request.

If you or your staff have any questions about this report, please call me on (202) 512-4128. The major contributors to this report are listed in appendix V.

Sincerely yours,

Joseph E. Kelley

Joseph E. Kelley
Director-in-Charge
International Affairs Issues

Executive Summary

Purpose

Iraq's extensive use of so-called dual-use equipment in its nuclear weapons program has raised concerns about the effectiveness of export controls over these items. At the request of the Chairman, Senate Committee on Governmental Affairs, GAO (1) determined the nature and extent of U.S. nuclear-related dual-use exports to countries of proliferation concern, (2) assessed U.S. policies and procedures for reviewing license applications for items that pose a proliferation risk, and (3) examined some U.S. methods used to deter and detect the diversion of exports to foreign nuclear proliferation programs.

Background

Nuclear-related dual-use items consist of equipment, materials, and technical data that have civilian uses but that can also be used for the design, fabrication, testing, and production of nuclear explosives or special nuclear material (such as weapons grade uranium or plutonium). The United States controls exports of these items to help prevent the proliferation of nuclear weapons.

By law, the Department of Commerce, in consultation with other agencies, is responsible for controlling nuclear-related dual-use exports. Commerce's Export Administration Regulations require an "individual validated license" for (1) items identified as having potential significance for nuclear explosives development, (2) items controlled for other than nuclear proliferation reasons but destined for nuclear end users or end uses, and (3) items that the exporter knows or has reason to know will be used in proscribed nuclear activities.

Commerce is required to refer all requests for such licenses to the Department of Energy, although in practice Energy has delegated some of its review authority to Commerce. When either agency believes a license request should be reviewed by other agencies, or denied, it is referred to the Subgroup on Nuclear Export Coordination, an interagency working group, and to higher levels if necessary.

To deter and detect the diversion of nuclear-related dual-use exports to proliferation activities, Commerce or other consulting agencies may request pre-license checks or post-shipment verifications. Pre-license checks are used to establish the legitimacy of the end user or verify the intended end use of the export; post-shipment verifications are used to ascertain whether exported items are being used appropriately. The U.S. government may also seek assurances from foreign governments that items will not be diverted to nuclear uses.

Results in Brief

The U.S. government has approved a significant number of nuclear-related dual-use licenses to 36 countries identified as posing a potential proliferation concern. Computers and other items with wide civilian uses account for the largest share of these exports. In contrast, items with critical applications in nuclear explosives development and few nonnuclear uses have only rarely been approved.

Most licensing decisions for eight countries GAO focused on were consistent with the goal of minimizing proliferation risk. However, from fiscal years 1988 to 1992, over 1,500 licenses were approved for organizations in these countries involved in or suspected of being involved in developing nuclear explosives or special nuclear material. These approvals increase the risk, in some cases significantly, that U.S. exports could contribute to nuclear proliferation, although GAO has no evidence that these exports did support proliferation activities. GAO also found weaknesses in the interagency licensing review process that have resulted in approval of a number of sensitive license applications without review by Energy or other members of the Subgroup on Nuclear Export Coordination.

U.S. government approval of sensitive exports dictates the need for effective ways to prevent or detect export diversions, but GAO identified several weaknesses in current procedures. These include (1) inadequate criteria for selecting pre-license checks and post-shipment verifications, (2) ineffective methods used to perform these inspections, and (3) lack of verification of government-to-government assurances against nuclear end uses.

Principal Findings

Significant Number of Licenses Approved to Countries of Proliferation Concern

From fiscal years 1985 to 1992, the United States issued about 336,000 nuclear-related dual-use licenses for exports valued at $264 billion. Of these, about 55,000 (16 percent) were for items valued at $29 billion exported to the 36 countries that the United States has identified as posing a potential proliferation concern.

Computers accounted for 86 percent of nuclear-related dual-use licenses to these 36 countries. Also licensed in large numbers were common industrial and scientific equipment such as measuring and calibrating

equipment, oscilloscopes, lasers, and numerically controlled machine tools. Items with few nonnuclear applications, such as maraging steel (used in the process to enrich uranium), were only rarely licensed.

Some Licenses Approved to Sensitive End Users

U.S. policy governing nuclear-related dual-use licenses is to prevent exports that could support nuclear proliferation without impeding legitimate exports. GAO's review indicated that decisions for most of the licenses from fiscal years 1988 to 1992 for eight countries of particular proliferation concern—Argentina, Brazil, India, Iran, Iraq, Israel, Pakistan, and South Africa—were consistent with the goal of minimizing proliferation risk. Approved licenses generally involved destinations and items of little or no apparent proliferation concern. License requests that were denied were typically for technically significant items or involved end users associated with nuclear proliferation activities.

However, of the 24,048 licenses approved for these eight countries, 1,508 (6 percent) were for end users involved in or suspected of being involved in nuclear weapons development or the manufacture of special nuclear materials. These licenses were approved because agency officials believed that the items would not be used to support nuclear proliferation activities. A number involved items that, because of their technical significance, present a higher risk of diversion to proscribed nuclear activities. Others involved sensitive end users that have played key roles in their countries' nuclear weapons development programs and for which U.S. officials have denied a large number of dual-use licenses.

Export Control Referral Procedures Have Weaknesses

The Commerce Department did not always refer nuclear-related dual-use license applications to the Department of Energy as required by regulations. From fiscal years 1988 to 1992, Commerce unilaterally approved the export of computers and other nuclear-related items to countries of proliferation concern, even though these licenses should have been referred to Energy. Commerce also approved without Energy consultation numerous licenses for other items going to end users engaged in nuclear weapons activities, despite regulations requiring referral of such licenses. Commerce and Energy officials agreed that many of these licenses should have been referred, and acknowledged that referral policies should be clarified to correct the problems.

During the same period, Energy did not forward to the Subgroup on Nuclear Export Coordination about 80 percent of the licenses it received

from Commerce for end users of nuclear proliferation concern. These licenses involved items such as computers, oscilloscopes, and lasers intended for end users suspected of developing nuclear explosives or special nuclear material. Energy recommended that Commerce approve most of these licenses because it believed that the exports were of limited technical significance and would not support nuclear proliferation activities.

Although Energy has discretion in determining which licenses to forward to the Subgroup, its practice of seeking interagency consultation on only a minority of licenses raises concerns that other agencies may be precluded from bringing their policy perspectives to bear on important licensing decisions. During our review, Defense and Arms Control and Disarmament Agency representatives to the Subgroup identified a number of licenses that they believed warranted interagency review but were not placed on the Subgroup's agenda. Moreover, agencies represented on the Subgroup are limited in their ability to influence which licenses Energy selects for interagency review and are unable to hold Commerce and Energy accountable for their review decisions because they lack consistent access to licensing information.

Inadequate Methods for Deterring or Detecting Diversions

Existing selection criteria do not provide sufficient guidance on what checks to undertake. During fiscal years 1991 and 1992, Commerce selected a number of cases for inspection involving items of low technical significance. For example, approximately 63 percent of nuclear-related pre-license checks in the eight countries of proliferation concern that GAO focused on were conducted on items that officials from the Los Alamos and Lawrence Livermore National Laboratories indicated were of lesser proliferation concern. In addition, cases were selected for end users whose proliferation credentials were already known. For example, about 39 percent of nuclear-related pre-license checks in the eight countries were conducted for end users that had already been identified by the Department of Energy as posing a nuclear proliferation concern. National laboratory and Defense officials indicated that pre-license checks are less useful in cases involving well-known end users because the existence and activities of the entities are already established.

GAO also found that (1) U.S. embassy officials who perform the pre-license checks and post-shipment verifications typically lack technical expertise in how nuclear-related dual-use items could be diverted; (2) Commerce's requests for inspections frequently omitted vital information, such as the

reason for the inspection or licensing conditions; and (3) Embassy officials frequently sent foreign service nationals to conduct inspections of their own countries' facilities.

The U.S. government does not systematically verify compliance with government-to-government assurances on the use of nuclear-related dual-use items because they are diplomatically negotiated agreements intended to carry the weight of an official commitment by a foreign government. According to State Department officials, the only method available would be a post-shipment verification, but post-shipment verifications are not used for this purpose. Thus, the U.S. government cannot be certain that exports licensed with government-to-government assurances are being used for their intended purposes.

Recommendations

GAO makes several recommendations to the Secretaries of Commerce, Energy, State, and Defense, and the Director of the Arms Control and Disarmament Agency to (1) improve review procedures for nuclear-related dual-use licenses and (2) enhance the effectiveness of pre-license checks and post-shipment verifications.

Agency Comments

As requested, GAO did not obtain official agency comments. However, GAO discussed the contents of the report with program officials at Commerce, Energy, State, Defense, and the Arms Control and Disarmament Agency. These officials generally agreed with the information presented in the report, although Commerce and Energy officials disagreed with the need to change the licensing review process to improve referrals to the Subgroup on Nuclear Export Coordination.

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Abbreviations

ACEP	Advisory Committee on Export Policy
ACDA	Arms Control and Disarmament Agency
COCOM	Coordinating Committee on Multilateral Export Controls
EARB	Export Administration Review Board
ECASS	Export Control Automated Support System
GAO	General Accounting Office
NRL	Nuclear Referral List
PLC	pre-license check
PSV	post-shipment verification
SNEC	Subgroup on Nuclear Export Coordination

Introduction

Preventing the proliferation of nuclear weapons is a fundamental U.S. national security and foreign policy objective. One means of advancing this objective is controlling nuclear-related dual-use exports. However, the discovery of Iraq's reliance on foreign imports for its nuclear weapons program has raised concerns about the effectiveness of U.S., as well as international, control efforts.

What Are Nuclear-Related Dual-Use Exports?

Nuclear-related dual-use exports consist of equipment, materials, and technical data that have civilian or nonnuclear uses but can also be used for the design, fabrication, testing, or production of nuclear explosives or special nuclear material (such as weapons grade uranium or plutonium). For example, computers are nearly indispensable in daily business and scientific activities, but can also be useful for designing nuclear weapons. Other dual-use items can be used for enriching uranium, separating plutonium from spent nuclear fuel, producing heavy water, or assisting in nuclear weapons testing.

Why and How Nuclear-Related Dual-Use Exports Are Controlled

The United States controls nuclear-related dual-use exports to meet U.S. statutory requirements and fulfill international obligations to prevent nuclear weapons proliferation. Controls are intended to signal U.S. opposition to proliferation, increase costs to countries developing nuclear explosives, and buy time for diplomacy to work. The United States is a signatory to the Nuclear Non-Proliferation Treaty, which prohibits nonnuclear states from acquiring nuclear weapons and nuclear weapons states from assisting them.

Section 309(c) of the Nuclear Non-Proliferation Act of 1978 requires the President to publish procedures for the Department of Commerce to control nuclear-related dual-use exports. The act covers all items under Commerce's jurisdiction which, if used for other than their intended purposes, could be of significance for nuclear explosive activities.

The procedures established pursuant to the Nuclear Non-Proliferation Act are contained in Commerce's Export Administration Regulations (15 C.F.R. Part 778). Under these regulations, exporters are required to seek an "individual validated license" for commodities and technical data controlled for nuclear proliferation reasons—items on the Nuclear Referral List (NRL). This list is updated periodically. Exporters are also required to obtain an individual validated license for any item if the

exporter knows or has reason to know that the item will be used in proscribed nuclear weapons activities, including

- designing, developing, fabricating, or testing nuclear weapons or nuclear explosive devices or
- designing, constructing, fabricating, or operating facilities, or components for facilities, for (1) chemical reprocessing of irradiated special nuclear or source material; (2) producing heavy water; (3) separating isotopes of source and special nuclear material; or (4) fabricating nuclear reactor fuel containing plutonium.

Those countries that have not acceded to the Nuclear Non-Proliferation Treaty or are suspected of engaging in nuclear proliferation activities appear on the "Nuclear Non-Proliferation Special Country List," contained in a supplement to the Export Administration Regulations (see app. I). This list is intended for use as a basic guide for agency officials when reviewing nuclear-related licenses. As of 1992, 36 countries were on the list.[1]

The regulations also establish interagency review procedures for licenses subject to nuclear proliferation controls. Commerce is required to refer all requests for such licenses to the Department of Energy. When either Commerce or Energy believes that a particular application should be reviewed by other agencies, or denied, the application is to be referred to an interagency working group—the Subgroup on Nuclear Export Coordination (SNEC). When the SNEC cannot reach a consensus, license requests are escalated to higher interagency groups such as the sub-Cabinet-level Advisory Committee on Export Policy (ACEP), and then to the President.

During the licensing review process, Commerce and other reviewing agencies can request a pre-license check (PLC) or a post-shipment verification (PSV). The purpose of a PLC is to determine whether an overseas person or firm would be a reliable recipient of U.S.-controlled goods and technical data. A PSV is used to confirm that licensed goods exported from the United States actually were received by the party named on the license and are being used in accordance with license provisions. The U.S. government may also seek assurances from foreign governments that items will not be diverted to nuclear uses.

[1]On October 6, 1993, the Commerce Department announced an interim rule removing 11 countries from the Special Country List, including Argentina, Brazil, and South Africa.

Objectives, Scope, and Methodology

We reviewed U.S controls over nuclear-related dual-use exports at the request of the Chairman, Senate Committee on Governmental Affairs. Specifically, we (1) determined the nature and extent of nuclear-related dual-use exports to countries of proliferation concern, (2) assessed U.S. policies and procedures for reviewing proposed nuclear-related dual-use exports that present a proliferation risk, and (3) examined some methods used to deter and detect the diversion of exports to foreign nuclear proliferation programs.

To address these objectives, we analyzed data from Commerce's Export Control Automated Support System (ECASS), a computerized export licensing database. We obtained computer records for all dual-use license applications for the 36 countries on the Nuclear Non-Proliferation Special Country List for fiscal years 1985 to 1992.

