

## Departments of Defense and State



*Report to Congress*  
**Section 1248 of the National Defense Authorization Act for Fiscal  
Year 2010 (Public Law 111 - 84)**

**RISK ASSESSMENT OF UNITED STATES  
SPACE EXPORT CONTROL POLICY**

Preparation of this report/study cost the Department of Defense a total of approximately \$876,000 in Fiscal Years 2010 - 2012.

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**Departments of Defense and State**  
***Final Report to Congress***  
**Section 1248 of the National Defense Authorization Act for Fiscal Year 2010**  
**(Public Law 111 - 84)**

***Executive Summary***

Section 1248 of the National Defense Authorization Act of Fiscal Year 2010 (Public Law 111-84) provides that the Secretaries of Defense and State shall carry out an assessment of the risks associated with removing satellites and related components from the United States Munitions List (USML). The Departments of Defense (DoD) and State (DoS) conducted this review and identified two satellite types, and related items, that are not purely defense-related and thus should not be designated as defense articles on the USML or controlled under the International Traffic In Arms Regulations (ITAR) administered by DoS. These satellites and related items do not contain technologies unique to the United States (U.S.) military industrial base nor are they critical to national security. In particular, the Departments believe the following items are more appropriately designated as dual-use items on the Commerce Control List (CCL) and controlled under the Export Administration Regulations (EAR):

- Communications satellites (COMSATs) that do not contain classified components;
- Remote sensing satellites with performance parameters below certain thresholds; and
- Systems, subsystems, parts and components associated with these satellites and with performance parameters below thresholds specified for items remaining on the USML.

The assessment examined the risks associated with removing from the USML those above-referenced dual-use items. The United States and other space-faring nations have satellites far more capable than those identified above as dual-use; however, those dual-use satellites and related items, including technology, can be used by countries with less experience and expertise in space to generate basic, initial military communications, remote sensing assets, and satellite jamming capabilities. It found that even though these items were available from other non-U.S. sources and not critical to preserving U.S. military edge, they could provide to a nation, with less space expertise than the United States, functionality that could potentially reduce or hinder U.S. military activities, operations, plans, or strategies.

Hence, the Departments agreed as long as the CCL includes adequate protections that the transfer of items from the USML would not contribute to the improvement of foreign military capabilities that could harm regional and international security and stability, and would not be diverted to support such capabilities. The Departments determined that the identified risks can be mitigated by transferring jurisdiction over their export licensing to the CCL. The CCL controls provide appropriate visibility into where and by whom the dual-use space components are being used, thus protecting national security by ensuring that foreign space assets containing U.S. components are not used against the United States.

The Departments used the flexibility of the CCL to design a set of controls that mitigates the risks associated with transfers of satellites and related items to countries that may use these items

counter to U.S. interests. The agreed-upon set also relaxes controls on our allies and partners while maintaining controls as agreed upon in multilateral trade control arrangements. However, Public Law (P.L.) 105-261, the Strom Thurmond National Defense Authorization Act (NDAA) for Fiscal Year 1999, Section 1513, removed the President's authority to change the jurisdictional status of satellites and related items. Rather, the law *requires* that the United States treat space-related items differently than other controlled technologies.

Space-related items, even if they have civilian applications, are the only dual-use items that are *required by law* to be controlled as defense articles. For all other items that warrant export controls, the President has, consistent with Arms Export Control Act, the authority to determine whether the controls of the ITAR, administered by the State Department, or of the EAR, administered by the Commerce Department, should govern. Moreover, for all items other than satellite-related items, the President has the authority to authorize the easing of controls on items and related technologies that transition to predominately civil uses or that become widely available. Other countries apply strict controls on export of space-related items for military applications and apply fewer controls to items supporting commercial space ventures. Current law forces the U.S. Government to continue to protect commonly available satellites and related items on the USML, thus impeding the U.S. ability to work with partners and putting U.S. manufacturers at a disadvantage, but providing no noticeable benefit to national security.

The Departments' review also confirmed the continued need for other space-related items to remain on the USML because they and related services contain critical components and technologies – along with the implicit expertise to create and use them – that provide the United States with a military or intelligence advantage in space. These items include:

- Satellites that perform a purely military or intelligence mission;
- Remote sensing satellites with high performance parameters;
- Systems, subsystems, parts and components unique to the above satellite types and not common to dual-use satellites; and
- Services in support of foreign launch operations for USML and CCL designated satellites.

P.L. 105-261, Section 1514, requires that the U.S. Government monitor and review technical exchanges between U.S. and foreign engineers that involve launch of a U.S. satellite by a foreign company. Such U.S. Government monitoring is referred to as "Special Export Controls" (SECs). The U.S. Government must perform, and U.S. industry must fund, SECs for all activities related to the export of a satellite for launch in a foreign country, unless it is a member of the North Atlantic Treaty Organization (NATO) or a major non-NATO ally of the United States.