To determine the reliability of the data, we assessed the relevant general and application controls for the system and found them to be generally adequate. Commerce officials told us that data are less reliable for fiscal years 1985 to 1987, before the introduction of automated data entry. Commerce reported that since fiscal year 1988, data entry reliability has approached 100 percent with the addition of electronic license application filing and optical character reader technology. We did not systematically sample licensing records to test data accuracy, but did verify specific examples cited in the report.

To determine the nature and extent of nuclear-related dual-use exports to countries that pose a proliferation concern, we devised, in consultation with Commerce, a methodology to identify all license applications for fiscal years 1985 to 1992 that were subject to nuclear proliferation controls. We also analyzed licensing patterns of Nuclear Referral List commodities and changes to the list.

For this report, we define nuclear-related dual-use exports to include all items appearing on the NRL each year, along with any other items that were referred by Commerce to Energy for nuclear proliferation review. Although we believe that our methodology provides a sufficient basis for the analyses and conclusions in this report, the methodology has three limitations that affect the accuracy of the data presented. First, ECASS data allow us to identify NRL items by commodity classification number only. As a result, the number of nuclear-related licenses is overstated because a small number of NRL commodity classifications also contain items not controlled for nuclear proliferation reasons. Additionally, some

commodities may be included even though they have technical characteristics that exempt them from controls. Finally, our methodology assumes that Commerce always followed procedures for referring to Energy all non-NRL license applications for items intended for nuclear end uses or end users. Because Commerce did not always follow these procedures (as discussed in ch. 4) a number of such licenses are not included in our totals. We do not believe that these limitations, which are offsetting, are large enough to significantly alter the data we present.

To assess the policies for reviewing nuclear-related dual-use license applications, we analyzed licensing decisions for eight countries on the Special Country List— Argentina, Brazil, India, Iran, Iraq, Israel, Pakistan, and South Africa. We selected these countries for one or more of the following reasons: (1) except for Iran, Iraq, and very recently South Africa, they are not parties to the Nuclear Non-Proliferation Treaty; (2) their actions have indicated a desire to obtain nuclear weapons; and (3) they have the technical capability to obtain enriched uranium or plutonium for use in a nuclear explosive device.[2] We also examined pertinent regulations and policy guidelines in effect during the time of our review;[3] reviewed the minutes of SNEC and ACEP meetings; reviewed various intelligence reporting on proliferation programs; and discussed licensing decisions with officials at the Departments of Commerce, Energy, State, and Defense, and the Arms Control and Disarmament Agency (ACDA).

To assess the license review process, we reviewed the Commerce database and the minutes of interagency meetings to identify license applications referred by Commerce to Energy and from Energy to interagency review bodies during fiscal years 1988 to 1992. We compared referrals from Commerce to Energy with regulations and Commerce and Energy procedures, and discussed the results with agency officials. We discussed Energy's referral process with SNEC representatives from each of the agencies and reviewed proposals from the Department of Defense and ACDA to reform the referral process. Finally, we compared licensing recommendations made by the SNEC with the final licensing decisions as

[2]As noted earlier, Argentina, Brazil, and South Africa are currently less of a proliferation concern. Argentina and Brazil have committed themselves to placing their nuclear materials under International Atomic Energy Agency safeguards. South Africa signed the Nuclear Non-Proliferation Treaty in 1991 and apparently destroyed its nuclear weapons stockpiles.

[3]Subsequent to the completion of our review, on March 9, 1994, the Commerce Department published an interim rule in the Federal Register revising the lists of proscribed nuclear activities, licensing factors, and items on the NRL (see chs. 1 and 3) to conform more closely to guidelines published by the Nuclear Suppliers Group, a multilateral organization that has established common control procedures for nuclear-related dual-use exports.

contained in the ECASS database to determine the extent to which Commerce followed SNEC licensing recommendations.

To assess methods for deterring and detecting the diversion of nuclear-related dual-use items, we (1) reviewed Commerce criteria and guidelines for selecting and conducting pre-license checks and post-shipment verifications and discussed their appropriateness with Commerce, State, Defense, and Los Alamos and Lawrence Livermore National Laboratory officials; (2) compiled data from Commerce on the numbers of PLCs and PSVs conducted during fiscal years 1991 and 1992; (3) met with and obtained documents from U.S. embassy and consulate officials in Germany, Israel, South Africa, India, Pakistan, and Hong Kong;[4] and (4) observed several PLCs conducted by U.S. embassy and consulate officials in Hong Kong and Pakistan. We also compiled data on government-to-government assurances obtained during fiscal years 1988 to 1991, and determined the extent to which the U.S. government verified compliance with these assurances.

We conducted our work from January 1992 to October 1993 in accordance with generally accepted government auditing standards.

As requested, we did not obtain official agency comments. However, we discussed the contents of the report with program officials at Commerce, Energy, State, Defense, and ACDA. These officials generally agreed with the information presented in the report, although Commerce and Energy officials disagreed with the need to change the licensing review process to improve referrals to the SNEC.

[4]We visited Germany and Hong Kong because they are countries suspected of serving as transshipment points for items of proliferation concern.

Nature and Extent of Nuclear-Related Dual-Use Exports

During the past several years, the Department of Commerce approved a significant number of nuclear-related dual-use export licenses for countries that pose a proliferation concern—the 36 countries on the Special Country List. The majority of these licenses involved NRL items, such as computers, with numerous civilian uses. NRL items with especially critical nuclear applications and relatively few nonnuclear uses have been licensed in small numbers or not at all.

The volume of licenses for NRL items has declined since fiscal year 1987, although less for Special Country List destinations than for other countries. This decline is due in large measure to the easing of licensing requirements for computers, which occurred in 1987 and again in 1990. License applications for computer exports should further decline in the future because of additional liberalization steps.

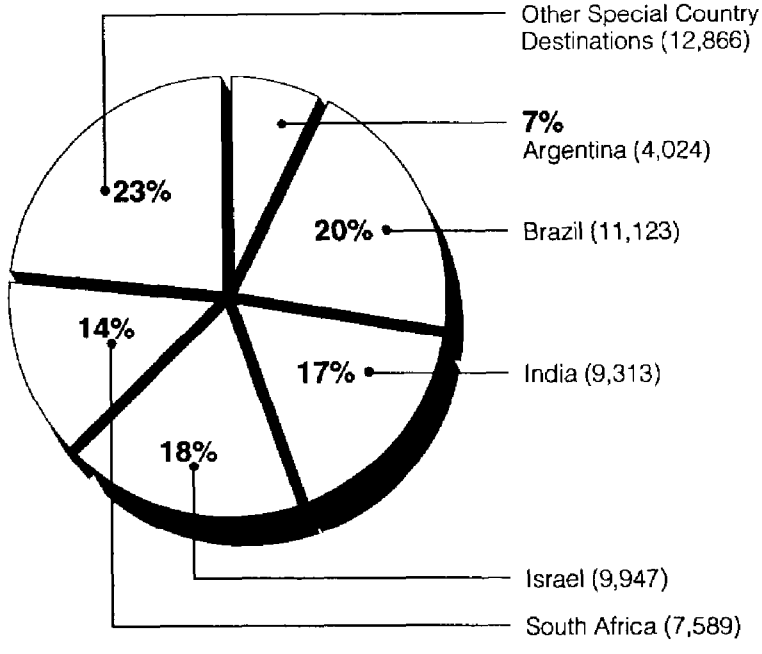
Significant Number of Nuclear-Related Dual-Use Licenses Approved to Countries of Proliferation Concern

From fiscal years 1985 through 1992, Commerce approved 54,862 nuclear-related dual-use export licenses to the 36 countries on the Special Country List. These licenses constituted 16 percent of the 336,389 nuclear-related dual-use licenses approved worldwide during this period. Exports covered by these licenses were valued at approximately $29.3 billion, compared to approximately $264 billion for all nuclear-related dual-use licenses. Ninety-three percent of nuclear-related dual-use licenses for Special Country List destinations during the 8-year period were for NRL items, compared with 99 percent for all destinations.[1]

As shown in figure 2.1, five of the eight countries we focused on accounted for 77 percent of the licenses approved for Special Country List destinations. The other three countries, Iraq, Iran, and Pakistan, accounted for 5 percent of the licenses for Special Country List destinations.

[1]As discussed in chapter 1, nuclear-related dual-use licenses also include non-NRL items if the licenses were referred to Energy for review because of concerns regarding the end use or end user.

Figure 2.1: Distribution of Licenses Approved for Special Country List Destinations (Fiscal Years 1985-92)



Commerce approved the great majority of nuclear-related dual-use license applications submitted during this period. During the 8-year period, Commerce approved 87 percent of such licenses to Special Country List destinations, denied 1.2 percent, and returned 11.8 percent without action (meaning that the exporter failed to provide sufficient information or withdrew the application, or Commerce determined that the item did not require a validated license).[2] This approval rate was only slightly lower than that for all countries—on average, Commerce approved 89.1 percent of nuclear-related dual-use licenses during this period, denied 1.5 percent, and returned 8.9 percent without action.

[2]A small number of licenses were also still pending, canceled, or suspended.

A Majority of Items on the NRL Have Been Licensed for Export

The U.S. government generally licenses for export the large majority of NRL items, although critical items with few nonnuclear uses were licensed less frequently or not at all. Of the 92 categories of items listed in the Export Administration Regulations since fiscal year 1985 as controlled for nuclear proliferation reasons,[3] 59 were licensed to Special Country List destinations between fiscal years 1985 and 1992. Worldwide, 67 of the 92 NRL items were licensed during this period. (See app. II for the list of NRL items as of 1992.)

Computers account for the largest share of nuclear-related dual-use licenses. Between fiscal years 1985 and 1992, 86 percent of such licenses approved to Special Country List destinations involved computers and computer-related equipment, compared with 77 percent for all countries. Computers account for this large share because of their extensive civilian applications.

Other NRL items have also been licensed in large numbers, both worldwide and to Special Country List destinations. Table 2.1 shows the number of licenses approved for the 10 NRL items—other than computers—licensed in greatest numbers to Special Country List destinations since fiscal year 1985. (See app. III for additional information on NRL items licensed to Special Country List destinations.) In general, these items were also the ones most commonly licensed to all countries during this period.

[3]As of fiscal year 1993, 80 commodity classification numbers were listed as controlled for nuclear proliferation reasons; another 12 have been controlled at one time or another since fiscal year 1985.

Table 2.1: NRL Commodities Besides Computers Licensed in Greatest Numbers to Special Country List Destinations (Fiscal Years 1985-92)

Commodity	Licenses
Measuring/calibrating/testing equipment[a]	2,480
Cathode ray oscilloscopes	1,101
Electronic equipment (including flash X-rays)[b]	965
Lasers	958
Communications switching equipment[a]	769
Pressure measuring instruments	680
Numerical control equipment	453
Fibrous and filamentary materials	389
Electron tubes	262
Lower speed photography equipment	149

[a]Since fiscal year 1992, these items have not been controlled for nuclear proliferation reasons.

[b]Flash X-rays constitute only a small number of the 965 licenses approved for electronic equipment.

Source: Department of Commerce.

The NRL items most commonly licensed have a variety of applications for nuclear weapons development, including weapons testing, uranium enrichment (isotopic separation), implosion systems development, and weapons detonation. According to Energy officials, these items are in greater demand than the rest of the NRL because they have wide civilian applications. For example, fibrous and filamentary materials are used to manufacture tennis rackets and fishing poles, while oscilloscopes have innumerable uses in the electronics industry.

In contrast, NRL items with relatively few nonnuclear uses were approved in small numbers or not at all, especially to Special Country List destinations. Generally, licenses for these items were approved in such small numbers because there were few license applications. Table 2.2 lists the items and shows the number of approved licenses between fiscal years 1985 and 1992, both worldwide and to Special Country List destinations.

Table 2.2: Licenses Approved for NRL Commodities With Least Nonnuclear Uses (Fiscal Years 1985-92)

Commodity	Licenses	
	All countries	Special Country List
Beryllium	484	9
High-speed cameras (including streak and framing cameras) and related equipment[a]	376	53
Pipes/valves/heat exchangers	61	13
Piping, fittings, valves	42	20
Pumps for molten metal	15	7
Valves (UF6 resistant)/power generating equipment	15	2
Aluminum/titanium tubing	12	0
Spin/flowing machines	8	2
Centrifugal balancing machines	4	1
Centrifuge rotor assembly units	2	0
Maraging steel	1	1
Electrolytic cells (fluoride)/UF6 production plants	1	0
Compressors and blowers	1	1
Phosphor-bronze mesh packings	0	0
Mechanical testing power equipment	0	0

[a]Streak and framing cameras constituted an extremely small number of the licenses approved under this Commodity Control List entry; most included film, cinema recording cameras, and image intensifiers.

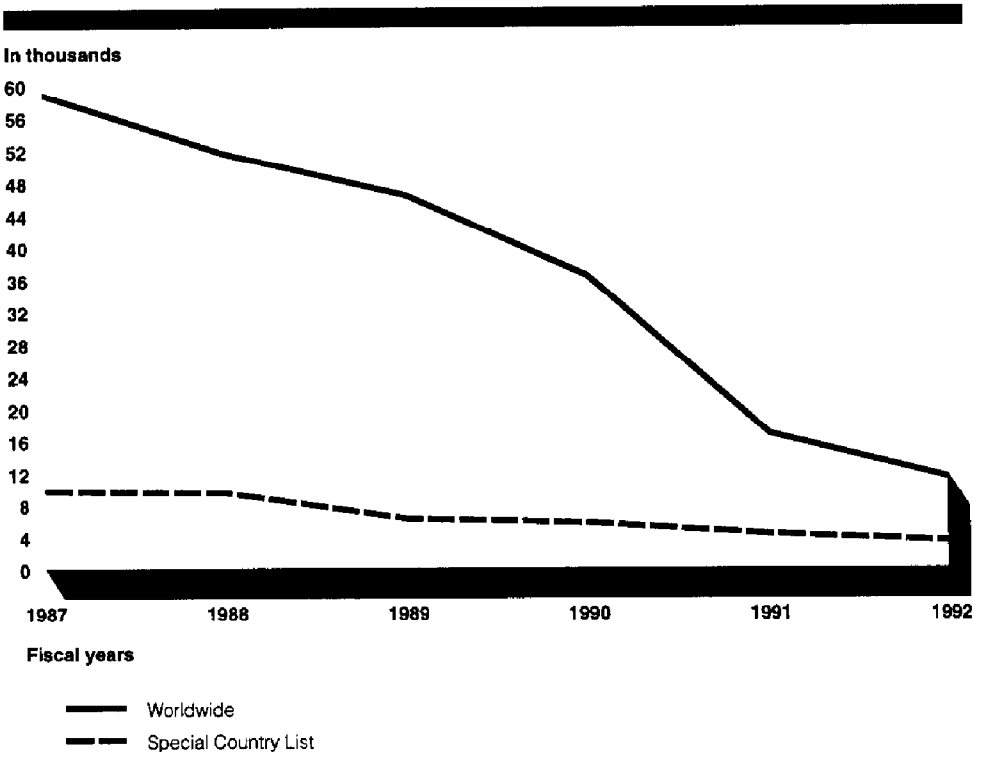
Source: Department of Commerce.

According to Energy officials, demand for these items is far smaller relative to other NRL items. In addition, our analysis confirms that not only do few end users have any need for these items, but in most instances only legitimate end users apply for them. According to Energy officials, illegitimate end users know these items will be denied because of their critical applications in nuclear weapons development, such as testing of implosion systems, manufacturing of gas centrifuge components, and production of heavy water.

Declining Trend of NRL Licenses

Since fiscal year 1987, the volume of individual validated licenses for NRL items has declined, although less for Special Country List destinations than for other countries. The number of NRL licenses worldwide declined 81 percent from fiscal years 1987 to 1992, compared with a 65-percent drop in NRL licenses to Special Country List destinations, as shown in figure 2.2.

Figure 2.2: Licenses for NRL Items to Worldwide and Special Country List Destinations (Fiscal Years 1987-92)



This decline in approved NRL licenses is due to the liberalization in export controls that occurred during the late 1980s. The United States eased licensing requirements for computers in 1987 and again in 1990, and also took other liberalization steps in accord with decisions reached by the Coordinating Committee on Multilateral Export Controls (COCOM).[4] In June 1990 COCOM exempted some items from export licensing requirements when the items were destined for COCOM member states. Because some of these items were also on the NRL, this exemption resulted in fewer total licenses; it did not affect licenses to Special Country List destinations because these countries are not members of COCOM. Also in June 1990, COCOM removed some commodities from its control list that were also on the NRL, thereby liberalizing licensing requirements for NRL exports not only to COCOM members but to all countries.[5]

[4]COCOM, comprised of the United States and its western allies, was established to control exports to the Soviet bloc.

[5]Additional changes have been made in the NRL since June 1990, but these have not resulted in net changes in licensing requirements. As many commodities have been added to the NRL as have been dropped.

Of all of these actions, the liberalization in computer licensing requirements has had the greatest impact: computers represented 92 percent of the decline in licenses for NRL items to Special Country List destinations and 86 percent of the decline for all countries.

On October 6, 1993, the Commerce Department published an interim rule further easing licensing requirements for computer exports. Under the new policy, only supercomputers (as they are currently defined) will require an export license for nuclear proliferation reasons and only when exported to Special Country List destinations.[6] This new policy will almost certainly result in a substantial decline in the number of computer license applications. We estimate that if these policy changes had been in effect in fiscal year 1992, there would have been approximately 86 percent fewer license applications for computer exports to countries on the Special Country List.

In formulating this new policy, the executive branch sought to promote U.S. computer exports by reducing the licensing burden and bringing U.S. export controls more in line with those of other countries.

[6]Licenses will still be required for lower level computers destined for Iran and Syria, in accord with existing foreign policy export controls. Such exports could be denied for nuclear proliferation reasons if it can be clearly established that they would be used to support nuclear weapons activities.

Dual-Use Nuclear Licensing Policy and Its Implementation

Most licensing decisions for eight countries of particular concern were consistent with the U.S. goal of minimizing proliferation risk. However, over 1,500 nuclear-related dual-use licenses were approved by the U.S. government to end users in these countries involved or suspected of being involved in nuclear proliferation activities. Some licenses involved technically significant items or facilities that have been denied licenses in other cases because of the risk of diversion to nuclear proliferation activities. These approvals, although generally consistent with U.S. policy implementation guidelines, do present a relatively greater risk that U.S. exports could contribute to nuclear weapons proliferation.

U.S. Nuclear-Related Export Policy Guidance

It is U.S. policy to prevent exports that would contribute to nuclear weapons proliferation, but without impeding legitimate exports. In accord with this policy, Commerce and other agencies with whom it consults conduct a case-by-case review of license applications using the following licensing factors:

- stated end use of the item;
- significance of the item for nuclear purposes;
- availability of the item from non-U.S. sources;
- types of assurances against nuclear explosive use; and
- nonproliferation credentials of the destination country.

The Subgroup on Nuclear Export Coordination has developed more detailed guidelines that agencies can follow in their case-by-case reviews. Specifically, the guidelines permit agency officials to review with a "presumption of approval" all applications except those that involve the following circumstances:

- Exports to Special Country List destinations if there is any evidence that they will be used for proscribed nuclear activities such as the design, manufacturing, or testing of nuclear weapons.
- Exports to any country if they involve (1) an unsafeguarded nuclear activity;[1] (2) a foreign naval nuclear propulsion program with which the United States does not cooperate; (3) items that present a high risk of diversion; or (4) a nuclear activity in a country for which the United States has a policy of nuclear noncooperation.

[1]Safeguards include inspections and other measures taken by the International Atomic Energy Agency to detect the diversion of nuclear material from peaceful nuclear activities.

These guidelines are intended to balance U.S. nonproliferation policy objectives with legitimate commercial interests. They seek to minimize the risk that U.S. exports could support nuclear proliferation activities, while providing licensing officials wide latitude to approve exports for other activities. For example, in certain circumstances licenses will be approved for Special Country List destinations even if the end user is involved in proscribed or unsafeguarded nuclear activities, so long as (1) the end user is also involved in non-proscribed activities, (2) the exports are intended and are appropriate for those non-proscribed uses, and (3) U.S. officials are able to develop conditions that would provide the necessary degree of confidence that the items will not be diverted.

Licensing Outcomes for Eight Countries of Concern

To assess the implementation of U.S. licensing policy, we analyzed licensing decisions for nuclear-related dual-use exports to eight countries of proliferation concern for fiscal years 1988 to 1992. The eight countries are Argentina, Brazil, India, Iran, Iraq, Israel, Pakistan, and South Africa. During this period, the United States reviewed 27,567 nuclear-related dual-use license applications for the eight countries and approved 24,048, or approximately 87 percent, as shown in table 3.1.

Table 3.1: Licensing Outcomes for Nuclear-Related Dual-Use Exports for Eight Countries of Concern (Fiscal Years 1988-92)

Country	Applications	Approvals	Denials	Other[a]
Argentina	2,644	2,433 (92.0%)	4 (0.2%)	207 (7.8%)
Brazil	7,476	6,966 (93.2%)	29 (0.4%)	481 (6.4%)
India	3,978	3,050 (76.7%)	69 (1.7%)	859 (21.6%)
Iran	721	366 (50.8%)	86(11.4%)	269 (37.3%)
Iraq[b]	410	253 (61.7%)	20 (4.9%)	137 (33.4%)
Israel	6,603	5,929 (89.8%)	44 (0.7%)	630 (9.5%)
Pakistan	808	650 (80.4%)	27 (3.3%)	131 (16.2%)
South Africa	4,927	4,401 (89.0%)	10 (0.2%)	516 (12.0%)
Total	**27,567**	**24,048 (87%)**	**289 (1%)**	**3,230 (12%)**

Note: Percentages may not add to 100 due to rounding.

[a]Includes licenses returned to the exporter without action, still pending, canceled, or suspended.

[b]Data through August 2, 1990. All pending applications were returned without action.

Source: Department of Commerce.

The four countries that accounted for the great majority of license applications (Brazil, Israel, South Africa, and India) have the largest and/or most technically advanced economies in the group and the greatest demand for nuclear-related dual-use items. The small volume of applications for Iran and Iraq and relatively lower approval rates are due to the less-developed nature of their economies and the more stringent application of U.S. licensing policy. The United States has embargoed all exports to Iraq since the Persian Gulf War, and since fiscal year 1992 has tightly restricted exports of proliferation items to Iran.

Most Licensing Outcomes Consistent With Goal of Minimizing Risk

In general, the licensing decisions summarized in table 3.1 were in accord with the overall goal of minimizing the risk that U.S. exports could be used to support nuclear proliferation. Most licenses that were approved entailed little or no apparent proliferation risk, while those that were denied represented an unacceptable risk because of the types of items or end users involved.

Approximately 90 percent of the 24,048 approved licenses were for exports to hospitals, banks, factories, and other civilian and governmental institutions that did not appear on the Department of Energy's Nuclear Proliferation Watch List.[2] Computers accounted for a large number (17,106) of the licenses to these end users.

Conversely, most of the 289 denied licenses represented an unacceptable proliferation risk because they involved (1) technically significant items going to end users or countries where the risk of diversion to proscribed activities was viewed as particularly high; (2) end users involved in unsafeguarded nuclear activities or foreign naval nuclear propulsion programs; or (3) end users engaged in nuclear activities in countries for which the United States has a policy of nuclear noncooperation. The following are examples of licenses denied based on the risk of diversion.

- A license for two three-axis turning machines capable of manufacturing nuclear weapons components to the Saddam General Establishment in Iraq.
- Nineteen licenses for high-powered computers to a military end user in Israel.

[2]The Watch List identifies end users of nuclear proliferation concern. Some of the end users on the Watch List are classified as "sensitive" because they are involved in proscribed nuclear weapons or fuel cycle activities; other end users are involved in non-sensitive nuclear activities or export diversion.

The following are examples where applications were denied because the recipients were primarily involved in unsafeguarded nuclear activities or a foreign naval nuclear propulsion program.

- Seven license applications for computers, radiation detection equipment, nuclear reactor equipment, bellows valves, and an oscilloscope to Israel's unsafeguarded nuclear program.
- All but 1 of 12 license applications for exports to an unsafeguarded nuclear research center in India.[3]
- Six licenses to a military end user in Brazil involved in naval nuclear propulsion research.

It has been U.S. policy not to cooperate with the nuclear programs in India, Iran, Iraq, Israel, Pakistan, and South Africa, resulting in denial of some licenses. For example, licenses involving computers, measuring and calibration equipment, and other NRL items were denied for the Iraqi Atomic Energy Commission, a nuclear end user in India, and a nuclear power plant in Pakistan. According to a State Department official, the United States has adopted a policy of nuclear noncooperation for some countries because of concerns that technology for civilian nuclear programs could be diverted to nuclear weapons development.

Some Licenses Approved Despite Higher Proliferation Risks

Although most of the licensing decisions for the eight countries we reviewed were in accord with the goal of minimizing proliferation risk, we did identify a number of licenses that were approved for exports to end users engaged in, or suspected of being engaged in, nuclear weapons proliferation. In approving these licenses, officials concluded that the items would not be used in proscribed nuclear activities. We have no evidence that such exports have contributed to nuclear proliferation; however, they do pose a relatively greater proliferation risk because of the end users involved.

Licenses Approved to Sensitive End Users

Of the 24,048 licenses approved for our eight countries of concern, more than 1,500 licenses were approved to "sensitive" end users involved or

[3]By mistake, Commerce did approve 1 non-NRL license to the center for 12 circuit boards valued at $30.

suspected of being involved in proscribed nuclear activities,[4] as shown in table 3.2. These exports were valued at $350 million. (App. IV contains more detailed information on these licenses.)

Table 3.2: Approvals of Nuclear-Related Dual-Use Licenses to Sensitive End Users in Eight Countries of Concern (Fiscal Years 1988-92)

Country	Applications	Approvals[a]	Percent approved
Argentina	50	39	78
Brazil	401	322	80
India	317	202	64
Iran	21	5	24
Iraq[b]	89	31	35
Israel	1,075	880	82
Pakistan	9	3	36
South Africa	31	26	84
Total	**1,993**	**1,508**	**74**

[a]Does not include licenses for non-NRL items approved without referral to the Department of Energy (see ch. 4).

[b]Through August 2, 1990.

Source: Department of Commerce, Department of Energy.

In reviewing these licenses, officials were to weigh the technical significance of the items in combination with the country and the end user. They concluded that there was little or no risk of diversion to proscribed and/or unsafeguarded nuclear activities. Generally, the end users for these 1,508 licenses were government agencies, research organizations, universities, and defense companies that, while participating in proscribed and/or unsafeguarded nuclear activities, are also engaged in other activities. Moreover, 241 of these licenses involved non-NRL items. According to the Chairman of the SNEC, non-NRL items generally have little or no significance for nuclear explosive purposes and, therefore, present only a small proliferation concern. Most of the remaining 1,267 licenses involved computers and computer parts, measuring and calibrating equipment, lasers, pressure measuring instruments, fibrous materials, and oscilloscopes.

In some instances, decisions to approve licenses for sensitive end users were also influenced by special country considerations—for example, the close bilateral relationship between the United States and Israel. In some

[4]We are including end users characterized as "sensitive" on the Department of Energy's Watch List, plus several end users linked to Israel's unsafeguarded nuclear program and certain Iraqi state establishments.

of these cases, approval decisions were contingent on government-to-government assurances against misuse or other licensing conditions (such as exporter reporting) designed to deter and detect diversions.

Specific Cases That Constitute Heightened Proliferation Risk

Although we have no evidence that any items exported under these 1,508 licenses have been used to support nuclear proliferation activities, some of these licenses may constitute a heightened proliferation risk by virtue of the items or end users involved. A number involved items that, because of their technical significance, present a higher risk of diversion to proscribed nuclear activities. Others involved sensitive end users for which U.S. officials have denied a large number of dual-use licenses because there was a risk of diversion to proscribed nuclear activities. These end users have been or are suspected to be key players in their countries' nuclear weapons programs.

Example: Machine Tool to Pakistan

In late 1989, the U.S. government approved a license to a military end user in Pakistan for two four-axis grinding machines capable of manufacturing critical nuclear weapons components. According to the Department of Energy's Nuclear Proliferation Watch List, the end user is involved, among other things, in sensitive nuclear activities, such as the design, manufacture, or testing of nuclear weapons or production of special nuclear materials.

The license was originally denied on grounds that there was an unacceptable risk of diversion to nuclear weapons development. However, the SNEC subsequently recommended approval based on (1) the exporter's argument that a diversion of the machine tool was unlikely and (2) the Department of Energy's conclusion that while the equipment was capable of contributing to sensitive nuclear activities, such capability would not necessarily translate into a diversion. The decision to approve the grinding machines, valued at $1.5 million, came after the SNEC had recommended denial of less valuable NRL licenses to the same end user, including measuring and calibrating equipment valued at under $10,000 and kevlar fabric valued at under $2,000. The SNEC had recommended denial of these licenses on grounds that there was an unacceptable risk of diversion to nuclear proliferation activities. Moreover, the license for the grinding machines was approved on the condition that the exporter provide the SNEC with periodic reports on the status of the item; however, according to Commerce officials, no such reports have ever been provided.

Example: Computers to Israel

During fiscal years 1988 to 1992, the United States issued 238 licenses for computers to certain Israeli end users linked to the unsafeguarded Israeli nuclear program. While the U.S. government denied some licenses for high-powered computers for these end users, the computers that were approved were generally more powerful than any exported to sensitive end users in other countries of concern. They were also more powerful than those used to develop many of the weapons in the U.S. nuclear arsenal.

According to a State Department official, while the United States does not support the Israeli nuclear program, it has approved such computer exports because of the overall U.S.-Israeli relationship and the U.S. policy of maintaining Israel's qualitative military superiority over its neighbors. In addition, the decision to approve some of these computer exports was influenced by the foreign availability of the equipment. For 62 of the 238 licenses, the United States received government-to-government assurances against nuclear use. According to a State Department official, there is no evidence that Israel has violated its assurances, although the U.S. government has not verified compliance (see ch. 5).

Example: Computers and Equipment to Iraq

The U.S. government approved 23 licenses during fiscal years 1988 and 1989 for computer equipment to end users later determined by the United Nations to be involved in Iraq's nuclear weapons program. Three of the licenses were for personal computers to the Iraqi Atomic Energy Commission (the headquarters for the Iraq nuclear weapons program), while six were for minicomputers and personal computers to Iraqi state establishments involved in uranium enrichment activities. According to a U.S. government assessment, Iraq may have made use of such computers to perform nuclear weapons design work, as well as to operate machine tools which may have been used in fabricating nuclear weapons, centrifuges, and electromagnetic uranium enrichment components.

Although it was U.S. policy not to support Iraq's efforts to acquire nuclear weapons, it was also U.S. policy to support benign trade with Iraq as a way to improve relations between the two countries and assist in rebuilding Iraq's economy following the Iran-Iraq War. According to a State official, prior to the Persian Gulf War U.S. licensing officials were concerned about Iraq's nuclear activities, but were not aware of the existence of its uranium enrichment programs. As a result, while most licenses for the Iraqi Atomic Energy Commission and certain other state establishments were denied, some involving moderately capable computers were approved. At the time these licenses were approved, only the Iraqi Atomic Energy Commission

was identified as a sensitive end user; other Iraqi state establishments were not identified as potentially involved in nuclear weapons activities.

Example: Various NRL Items to India

The United States approved 33 licenses to a nuclear research center in India that operates an unsafeguarded reactor and unsafeguarded isotopic separation facilities. According to testimony by the Director of Central Intelligence before the Senate Governmental Affairs Committee, the center is also involved in thermonuclear weapons design work. A State Department official told us that it is U.S. policy not to cooperate with the Indian nuclear program, but the United States attempts to separate its concerns about the Indian nuclear program from other aspects of the U.S.-Indian relationship.

Of the 33 licenses approved, 14 were for such NRL items as computers, laser equipment, and pressure measuring equipment. According to an Energy official, these licenses were approved because they involved technically insignificant items with legitimate uses for civilian research and because, in the official's view, there was little likelihood that the items would be diverted to proscribed nuclear activities. Other licenses for the center, involving more technically significant NRL items, have been denied.

The U.S. government also approved six licenses involving NRL items such as computers and equipment for ammonia production for Indian fertilizer factories. These factories also make heavy water as a by-product, which is important to the Indian nuclear program because India's unsafeguarded nuclear reactors require it to operate. Heavy water production is a proscribed activity and is subject to International Atomic Energy Agency safeguards. According to a State Department official, the United States approves licenses for Indian fertilizer manufacturers collocated with heavy water production facilities if the exports will not contribute to heavy water production.

Conclusions

Short of denying all exports to countries or end users of concern, U.S. licensing decisions will continue to require judgment and the balancing of proliferation concerns against legitimate trade interests and other U.S. objectives. While the United States has denied licenses believed to pose an unacceptable proliferation risk, it has approved other licenses for end users involved in or suspected of being involved in nuclear weapons activities. Officials approved these licenses because they believed the items would not support proliferation activities, even though other licenses to these same end users were denied. In some cases, decisions to

approve these licenses were influenced by assurances against misuse, or specific methods (such as exporter reporting) to verify compliance with U.S. licensing conditions, but such assurances are not routinely verified (see ch. 5) and in at least one instance required exporter reporting has not been done.

We have no evidence that any of these exports have been used in nuclear explosives programs. However, they constitute a higher nuclear proliferation risk—some significantly higher—than most of the other licenses that were approved because of the sensitivity of the items involved or the role of the end users in unsafeguarded nuclear activities.

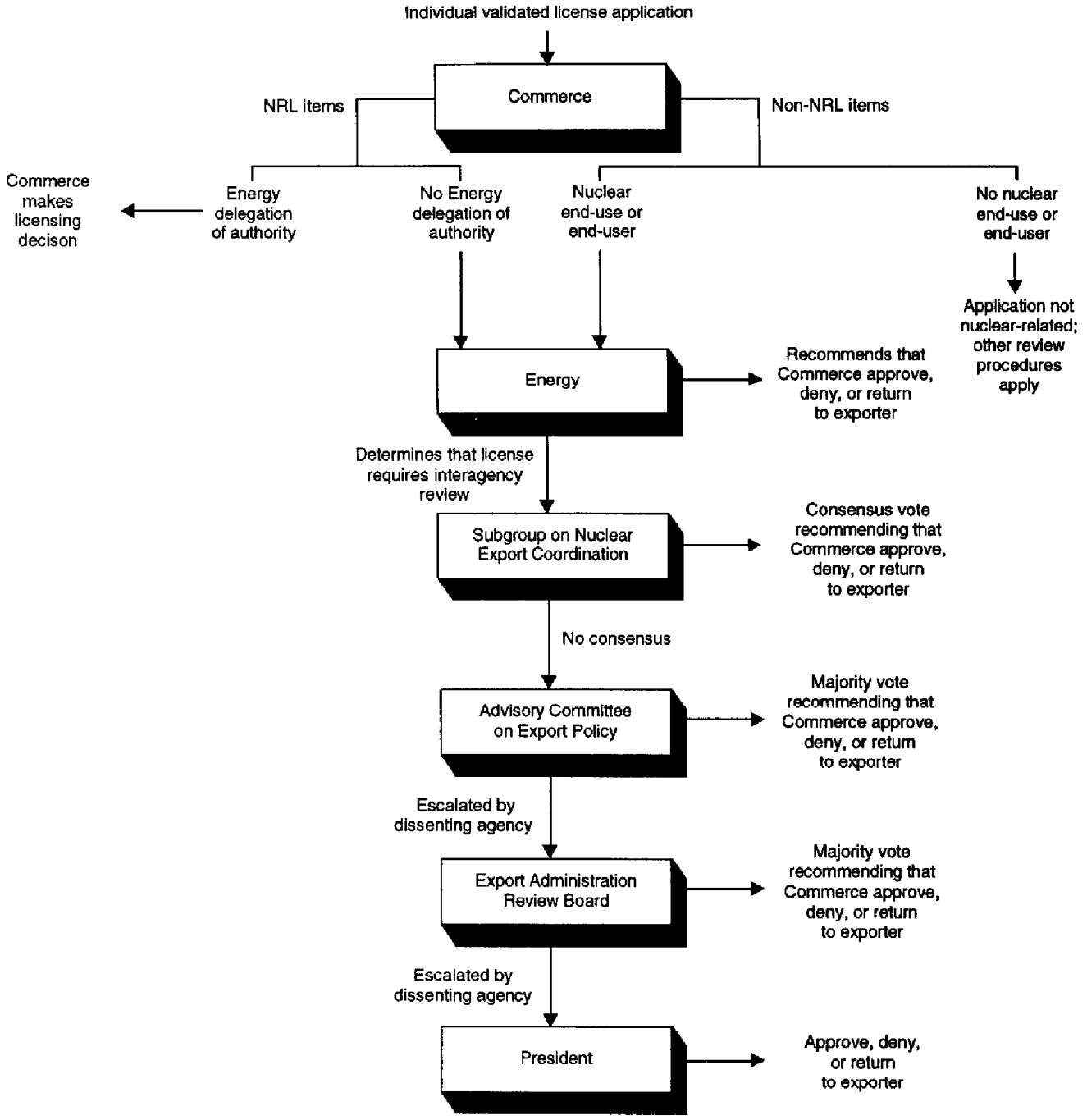
The Interagency Review System Should Be Strengthened

The interagency process for reviewing license applications has weaknesses that have prevented some nuclear-related dual-use licenses from receiving adequate review. We found that the Commerce Department did not always send to Energy all those licenses requiring referral and that Energy recommended approval of a majority of licenses for end users engaged in nuclear weapons activities without subjecting them to interagency review. Such recommendations by Energy do not violate regulations, but do limit the opportunity for the Department of Defense and the Arms Control and Disarmament Agency to see all licenses they believe warrant their review.

The Interagency Review Process

Regulations pursuant to the Nuclear Non-Proliferation Act of 1978 establish an interagency review process for nuclear-related dual-use licenses involving the Departments of Commerce, Energy, State, and Defense, and ACDA. The act specifies that Commerce must consult with these agencies as needed when making licensing decisions. Figure 4.1 illustrates the path a license application takes during the review process, depending on whether the license involves an NRL or non-NRL item.

Figure 4.1: Procedures for Interagency Review of Nuclear-Related Dual-Use Licenses



Referral procedures are designed to allow licenses to be reviewed by agencies with relevant technical expertise as well as different perspectives on nuclear proliferation issues. Energy advises Commerce because of its technical expertise in nuclear weapons research and development. In turn, Defense, State, and ACDA bring national defense, foreign policy, and arms control considerations into license decision-making. By participating in interagency review groups such as the SNEC, these agencies can attempt to block any export that in their view would not be in the national interest.

Commerce and Energy Review

The regulations require Commerce to refer nuclear-related dual-use license applications to Energy, but in practice Energy has delegated some of its review authority, enabling Commerce to decide some licenses on its own.[1] Energy's intent in such delegations is to decrease the volume of license applications it reviews, so those licenses that do not pose a proliferation risk can be processed more quickly.

In accord with these delegations, license applications involving more than half of the items on the NRL can be decided by Commerce without consultation unless they involve a nuclear end use or end user or certain countries designated by Energy as being of significant proliferation concern. License applications for another fifth of the NRL are referred to Energy only if intended for a Special Country List destination or to certain other countries, or involve a nuclear end use or end user.

Energy has not delegated its authority to review applications for the more sensitive categories of nuclear-related dual-use licenses. Energy also has retained its authority to review license applications for non-NRL items involving nuclear end uses or end users.

Referrals to the SNEC and Other Interagency Review Groups

Regulations require that licenses be referred to the SNEC if either Commerce or Energy believes that a particular license should be reviewed by other agencies or denied. The SNEC is an interagency working group consisting of voting representatives from Commerce, Energy, Defense, State, and ACDA.[2]

[1]These delegations, first issued in 1985, constitute written memorandums of understanding between the Departments of Commerce and Energy.

[2]Also in attendance at SNEC meetings are nonvoting representatives from the Central Intelligence Agency, the National Security Council, and the Joint Chiefs of Staff. While the Nuclear Regulatory Commission is a statutory member of the SNEC, it does not vote on dual-use licenses.

When the SNEC cannot reach consensus, license applications are escalated to the Advisory Committee on Export Policy—an Assistant Secretary-level interagency review group consisting of voting representatives from the SNEC agencies. ACEP votes by majority, although dissenting agencies can escalate licenses to a higher level interagency group—the Export Administration Review Board (EARB)—which in turn can send licenses to the President. Although Commerce is the licensing authority, it will, according to Commerce officials, follow the recommendations of Energy, the SNEC, ACEP, or EARB in making its licensing determinations.

Results of Review Process

From fiscal years 1988 to 1992, Commerce decided without Energy consultation about 50 percent of the 34,281 nuclear-related dual-use license applications to Special Country List destinations. Of the licenses Commerce referred, Energy made recommendations to Commerce on about 93 percent without subjecting them to interagency review.

Table 4.1 shows the results of license reviews by Energy and succeeding review levels. The SNEC and ACEP cause a higher proportion of licenses to be denied than Energy because these groups review more sensitive licenses[3] and Energy is generally required to refer to the SNEC those licenses that it believes should be denied.

Table 4.1: Licensing Decisions by Review Level (Fiscal Years 1988-92)

	Total licenses	Approved	Denied	Other[a]
Energy	15,828	14,208 (90%)	101 (1%)	1,515 (10%)
SNEC	1,140	695 (61%)	112 (10%)	333 (29%)
ACEP	105	30 (29%)	7 (7%)	68 (65%)
EARB	18[b]	17 (94%)	1 (6%)	0 (0%)
President	3	0 (0%)	3 (100%)	0 (0%)
Total	**17,094**	**14,947 (87%)**	**224 (2%)**	**1,916 (11%)**

Note: Percentages may not add to 100 due to rounding.

[a]Includes licenses that were returned without action, still pending, canceled, or suspended.

[b]All 18 licenses, for computer exports to certain Israeli end users, were reviewed in 1991; according to Commerce data, the EARB reviewed no licenses in fiscal year 1992.

Sources: Department of Commerce and the SNEC.

We reviewed SNEC licensing decisions from fiscal years 1988 to 1991 and identified only two cases where Commerce approved licenses even though

[3]Most licenses reviewed by the SNEC involve one of the eight countries discussed in chapter 3.

a majority of other SNEC agencies had voted that they be denied. They both occurred in fiscal year 1990.

The two licenses involved (1) a flash X-ray system to an end user suspected of engaging in proscribed nuclear activities and (2) a low-speed computer to an end user which at the time was a known diverter. Some agencies voting for denial at the SNEC wanted these licenses escalated to a committee of the National Security Council, but Commerce approved them without escalation because it did not recognize the authority of the National Security Council committee. Commerce believed that agencies voting for denial should have escalated these licenses to ACEP. At the time, the ACEP escalation process was informal—it had not yet been established by regulations.[4]

Commerce Does Not Refer All Licenses to Energy That It Should

Most of the nuclear-related dual-use licenses Commerce decided without Energy review did not have to be referred because they were covered by Energy delegations of authority. However, from October 1987 to May 1992, Commerce approved about 130 licenses for NRL items going to Special Country List destinations without obtaining Energy review, even though no Energy delegations of authority applied.

Of these NRL licenses, more than three-quarters were for computers going primarily to Argentina, Brazil, India, Israel, and South Africa, and in a small number of instances to Iran and Iraq. Additionally, 23 of these computer licenses involved end users on Energy's Nuclear Proliferation Watch List, including some end users listed as "sensitive" because of their possible involvement in proscribed nuclear activities. The other NRL licenses involved spark gaps, thyratrons, oscilloscopes, and other items, some to sensitive Watch List end users.

In addition to the NRL licenses, Commerce approved without Energy review nearly 1,500 licenses for non-NRL items going to end users on Energy's Watch List, even though regulations require Energy review of non-NRL licenses involving nuclear end users. The large majority of these licenses were for Argentina, Brazil, India, Israel, and South Africa, although 26 were for Iraq, Pakistan, and Iran. Of these licenses, about 500 were for sensitive end users.

[4]The process by which licenses can be escalated from the SNEC to ACEP and higher level review was published in the Federal Register in February 1991.

Reasons Given for Non-Referral

Commerce officials acknowledged that Energy should have been consulted on most of the approximately 130 NRL licenses. According to these officials, an inexperienced licensing officer was responsible for a large number of the computer licenses that were not referred as required. Additionally, most of the licenses were reviewed prior to the adoption in October 1991 of a "two-person sign-off rule," whereby the decisions of one licensing officer must be reviewed by another licensing officer.

In the case of the non-NRL licenses, Commerce officials told us they had the discretion to decide which licenses involving Watch List end users should be referred and which should not. They said that although Energy's initial intent in providing the Watch List was that all licenses would be referred, this policy had eroded over time because of repeated messages from Energy that it did not wish to see certain licenses. As a result, Commerce licensing officers now use the Watch List as a general guide and do not routinely forward all license applications involving Watch List end users to Energy.

Nonetheless, Commerce officials acknowledged that some of the non-NRL licenses did involve end users of "true" proliferation concern and should have been referred to Energy. An Energy licensing official agreed with Commerce that many of the non-NRL licenses should have been referred, although he understands why Commerce believes it has some discretion. However, the Energy official told us that Commerce improperly exercised that discretion, particularly for the licenses for end users listed on the Watch List as sensitive. Officials from both agencies acknowledged that the referral policy for licenses to Watch List end users should be clarified.

Impact of Commerce's Failure to Refer Licenses

Commerce's failure to properly refer licenses increases the risk that a U.S. export could support a nuclear proliferation program. Energy or other reviewing agencies could, if given the opportunity, vote to deny some licenses Commerce fails to refer.

On the basis of our analysis, we believe many of the approximately 130 NRL licenses would have been approved by Energy had they been referred. For instance, of the computer licenses, most are similar to cases that were approved by Energy. However, seven of them, based on similar past cases, could have been escalated to the SNEC, where five might have been approved and two might have been denied depending on the end use, the specific facilities receiving the exports, or other policy considerations. Analyzing the other NRL licenses is more difficult because we were unable

to assess the technical significance of the items; however, other licenses for such items have been approved by Energy under similar circumstances.

We cannot be certain whether any of the approximately 500 non-NRL licenses involving sensitive end users would actually have been denied if Commerce had referred them. However, we found that Energy and the SNEC had recommend denial of a small number of similar licenses in the past, a few involving sensitive end users that were also listed among the approximately 500 licenses Commerce did not refer to Energy.

Referrals to the SNEC

Energy has discretion in deciding which license applications it should forward to the SNEC. Two agencies on the SNEC, the Department of Defense and the ACDA, have expressed concern over Energy's exercise of its discretion and the lack of visibility over licenses not referred, leading to proposals to reform the review process.

Energy Referral Guidelines and Actions

Regulations generally require that if Energy believes Commerce should deny a license, it must refer that license to the SNEC. However, according to an Energy official, in some instances Energy does not refer licenses to the SNEC that it wants denied because the SNEC already has a policy that such licenses should be denied.[5]

If Energy believes a license should be approved, it reviews SNEC referral policies to decide whether the license application should be referred. Generally, the SNEC has directed Energy to refer licenses for which there is a risk of diversion to nuclear end uses, in addition to certain licenses for specific end users. Energy officials told us they also refer other licenses that they would recommend be approved if they believe other SNEC agencies would want to review them.

Under these guidelines, from fiscal years 1988 to 1992, Energy referred to the SNEC only 26 percent of the license applications it received from Commerce for end users listed as sensitive on its Nuclear Proliferation Watch List. Of the licenses not referred by Energy, 79 percent were ultimately approved, less than 1 percent were denied, and the remainder were generally returned without action.

[5]Energy provides periodic reports to the SNEC on those licenses it denied without interagency consultation.

Most license applications for sensitive end users that Energy referred to the SNEC involved NRL items; few non-NRL licenses for sensitive end users were referred. According to an Energy official, license applications for sensitive end users that were not referred to the SNEC generally involved items that would not contribute to a country's nuclear program. In addition, Energy officials said these licenses posed no risk of diversion because they were intended for use in non-proscribed activities.

Defense and ACDA Concerns About Energy Referrals

Although the State Department representative to the SNEC said he was satisfied with Energy referrals, Defense and ACDA officials stated that not all nuclear-related dual-use licenses that could be of concern to various SNEC agencies are being referred to the SNEC. In addition, Defense and ACDA officials said they have only a limited ability to hold Energy accountable for its licensing recommendations because they lack access to licensing information.

At our request, Defense and ACDA representatives to the SNEC reviewed a list of licenses that in June 1991 Energy recommended be approved without SNEC review. They identified several licenses that they believed warranted such review.

Defense and ACDA officials stated that although they would not necessarily have voted to deny all of these licenses, they were concerned that Energy reviewed them without interagency consultation. They believe Energy has a policy perspective that could lead it to recommend approval of some licenses that Defense and ACDA want denied. For example, according to Defense officials, Energy emphasizes technical factors, such as the sophistication of the item and its appropriateness for the stated end use, while downplaying political developments within a country or the statements of its leaders. Defense officials also believe that Energy does not fully appreciate the potential utility of low-technology NRL items or non-NRL items to nuclear proliferation activities in less developed countries.

Defense's and ACDA's complaints regarding the SNEC agenda stem in part from the fact that these agencies vote to deny nuclear-related dual-use licenses more often than other agencies. For example, for the licenses escalated to ACEP between March 1991 and July 1992, Defense and ACDA voted at the SNEC for denial 63 and 50 percent of the time, respectively, while Energy voted for denial 47 percent of the time, Commerce 13 percent, and State 8 percent. Defense never voted to approve any of

these licenses; in those cases where it did not to vote to deny, it decided to defer its position until further discussion at the ACEP.

Although technically all agencies are allowed to place license applications on the SNEC agenda, in most instances only Commerce and Energy have the ability to do so because they are the only agencies with access to all nuclear-related dual-use license applications.[6] Other SNEC agencies can request that Energy refer certain types of licenses, but Energy will only do so if directed by a consensus vote at the SNEC, which is generally difficult to achieve.

Other SNEC agencies are also limited in their ability to hold Commerce and Energy accountable for their licensing decisions because they rarely are given information on licenses decided without interagency review. Although guidelines from the SNEC chairman recommend that Energy report periodically to the SNEC on licenses that are approved, Energy officials said they provide such information to the SNEC only on an ad hoc basis because of resource constraints and because in their view it is unclear what would be gained by distributing such data. Our review confirmed that Energy has not provided the SNEC with information on licenses approved without SNEC review since October 1991.

Proposals for Reforming the Energy Referral Process

To better ensure that the right licenses reach the SNEC agenda, Defense proposed in February 1992 that Energy refer to the SNEC all licenses for items controlled multilaterally by the Nuclear Suppliers Group when destined for certain countries that are not in this group.[7] The SNEC did not accept Defense's proposal because representatives from Commerce, State, and Energy did not agree that these types of licenses were of sufficient concern to warrant SNEC review. Defense also proposed that Energy provide information on all approved licenses not reviewed by the SNEC, but the SNEC rejected this as well.

To provide more transparency to the process, ACDA has proposed that all licenses referred from Commerce to Energy be referred simultaneously to other SNEC agencies. Commerce opposed this on the grounds that (1) it would be duplicative and costly, and could add to license processing time,

[6]Agencies may have access to some license applications because they are referred for other reasons. For example, Defense receives licenses involving computers and other electronic equipment for certain Special Country List destinations.

[7]The Nuclear Suppliers Group is a multilateral group that imposes licensing requirements on certain items for nuclear proliferation reasons.

if each agency reviewed every license and (2) it is of questionable value given that other SNEC agencies do not possess expertise or intelligence information beyond that available at Commerce and Energy.

Conclusions

Although Commerce referred most licenses in accord with Energy delegations of authority, from October 1987 to May 1992 not all licenses were referred to Energy as required. Commerce's failure to refer some licenses to Energy as required increases the chance that a license will be improperly approved for lack of adequate technical review. Commerce's adoption of a two person sign-off rule should partially address the cause of its failure to refer some NRL licenses. However, there is no agreement between Commerce and Energy on the proper use of the Nuclear Proliferation Watch List in making referral decisions. Until Commerce and Energy take steps to clarify what licenses should be referred, Commerce may still fail to refer some non-NRL licenses for sensitive nuclear end users, even though regulations require referral of such licenses and Energy wishes to review them.

Although Energy has discretion in determining which licenses to forward to the SNEC, its practice of seeking interagency consultation on only a minority of licenses for sensitive end users raises concerns that other agencies may be precluded from bringing their policy perspectives to bear on important licensing decisions. During our review, Defense and ACDA representatives to the SNEC identified a number of licenses—some involving nuclear-capable items destined for end users of proliferation concern—that they believed warranted SNEC review but were not placed on the SNEC agenda. These agencies are limited in their ability to influence which licenses Energy selects for interagency review and are unable to hold Commerce and Energy accountable for their review decisions because they lack consistent access to licensing information.

Recommendations

We recommend that the Secretary of Energy reach agreement with the Secretary of Commerce on guidelines for referral of licenses involving end users on the Nuclear Proliferation Watch List.

To ensure that the most sensitive licenses are referred to the SNEC, we recommend that (1) the Secretaries of Commerce and Energy provide periodic reports to the SNEC on those nuclear-related dual-use licenses approved without interagency review and (2) the Secretaries of Commerce, Energy, State, and Defense and the Director of the Arms

Control and Disarmament Agency (the voting members of the SNEC) use licensing information contained in these reports to establish mutually acceptable guidelines for selection of licenses for interagency review.

Methods Used to Deter and Detect Diversions Have Limitations

The U.S. government's methods for deterring and detecting diversions of nuclear-related dual-use items have several limitations. First, selection criteria for pre-license checks and post-shipment verifications do not provide sufficient focus to ensure useful selection of nuclear-related inspections. Second, the methods used to perform these inspections hamper their effectiveness. Finally, the U.S. government does not systematically verify compliance with government-to-government assurances on the use of nuclear-related dual-use items because they are diplomatically negotiated agreements intended to carry the weight of an official commitment.

Few Nuclear-Related Dual-Use Licenses Are Subjected to Inspection

Only a small proportion of the nuclear-related dual-use licenses referred to the Department of Energy have been subjected to PLCs and PSVs. During fiscal years 1991 and 1992, Commerce conducted PLCs for 221 (2.6 percent) of the 8,370 nuclear-related dual-use licenses referred to Energy. During the same period, 56 PSVs were conducted on already exported items.

More than half of the PLCs and PSVs were conducted in the eight countries of particular proliferation concern. Figure 5.1 shows the distribution of PLCs among the eight countries, the other 28 countries on the Special Country List, and all other countries.

Figure 5.1: Geographic Distribution of Nuclear-Related Dual-Use PLCs (Fiscal Years 1991-92)

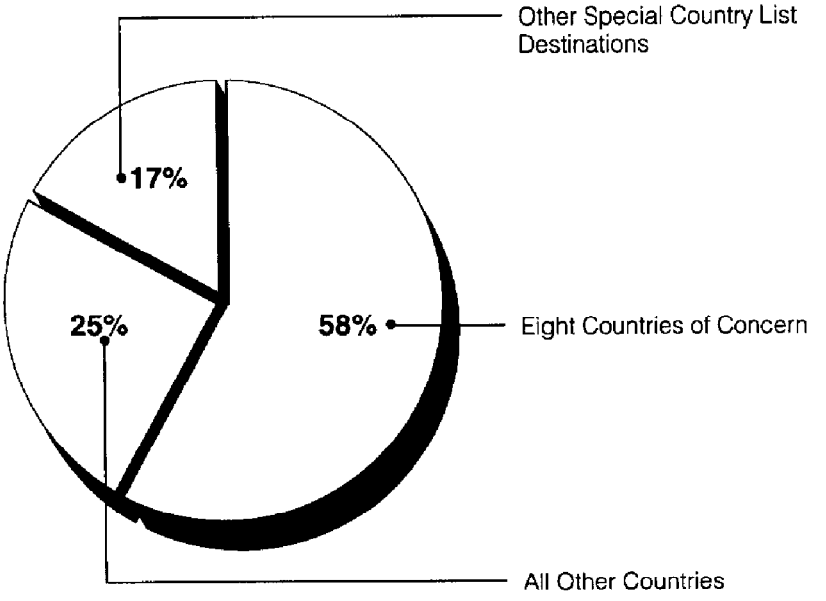


Table 5.1 shows the actual number of inspections (both PLCs and PSVs) conducted in each of the eight countries. Brazil, India, Israel, South Africa, and Pakistan accounted for the highest volume of checks.

Table 5.1: Nuclear-Related Dual-Use Inspections Conducted in Countries of Proliferation Concern (Fiscal Years 1991-92)

Country	PLCs	PSVs	Total
Argentina	9	1	**10**
Brazil	31	3	**34**
India	24	8	**32**
Iran	1	0	**1**
Iraq	0	0	**0**
Israel	23	4	**27**
Pakistan	15	11	**26**
South Africa	19	11	**30**
Total	**122**	**38**	**160**

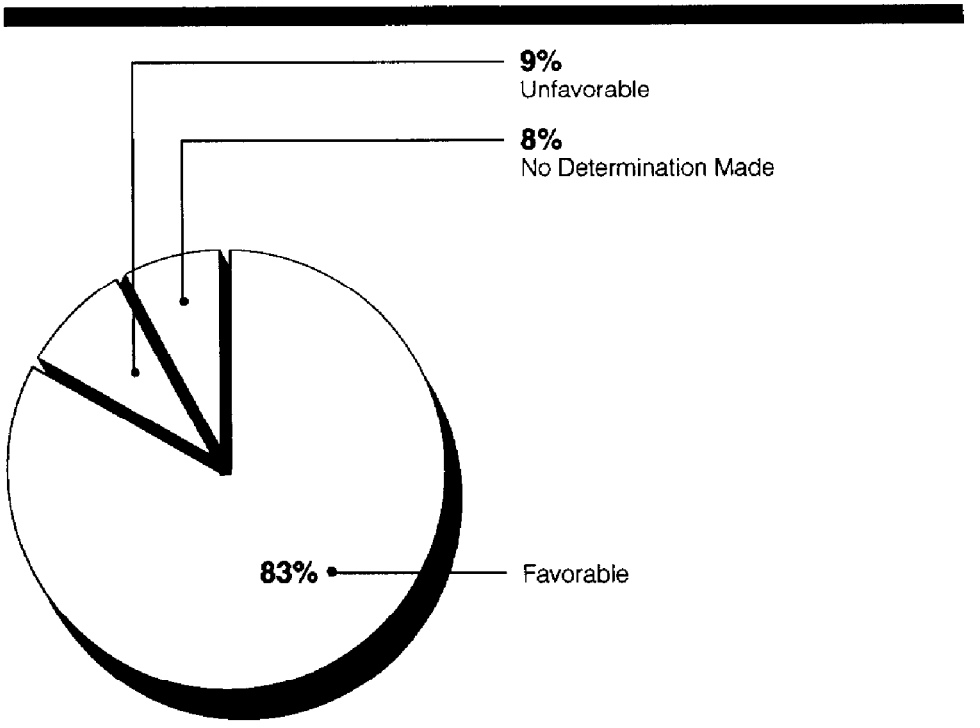
Over 60 percent of these inspections related to computers. Other commodities were checked infrequently. Other items checked five times

or more in these countries included oscilloscopes, numerical control units, fibrous material, and pressure measuring equipment.

Most Inspections Have Favorable Results

Most nuclear-related dual-use PLCs and PSVs conducted during fiscal years 1991 and 1992 had favorable results—meaning that Commerce determined, based on information provided by officials conducting inspections, that the end-user was a reliable recipient of U.S. technology. (See fig. 5.2.)

Figure 5.2: Results of Nuclear-Related Dual-Use PLCs and PSVs (Fiscal Years 1991-92)



A total of 47 of these PLCs and PSVs involved end users on the Department of Energy's Watch List, and 35 of these had favorable results.

Not all unfavorable PLCs resulted in the denial of license applications. Of the 21 license applications that received unfavorable PLCs for all countries

in fiscal years 1991 and 1992, seven were ultimately approved. Two of these seven licenses involved end users on the Watch List.

A Commerce official stated that six of the seven licenses were approved despite the unfavorable PLC results after additional conditions were attached. For instance, the licenses specified that the items could not be used for a nuclear end use or that they could not be transferred to another end user without prior permission from the U.S. government. The remaining license involved an unfavorable PLC that revealed the end user had ordered switching equipment in a quantity far in excess of its needs. When the firm reduced the amount of the item ordered, the license was approved.

In the case of one of the seven licenses, involving an unfavorable PLC on an end user in Israel, subsequent exports to the end user also were approved. A Commerce official told us the subsequent exports were approved after the addition of licensing conditions or when the Israeli government provided assurances that the items would not be misused.

Selection Criteria Lack Specific Guidance for Nuclear-Related Dual-Use Inspections

Commerce has provided general criteria for selecting which export licenses should be subject to a PLC or PSV, but the criteria do not sufficiently focus on nuclear-related dual-use licenses. A Commerce official said the agency has not provided guidance on applying the criteria more specifically to such licenses. Rather, the current inspection system was designed more generally to cover all proliferation and military-related dual-use items. Without this focus, however, Commerce cannot be certain that the licenses presenting the greatest nuclear proliferation risk are selected for inspection.

Commerce's Selection Criteria

According to a Commerce official, any U.S. government agency with export control responsibilities may request an inspection; however, most originate with export enforcement officials at Commerce. The SNEC also requests inspections if it believes they are needed to assist its decision-making process.

Commerce officials use a list of general criteria to guide selection of licenses that require a PLC or PSV. These criteria encompass

- new consignees or exporters;
- items that would be denied for certain end uses or to suspicious end users;

- items having potential for use in nuclear, chemical, or biological warfare, and those with military or missile technology applications;
- large volume licenses (quantity of items or dollar value) for resale purposes where the equipment or technology involved would not be approved to countries or end users in close proximity to the ultimate consignee;
- suspicious ultimate consignees (those that previously have received unfavorable inspections, whose business is not consistent with the items or the end use listed on the license application, or where other derogatory information is known);
- conditions attached to the license; or
- items for which illegal acquisition attempts have been made.

Weaknesses in Selection Criteria

According to Defense and national laboratory officials, priority consideration for selecting PLCs and PSVs should be given to the most sensitive nuclear-related dual-use items. However, the selection criteria do not highlight such items, or even distinguish the relative importance of items having uses in nuclear, chemical, or biological weapons, or with military or missile technology applications. These officials also noted that PLCs are most valuable when they involve end users that are not well-known. The selection criteria do not provide guidance covering this point.

Laboratory officials told us that, while overall selection of PLCs and PSVs was fairly good, during fiscal years 1991 and 1992 more PLCs and PSVs should have been performed for particularly sensitive NRL items in countries of proliferation concern. According to these officials, such sensitive items include neutron generators/tubes, fibrous material, high-strength materials useful in gas centrifuges (such as maraging steel and beryllium), equipment that is corrosion resistant to uranium hexaflouride, high explosives, and high-speed photographic equipment. One laboratory official noted that 15 licenses were approved for exports of fibrous material to Israel in fiscal year 1991. However, no PLCs were conducted on license applications involving this item. As another example, 26 licenses were approved for corrosion-resistant sensing elements to India in fiscal year 1992. However, only three PLCs were conducted on these license applications.

In addition, approximately 63 percent of nuclear-related PLCs in the eight countries of proliferation concern were conducted on items national laboratory officials identified as being of lesser proliferation concern. The

majority of these PLCs were for computers. However, laboratory officials said computers are less critical for nuclear weapons development than some other NRL items and should have low priority for PLC and PSV selection unless the computer has a high data processing speed.

Defense and national laboratory officials, as well as embassy officials who conduct PLCs, said PLCs on unknown end users are valuable for verifying their existence, commercial viability, and ability to use the items as proposed on the license applications. However, during fiscal years 1991 and 1992, Commerce performed PLCs on some known end users, including foreign subsidiaries of U.S. firms and end users already suspected of participating in proscribed activities. In addition, about 39 percent of nuclear-related PLCs in the eight countries of proliferation concern were performed on Department of Energy Watch List end users.

PLCs are less useful in cases involving well-known end users, the officials said, because the existence and activities of the entities are already established. PSVs, however, may be useful for these end users to verify the location of licensed items and conformance with end-use statements and licensing conditions. During fiscal years 1991 and 1992, about 37 percent of nuclear-related PSVs in the eight countries of proliferation concern were performed on Energy Watch List end users.

Methods for Conducting Inspections Are Not Effective

Commerce has issued general guidance on how to conduct PLCs and PSVs, but has not developed specific guidance for conducting nuclear-related dual-use inspections. In the countries we visited, inspections were generally done in accordance with Commerce guidance; however, we found limitations in the way they were conducted that hamper their effectiveness.

How Inspections Are Conducted

To initiate a PLC or PSV, Commerce sends a request cable containing information on the case to the appropriate overseas post. Embassy officials at the post are typically designated to conduct the inspections. In some circumstances, Commerce may send teams of export enforcement officials to selected countries to conduct inspections.

Procedures for conducting PLCs and PSVs are generally the same. Initially, the embassy official is responsible for collecting background information on the end user. This may involve a review of previous inspections

conducted on the end user or an examination of financial reports to determine the end user's credit history and ownership.

Once background information is collected, the embassy official is required to visit the end user and interview the chief executive officer or other high-ranking employees. Following the visit, the embassy official is to submit a reply cable to Commerce detailing the information collected and stating whether the end user is considered a reliable recipient of U.S. technology. On the basis of this report, Commerce determines whether the inspection result was favorable or unfavorable.

Some Inspections Have Proven Ineffective

In several instances, embassy officials did not uncover derogatory information on end users determined through other sources to be involved in nuclear proliferation activities.

- In March 1988, the U.S. embassy in Pakistan conducted a PLC for the proposed export of a computer to an end user located on the premises of a military facility in Pakistan. Although embassy officials did not visit the end user, citing time and budget constraints, the reply cable stated that the end user was a reliable recipient of U.S. technology. A subsequent PLC conducted during fiscal year 1991 reported the same finding for an oscilloscope export. The Energy Watch List, however, indicates that the military facility is involved in sensitive nuclear activities.
- In May 1989, the U.S. embassy in Iraq conducted a PLC for the proposed export of a machine tool to Bader General Establishment.[1] Inspectors toured the facility and viewed the plant where the machine tool would be used. The reply cable stated that Bader General Establishment was a reliable recipient of U.S. technology. However, after the Persian Gulf War, U.N. inspections revealed that the facility was a primary contributor to Iraq's nuclear weapons program.
- In December 1990, the U.S. embassy in Israel conducted a PLC at a government commission for a proposed export to an end user involved in Israel's unsafeguarded nuclear program. The inspecting official, an Israeli national, interviewed the commission's public relations official as well as a representative from the end user. The U.S. embassy subsequently recommended approval of the application based on the results of the PLC.

Limitations in Methods for Conducting Inspections

Several limitations in the methods for performing PLCs and PSVs may hamper their effectiveness. Specifically, we found that

[1]The application by this Iraqi government entity was ultimately returned without action.

- inspecting officials lack technical expertise in how nuclear-related dual-use items may be diverted,
- Commerce's requests for inspections omit vital information,
- foreign service nationals conduct many inspections, and
- some inspection reports do not provide an assessment of the end user's reliability.

In addition, U.S. embassy and consulate officials may have difficulty gaining access to end-user facilities.

Embassy Officials Typically Lack Technical Expertise

Inspecting officials we interviewed said that they lacked technical expertise in how nuclear-related dual-use items could be diverted to proliferation activities and that they had not received training in how to conduct inspections for these items. They said that without such expertise and training, it is difficult for them to effectively detect potential or actual attempts to divert these items to a nuclear weapons program.

Laboratory and Defense officials said embassy officials should have some expertise on technical aspects of nuclear-related dual-use items and investigative techniques. They said suitable training should include (1) briefings on fuel-cycle technologies and the basics of weapon design, (2) trips to U.S. government nuclear laboratories and manufacturers of nuclear-related dual-use items, and (3) instruction from law enforcement and intelligence officials on how to detect and track procurement networks. They suggested that training could be provided by the national laboratories or during annual export control training seminars currently offered at posts in countries of proliferation concern.

Commerce's Request Cables Omit Vital Information

Embassy officials told us that the information provided by Commerce in its request cables is often inadequate. For example, the cables frequently do not state why the inspection is being requested, that the case is of nuclear nonproliferation concern, or what special conditions have been attached to the license. The officials indicated that without this information, inspectors cannot focus their efforts on the most critical factors in the case. Further, they cannot take into consideration the unique technical characteristics of nuclear-related dual-use items.

According to national laboratory and Defense officials, Commerce could improve the information provided to embassy officials by including the reasons for conducting the inspection and a briefing or set of questions specifically designed for each case. They suggested that a set of reference materials for use in conducting nuclear-related dual-use inspections could

be also developed. The materials, for instance, could include background information on the commodity, photographs, a description of other equipment typically found in the environment, and summaries of how the equipment could be adapted for use in a nuclear weapons program.

Foreign Service Nationals Conduct Inspections Without Supervision

At several posts, including Hong Kong, India, Pakistan, Germany, and Israel, foreign service nationals were conducting nuclear-related dual-use inspections.[2] In some cases, these individuals were unaccompanied by U.S. embassy officials. For example, at the U.S. Consulate in Hong Kong, a foreign service national has been responsible for performing, without direct supervision, all nuclear-related dual-use inspections for the past 17 years. According to U.S. officials at the U.S. Embassy in Israel, a foreign service national who was a former employee of the Israeli Foreign Service has been primarily responsible for conducting inspections. Officials said that until the beginning of 1992, this individual conducted the majority of inspections without an accompanying U.S. official.

Reliance on foreign service nationals to conduct inspections in countries of proliferation concern raises concerns about internal control weaknesses and the potential for compromise of the foreign service national by the host government. National laboratory and Defense officials stated that the use of foreign service nationals presents potential conflicts of interest and that foreign service nationals should not be allowed to draw official conclusions about the reliability of end users.

During the time we conducted our fieldwork, Commerce issued new guidance on the use of foreign service nations. The guidance recommends against allowing them to perform nuclear-related dual-use inspections. However, it leaves the decision on who should perform the inspections to the discretion of the posts.

Some Reports Fail to Provide Reliability Assessment

Embassy officials do not always report on the reliability of end users as required by Commerce. For example, some reply cables we reviewed only reported what information was gathered and recommended that headquarters officials "consider the above information, as well as any which may be available from other U.S. government agencies, in making a decision on the license application."

Embassy officials in Germany said they viewed their role as presenting information, not making judgments about reliability. National laboratory

[2]Foreign service nationals are citizens of foreign countries employed by the U.S. government to assist in overseas post operations.

and Defense officials told us that if embassy personnel receive sufficient training to conduct nuclear-related dual-use inspections, they should be able to draw conclusions on whether the end user is reliable.

Access to Some Foreign Facilities Is Difficult or Impossible

In addition to methodological weaknesses, difficulties in obtaining access to end-user facilities limit the usefulness of some inspections. Embassy officials in some countries have difficulty obtaining immediate access to foreign facilities or cannot obtain access at all because the host government is sensitive about inspections infringing on its sovereignty. India, for example, has a memorandum of understanding with the U.S. government that places limits on U.S. officials' ability to conduct inspections involving nuclear-related dual-use exports. In Germany, U.S. officials told us they are not allowed independent access to end users to conduct PSVs and must rely on the German Customs Service for these inspections. U.S. officials said they are allowed to conduct PLCs on prospective German end users.

National laboratory and Defense officials said that site visits to end-user facilities are an essential component of useful PLCs and PSVs because they allow inspecting officials to assess end-user reliability by viewing facility operations during a PLC or verifying the location and end uses of an item during a PSV. However, they pointed out that the usefulness of inspections is limited in cases where access is delayed or denied because end users engaged in proliferation activities gain time to legitimize their operations before the inspectors arrive.

Compliance With Government-to-Government End-Use Assurances Is Not Verified

For some nuclear-related dual-use licenses, the U.S. government obtains assurances from the host government that the licensed items will not be used for specified nuclear purposes or retransferred without prior U.S. government consent. According to State, Defense, and ACDA officials, the U.S. government does not systematically verify compliance with these end-use assurances because they are diplomatically negotiated agreements intended to carry the weight of an official commitment by a foreign government. Thus, it cannot be certain that the licensed exports are being used only for their intended purposes.

Objectives of Obtaining End-Use Assurances

Government-to-government end-use assurances are diplomatically negotiated agreements between the U.S. and foreign governments pledging that end users of U.S. technology will not misuse or divert sensitive items. While end-use assurances are not a guarantee against diversion, according

to a State Department official, they carry the weight of an official commitment by the foreign government and therefore provide the United States with added confidence that U.S. exports will be used as stated on the license applications.

The SNEC generally determines which export licenses should be approved on condition that the U.S. government obtain end-use assurances prohibiting specified nuclear activities.[3] According to the State and ACDA representatives to the SNEC, there are no formal criteria for determining when to seek an end-use assurance; assurances are used based on the proposed end use and end user, the risk of diversion to nuclear weapons activities, and the recipient country's nonproliferation stance.

In cases involving supercomputers, security plans may be attached to government-to-government end-use assurances designating procedures for preventing misuse of the computers. These plans preclude use of the computers in nuclear activities and may include provisions concerning such things as the use of guards, and computer usage logs and software to monitor computer programming. The restrictiveness of the security plan depends upon the country of destination, the processing speed of the supercomputer, and the type of end use.

Number of End-Use Assurances Obtained

Table 5.2 shows the number of government-to-government assurances obtained during fiscal years 1988 to 1992 that prohibited specified nuclear end uses.

Table 5.2: Government-to-Government Assurances Prohibiting Specified Nuclear End Uses by Country (Fiscal Years 1988-92)

Country	1988	1989	1990	1991	1992	Total
Argentina	2	1	0	0	0	**3**
Brazil	0	0	0	0	12	**12**
India	2	0	1	2	0	**5**
Israel	78	32	30	52	30	**222**
Kuwait	0	0	0	0	1	**1**
Pakistan	1	0	0	0	0	**1**
Saudi Arabia	0	0	0	0	1	**1**
South Africa	84	137	33	2	4	**260**
Taiwan	2	4	3	8	21	**38**
Total	**169**	**174**	**67**	**64**	**69**	**543**

Source: Department of State.

[3]ACEP and the EARB have also on occasion requested assurances.

The vast majority of these assurances were obtained for computer exports. In addition, all of the assurances for Brazil, Saudi Arabia, and Kuwait, and a small number for India, South Africa, and Taiwan, were for supercomputers and thus involved implementation of supercomputer security plans.

The assurances obtained from South Africa generally involved exports to commercial or other private sector end users not of nuclear proliferation concern. According to a State Department official, the high number of end-use assurances obtained from South Africa in 1988 and 1989 was largely due to the economic sanctions mandated by the Comprehensive Anti-Apartheid Act, which included a prohibition on nuclear cooperation; assurances from South Africa declined as these sanctions were lifted.

For Israel, the majority of nuclear assurances involved military end users. The United States obtains end-use assurances for certain exports to Israeli military end users in lieu of conducting inspections of these end users.

Compliance With End-Use Assurances Is Seldom Verified

According to U.S. officials, there is no evidence of cases where end-use assurances have been violated; however, officials also said there is no systematic effort to verify compliance with such assurances because they constitute an official commitment by a foreign government. According to State Department officials, most end-use assurances have no provisions for verifying compliance. The only exceptions are supercomputer security plans, which establish U.S. inspection rights because of the high sensitivity of the exports.

U.S. embassy officials in Israel and South Africa questioned the value of end-use assurances when they cannot be verified. According to State and ACDA officials, the only method available for verification is a PSV, but PSVs are not used for this purpose. An ACDA official said efforts to use PSVs to verify end-use assurances could have negative diplomatic consequences because the United States could be seen as not accepting the foreign government's commitment at face value.

According to State Department officials, the U.S. government has verified adherence to supercomputer security plans in only one Indian case in response to allegations of tampering. Officials said no conclusive evidence of tampering was found, but security measures were revised to address the concerns.

Conclusions

Licensing officials use the results of PLCs and PSVs to assess the reliability of end users of nuclear-related dual-use exports and to detect and prevent diversion of these commodities. However, Commerce's selection criteria are not sufficiently focused on nuclear-related dual-use licenses to ensure that the right inspections are being performed. As a result, PLCs and PSVs are selected for cases involving items of lesser proliferation concern and end users whose proliferation credentials are already established.

In addition, the methods used to conduct these inspections have limitations that reduce their usefulness. Inspectors receive insufficient training and guidance on performing nuclear-related dual-use inspections, and Commerce's requests for inspections often omit vital information. Further, some U.S. diplomatic posts rely on foreign service nationals to conduct inspections. Finally, U.S. personnel sometimes have difficulty gaining access to facilities to conduct inspections. Without access, the inspectors cannot adequately assess the end user's reliability to receive sensitive U.S. technology.

According to U.S. officials, government-to-government assurances regarding the end use of exports provide additional confidence that a foreign government will not allow the diversion of items to nuclear weapons programs. However, the U.S. government makes no effort to systematically verify compliance with these end-use assurances.

Recommendations

To enhance the effectiveness of PLCs and PSVs for nuclear-related dual-use exports, we recommend that the Secretary of Commerce, in consultation with the Secretary of Energy,

- focus selection of PLCs and PSVs by developing lists that (1) prioritize the most technically sensitive nuclear-related dual-use items and (2) identify end users whose proliferation credentials are already established,
- develop specific guidance for U.S. embassy officials on how to conduct inspections for nuclear-related dual-use items and require nuclear nonproliferation training for those conducting PLCs and PSVs,
- direct that requests for PLCs and PSVs explain why the inspection is being requested and highlight special licensing conditions, and
- eliminate U.S. reliance on foreign service nationals to perform nuclear-related dual-use PLCs and PSVs.

Nuclear Nonproliferation Special Country List (1992)

Afghanistan
Albania
Algeria
Andorra
Angola
Argentina[a]
Bahrain[a]
Brazil[a]
Burma
Chile[a]
Comoros
Djibouti
Guyana
India
Iran
Iraq
Israel
Kuwait[a]
Libya
Malawi[a]
Mauritania
Mozambique
Niger
Oman
Pakistan
Qatar[a]
Saudi Arabia[a]
South Africa[a]
St. Kitts
Syria[a]
Tanzania
United Arab Emirates
Vanuatu
Yemen Arab Republic[a]
Zambia
Zimbabwe

[a]These countries were removed from the Special Country List under interim rules published in the Federal Register on October 6, 1993.

Source: Commerce's Export Administration Regulations, supplement 4 to part 778.

Nuclear Referral List (1992)

Industrial Equipment

Arc induction furnaces
Numerical control equipment/related software
Hot isostatic presses
Dimensional inspection systems and equipment/related software
Robots
Isostatic presses/related software
Spin/flowing machines/related software
Mechanical testing power equipment
Vibration testing equipment

Materials

Fibrous and filamentary materials
Crucibles
Aluminum/titanium tubing
Maraging steel
Depleted uranium
Tantalum sheet
Tungsten (parts made of)
Sensing elements of nick
Zirconium
Nickel
Lithium
Hafnium
Beryllium
High purity bismuth-209
Calcium
Radioisotopes
Magnesium
Chlorine triflouride
Boron
Wet-proofed catalyst

Uranium Isotope Separation Equipment and Components

Filament winding machines/related software
Electrolytic cells (fluorine) UF6 production plants
Valves (UF6 resistant)/related technology
Pressure measuring equipment
Piping, fittings, valves/related software and technology
Pipes/valves/heat exchangers/related software and technology
Pumps for molten metal
Electron accelerators
Centrifuge rotor assembly equipment

	Centrifugal balancing machines/related software and technology Superconducting solenoidal electromagnets Pulse amplifiers Inverters/converters/frequency changers UF6 mass spectrometers/related software and technology Lasers
Heavy Water Production Plant Related Equipment	Phosphor-bronze mesh packings Compressors and blowers
Implosion Systems Development Equipment	Flash X-ray Multistage light gas gun Electron tubes Streak cameras, shutters Photographic equipment (specified) Electronic equipment time delay generation
Explosives and Related Equipment	Capacitators Switching devices Firing sets and HCG pulsers Detonators
Nuclear Testing Equipment and Components	High speed pulse generators Cathode ray oscilloscopes Computers Photomultiplier tubes
Other	Helium-3 Power generating systems/neutron generator equipment/related software and technology Nuclear reactor equipment/software and technology

Sources: Department of Commerce, Department of Energy.

Nuclear-Related Dual-Use Licenses for Countries on the Special Country List (Fiscal Years 1985-92)

Nuclear Referral List items	License applications	Dollar value	License approvals	Dollar value
Computers, electronic/digital, related	47,033	$32,572,549,605	41,702	$27,570,856,528
Measuring/calibrating/testing equipment	2,922	145,359,333	2,480	114,083,435
Cathode ray oscilloscopes and components	1,376	40,085,561	1,101	24,823,379
Electronic devices/components	1,167	83,943,479	965	75,496,259
Lasers/optical equipment	1,125	79,498,558	958	68,219,829
Switching equipment/signalling systems	826	505,445,220	769	462,971,776
Specially designed pressure measuring instruments	905	10,864,429	680	7,673,766
Numerical control equipment	518	126,760,703	453	112,069,437
Fibrous/filamentary materials	462	91,254,425	389	79,560,930
Electron tubes and specially designed components	303	24,818,902	262	15,450,951
Photographic equipment (specified)	166	3,085,675	149	2,700,841
Zirconium/nickel/lithium/hafnium/ beryllium	177	12,950,463	135	7,264,977
Switching devices/ triggered spark gaps/thyratrons	198	5,277,560	133	4,444,828
Telecommunication transmission equipment/systems	117	10,557,224	108	10,466,803
Photosensitive components	90	2,240,853	82	2,219,123
Thermoelectric materials/devices	94	10,464,853	81	6,382,997
Streak cameras, shutters	75	2,241,703	53	1,293,259
Sensing elements, corrosion-resistant	92	5,008,841	53	1,103,321
Boron metal/ compounds/mixtures	46	636,985	44	610,991
Photomultiplier tubes	56	260,407	43	211,970
Measuring equipment, precision linear/angular	50	7,556,139	42	7,009,484
Valves/neutron generator/power generating systems	54	26,473,214	42	24,182,744
Numerically controlled machines, components/parts for	53	2,912,476	41	2,629,168
Inverters/converters/frequency changers/generators	53	827,315	41	689,224
Nuclear reactor/nuclear power plant-related equipment	61	27,550,664	26	1,324,321
Cryogenic equipment/materials	31	1,211,890	24	889,527
Software for UF6 mass spectrometers	25	170,478	22	157,633
Vibration testing equipment (specified)	39	10,624,012	21	4,480,022
Mass spectrometers	26	1,208,266	21	999,871
Piping/fittings/valves made/lined with alloys	23	708,935	20	706,709
Electronic equipment for time delay generation	22	296,204	20	287,579
Vacuum/controlled environment furnaces	28	1,685,058	13	792,095
Pipes/valves/fittings/heat exchangers	18	577,032	13	482,249
Flatbed microdensitometers	14	736,001	12	727,801

(continued)

Nuclear Referral List items	License applications	Dollar value	License approvals	Dollar value
Presses and specialized controls/accessories	18	3,777,418	10	2,401,171
Helium, enriched in isotope 3	16	160,975	10	116,350
Machines for turning optical-quality surfaces	12	3,279,165	8	1,821,973
Pumps (specified)	12	566,478	7	390,368
Accelerator-produced/naturally occurring radioisotopes	13	461,865	7	130,686
Systolic array/neural/optical computers	9	41,025,899	7	15,025,899
Numerically controlled machine tools	6	715,701	6	715,701
Electric arc devices	6	1,754,254	5	254,254
Magnesium containing impurities other than calcium	7	16,315	5	115
Filament winding machines	10	2,192,800	4	405,605
Capacitors (specified)	7	176,862	3	160,804
Accelerators, particle (specified)	3	2,057,840	3	2,057,840
Technology for UF6 mass spectrometers	4	11,700	3	11,700
Tubes/pipe/fittings, pressure (specified)	5	633,794	2	26,556
Cylindrical disks	2	504,000	2	504,000
Spin and flow forming machines	2	640,000	2	640,000
Isostatic presses	2	1,060,102	1	229,836
Software for numerical control equipment	1	28,410	1	28,410
Pulse amplifiers	1	8,473	1	8,473
Uranium, depleted (specified)	1	33,750	1	33,750
Tantalum sheet with at least 20-centimeter diameter	1	3,024	1	3,024
Chlorine triflouride	2	10,450	1	2,800
Compressors and blowers	1	3,855	1	3,855
Centrifugal balancing machines	1	70,426	1	70,426
Maraging steel	1	2,511	1	2,511
Technology for nuclear reactors	1	200	0	0
Vibration test equipment	1	14,500	0	0
Tungsten (parts made of)	1	48,600	0	0
Electron accelerators	1	125,000	0	0
NRL items subtotal	**58,392**	**33,875,226,830**	**51,091**	**28,638,309,934**
Non-NRL items subtotal	**4,620**	**576,213,887**	**3,771**	**408,580,878**
Total	**63,012**	**$34,451,440,717**	**54,862**	**$29,046,890,812**

Source: Department of Commerce.

Nuclear-Related Dual-Use Licenses for Sensitive End Users in Eight Countries (Fiscal Years 1988-92)

Table IV.1: Licenses for Sensitive End Users in Argentina

Nuclear Referral List items	License applications	Dollar value	License approvals	Dollar value
Computers, electronic/digital, related	23	$10,293,107	20	$9,393,007
Measuring/calibrating/testing equipment	7	120,595	6	97,055
Nuclear reactor/nuclear power plant-related equipment	4	471,270	2	42,212
Cathode ray oscilloscopes and components	3	75,869	2	67,468
Lasers/optical equipment	1	704	1	704
Boron metal/compounds/mixtures	1	4,231	1	4,231
Zirconium/nickel/lithium/hafnium/beryllium	2	6,966,980	1	3,020,330
Switching devices/triggered spark gaps/thyratrons	1	3,229	1	3,229
Electron tubes and specially designed components	1	6,000	1	6,000
Specially designed pressure measuring instruments	1	2,600	0	0
NRL items subtotal	**44**	**17,944,585**	**35**	**12,634,236**
Non-NRL items subtotal	**6**	**322,344**	**4**	**278,900**
Total	**50**	**$18,226,929**	**39**	**$12,913,136**

Sources: Department of Commerce, Department of Energy.

Table IV.2: Licenses for Sensitive End Users in Brazil

Nuclear Referral List items	License applications	Dollar value	License approvals	Dollar value
Computers, electronic/digital, related	206	$112,563,407	167	$86,469,235
Measuring/calibrating/testing equipment	55	2,186,770	49	1,958,201
Cathode ray oscilloscopes and components	33	607,575	25	505,769
Electronic devices/components	12	71,925	10	56,709
Fibrous/filamentary materials	7	16,011,289	5	15,999,000
Lasers/optical equipment	5	181,376	4	110,734
Specially designed pressure measuring instruments	5	10,645	4	7,835
Switching equipment/signalling systems	3	475,131	3	475,131
Numerically controlled machines, components/parts for	2	279,412	2	279,412
Photomultiplier tubes	2	3,281	2	3,281
Photographic equipment (specified)	3	9,098	2	4,464
Telecommunication transmission equipment/systems	2	25,625	2	25,625
Numerical control equipment	2	13,983	1	3,081
Machines for turning optical-quality surfaces	1	655,650	1	655,650
Thermoelectric materials/devices	1	420	1	420
Vacuum/controlled environment furnaces	2	27,340	1	5,215
Cryogenic equipment/materials	1	21,845	1	21,845
Accelerators, particle (specified)	1	2,020,200	1	2,020,200
Helium, enriched in isotope 3	1	33,690	1	33,690
Switching devices/triggered spark gaps/thyratrons	5	18,299	1	3,540
Vibration testing equipment (specified)	1	149,734	0	0
Streak cameras, shutters	2	2,363	0	0
NRL items subtotal	**352**	**135,369,058**	**283**	**108,639,037**
Non-NRL items subtotal	**49**	**2,698,089**	**39**	**1,297,059**
Total	**401**	**$138,067,147**	**322**	**$109,936,196**

Sources: Department of Commerce, Department of Energy.

Table IV.3: Licenses for Sensitive End Users in India

Nuclear Referral List items	License applications	Dollar value	License approvals	Dollar value
Computers, electronic/digital, related	92	$30,803,597	65	$15,550,916
Specially designed pressure measuring instruments	20	144,942	14	107,467
Photosensitive components	9	376,079	8	141,079
Lasers/optical equipment	8	167,580	7	165,588
Zirconium/nickel/lithium/hafnium/beryllium	5	11,781	5	11,781
Boron metal/compounds/mixtures	4	15,353	4	15,353
Electronic devices/components	4	15,610	3	6,910
Measuring/calibrating/testing equipment	5	87,042	3	66,305
Switching devices/triggered spark gaps/thyratrons	7	22,163	3	12,834
Cathode ray oscilloscopes and components	3	43,657	3	43,657
Numerical control equipment	2	1,681,500	2	1,681,500
Photomultiplier tubes	1	3,376	1	3,376
Thermoelectric materials/devices	2	406	1	203
Cryogenic equipment/materials	2	39,958	1	24,790
Pipes/valves/fittings/heat exchangers	1	113,640	1	113,640
Telecommunication transmission equipment/systems	2	104,590	1	102,760
Electron tubes and specially designed components	2	86,012	1	46,722
Dimensional inspection systems or devices	1	768	0	0
Nuclear reactor/nuclear power plant-related equipment	4	365,124	0	0
NRL items subtotal	**174**	**34,083,178**	**123**	**18,094,881**
Non-NRL items subtotal	**143**	**7,617,868**	**79**	**1,681,918**
Total	**317**	**$41,701,046**	**202**	**$19,776,799**

Sources: Department of Commerce, Department of Energy.

Table IV.4: Licenses for Sensitive End Users in Iran

Nuclear Referral List items	License applications	Dollar value	License approvals	Dollar value
Computers, electronic/digital, related	11	$2,747,810	5	$928,100
Lasers/optical equipment	1	194,682	0	0
Boron metal/compounds/mixtures	1	15,210	0	0
Vacuum/controlled environment furnaces	1	61,120	0	0
Cathode ray oscilloscopes and components	1	120,415	0	0
NRL items subtotal	**15**	**3,139,237**	**5**	**928,100**
Non-NRL items subtotal	**6**	**57,986**	**0**	**0**
Total	**21**	**$3,197,223**	**5**	**$928,100**

Sources: Department of Commerce, Department of Energy.

Table IV.5: Licenses for Sensitive End Users in Iraq

Nuclear Referral List items	License applications	Dollar value	License approvals	Dollar value
Computers, electronic/digital, related	54	$23,187,634	23	$3,205,325
Lasers/optical equipment	3	582,602	2	52,602
Numerical control equipment	6	5,527,161	1	888,000
Measuring/calibrating/testing equipment	4	18,923	1	7,375
Electronic devices/components	2	90,772	0	0
Thermoelectric materials/devices	1	8,856	0	0
Cathode ray oscilloscopes and components	1	6,585	0	0
Telecommunication transmission equipment/systems	1	52,480	0	0
NRL items subtotal	**72**	**29,475,013**	**27**	**4,153,302**
Non-NRL items subtotal	**17**	**169,663**	**4**	**10,066**
Total	**89**	**$29,644,676**	**31**	**4,163,368**

Sources: Department of Commerce, Department of Energy.

Table IV.6: Licenses for Sensitive End Users in Israel

Nuclear Referral List items	License applications	Dollar value	License approvals	Dollar value
Computers, electronic/digital, related	618	$234,373,453	518	$168,352,727
Fibrous/filamentary materials	73	11,269,921	72	11,269,921
Cathode ray oscilloscopes and components	49	1,214,747	41	1,127,033
Lasers/optical equipment	42	1,401,797	35	1,201,728
Specially designed pressure measuring instruments	34	570,403	29	507,870
Electronic devices/components	28	742,986	18	697,892
Measuring/calibrating/testing equipment	17	194,444	17	194,444
Switching devices/triggered spark gaps/thyratrons	16	218,631	9	118,117
Telecommunication transmission equipment/systems	6	359,239	6	359,239
Photosensitive components	5	46,321	5	46,321
Numerical control equipment	3	126,268	3	126,268
Vibration testing equipment (specified)	3	234,088	2	171,088
Streak cameras, shutters	2	243,300	2	243,300
Flatbed microdensitometers	1	37,000	1	37,000
Thermoelectric materials/devices	2	532	1	352
Cryogenic equipment/materials	2	245,642	1	3,930
Piping/fittings/valves made/lined with named alloys	2	904	1	896
Zirconium/nickel/lithium/hafnium/beryllium	6	92,412	1	1,730
Inverters/converters/frequency changers/generators	2	21,228	1	20,500
Cylindrical disks	1	216,000	1	216,000
Electron tubes and specially designed components	1	14,000	1	14,000
Filament winding machines	1	190,000	0	0
Capacitors (specified)	3	9,848	0	0
Nuclear reactor/nuclear power plant-related equipment	2	7,433	0	0
Sensing elements, corrosion-resistant	1	1,410	0	0
Helium, enriched in isotope 3	1	1,225	0	0
NRL items subtotal	**921**	**251,833,232**	**765**	**184,710,356**
Non-NRL items subtotal	**154**	**9,433,674**	**115**	**8,662,671**
Total	**1,075**	**$261,266,906**	**880**	**$193,373,027**

Sources: Department of Commerce, Department of Energy.

Table IV.7: Licenses for Sensitive End Users in Pakistan

Nuclear Referral List items	License applications	Dollar value	License approvals	Dollar value
Numerical control equipment	1	$1,476,808	1	$1,476,808
Computers, electronic/digital, related	4	916,906	1	635,690
Cathode ray oscilloscopes and components	2	34,479	1	14,479
Measuring/calibrating/testing equipment	1	8,345	0	0
NRL items subtotal	**8**	**2,436,538**	**3**	**2,126,977**
Non-NRL items subtotal	**1**	**1,854**	**0**	**0**
Total	**9**	**$2,438,392**	**3**	**$2,126,977**

Sources: Department of Commerce, Department of Energy.

Table IV.8: Licenses for Sensitive End Users in South Africa

Nuclear Referral List items	License applications	Dollar value	License approvals	Dollar value
Computers, electronic/digital, related	16	$8,060,243	15	$6,420,463
Lasers/optical equipment	7	11,996	5	9,506
Measuring/calibrating/testing equipment	3	88,955	2	59,349
Photosensitive components	2	3,550	2	3,550
Presses and specialized controls/accessories	1	266,666	1	266,666
Electron tubes and specially designed components	1	33,200	1	33,200
Vacuum/controlled environment furnaces	1	381,320	0	0
NRL items subtotal	**31**	**8,845,930**	**26**	**6,792,734**
Non-NRL items subtotal	**0**	**0**	**0**	**0**
Total	**31**	**$8,845,930**	**26**	**$6,792,734**

Sources: Department of Commerce, Department of Energy.

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