Some of the launch activities that currently require monitoring present a very low risk to national security, such as transport of a satellite to the foreign launch site, return of test equipment to the United States, and review of technical documents whose content and format are contractually required and previously approved by the U.S. Government, but P.L. 105-261 does not cover higher risk activities, including launch vehicle development conducted in partnership with a foreign company or launch from NATO countries that use Russian launch vehicles and technical personnel. However, ITAR Section 124.15(c) allows the U.S. Government the discretion to

apply SECs to any USML licensed activity "in furtherance of the security and foreign policy of the United States." The two authorities differ regarding whether to implement and who pays for the SECs. P.L. 105-261 requires that the U.S. Government monitor and the U.S. satellite manufacturer provide physical security in Russia for a table specially manufactured to hold the satellite *after the satellite has been moved and attached to the launch vehicle*, but does not require monitoring of technical discussions or data exchanges between U.S. and Russian launch vehicle engineers on how to modify a Russian engine for use on a new U.S. commercial launch vehicle. To apply SECs to the higher risk activities where not required by law to do so, DoD must invoke its discretionary authority and cannot seek industry reimbursement. The review thus concluded that DoD should be authorized greater flexibility to apply SECs in response to the actual risk, and be provided the authority to seek appropriate reimbursement from industry.

For the sake of national and economic security, the Departments recommend that authority to determine the appropriate export control status of satellites and space-related items be returned to the President. Specifically:

- The President should be authorized to determine the export control jurisdiction status of satellites and related items; and
- The Department of Defense should be authorized to determine the need to apply special export controls to U.S. companies providing technical services in support of foreign satellite or launch vehicle development and associated launch operations, and to be reimbursed as appropriate.

The Departments have provided as appendices to this report the Administration's current drafts of the regulatory text illustrating how the current controls would change if the President is given authority to change the export control jurisdiction of spacecraft and related items. **Appendix 1** provides a draft rewritten USML Category XV for spacecraft and related items that identifies items and services that should continue to be controlled on the USML. The methodology used to create the draft Category XV is the "Bright Line" methodology used to rewrite other USML categories, and the process would be used for future updates to Category XV if the recommended authority was returned to the President. **Appendix 2** provides a draft of the associated CCL regulations for items that could be transferred to the CCL. Changes to existing regulations could only be implemented following the enactment of legislation that removes current restrictions on Presidential authority, publication of both draft texts as proposed rules for public notice and comment, and appropriate notifications to Congress.

In summary, the Departments agree that maintaining non-critical satellites and related components on the USML and monitoring low-risk launch activities provide limited national security benefits. Moreover, this practice places the U.S. space industrial base at a distinct competitive disadvantage when bidding against companies from other advanced satellite-exporting countries that have less stringent export control policies and practices. Transferring select items from the USML to the CCL would allow for controls consistent with other technologies and would help enhance the competitiveness of the U.S. space industrial base, while continuing to protect U.S. national security needs. It would also provide the flexibility needed to apply U.S. export control personnel and resources to higher priority issues, increasing protection of those items that do provide the United States with significant military or intelligence advantages.

## ***Findings***

***1. Compared to the United States, other nations have fewer controls on commercial space and space-related items.*** Currently, most other space-faring countries control the export of satellites and specific items associated with satellites, including underlying technologies. Each country controls military satellites based on the sensitivity of the technology, capability, and their own unique foreign policy and national security imperatives. But none of the other space-faring countries control all parts, components, accessories, or attachments that were in any way modified for use with a commercial satellite. The United States is the only country that controls reexport of foreign-origin satellites containing U.S.-origin satellite-related items. Some countries allow their items to be incorporated into a third party satellite and then reexported without further restrictions.

The U.S. Government, however, continues to apply strict control, even in instances when the technology is available from non-U.S. suppliers on whom no such restrictions are in place. Commercial communications and imaging satellites and related equipment, for example, are considered dual-use items by Wassenaar Arrangement (WA) Participating States and are exported with fewer restrictions than those imposed by the U.S. Government. The United States is the only space-faring nation that controls all commercial satellites and related items, including technology, as munitions items.

The U.S. Government's control of commercial satellites and related items as munitions items is not effective in protecting U.S. national security because some dual-use satellites and related technologies equivalent to those originating in the United States are available from non-U.S. providers. Countries can often times obtain similar levels of technology from other countries with export policies that differ from the United States. Allied countries and those that are not of concern to the United States can also obtain items of similar capability from non-U.S. providers – and without the significant degree of collateral, extra-territorial controls that the United States imposes on such items as a result of the current law. Applying more stringent export control policies and practices than are imposed by other advanced satellite-exporting countries places the U.S. satellite industry at a distinct, competitive disadvantage that undermines the U.S. space industrial base to the detriment of U.S. national security, while doing nothing to protect the technological advances that are critical to giving our war fighters the advantages that U.S. technology can afford them.

***2. Over the last 15 years, a substantial number of commercial satellite systems, subsystems, components, and related technologies have become less critical to national security. During that time, other countries have become more proficient in space technologies.*** The interim Section 1248 report of May 2011 provided an initial assessment of these exports. The results and recommendations provided herein expand upon and supersede those of the earlier interim report. The original assessment was a conservative starting point and identified a limited number of items no longer critical to national security. This final report includes a more comprehensive assessment of United States Munitions List (USML) Category XV Spacecraft Systems and Associated Equipment. The methodology used to assess Category XV is the same as that used in the Administration's Export Control Reform effort to rewrite other USML categories. The same process would be used for future updates if the authority to determine the export control

jurisdictional status of satellites and related items was returned to the President. The methodology results in controls focused on critical technologies and items, the proliferation of which could pose a significant national security threat.

The USML defines the articles and services the President has identified to be specifically designed, adapted, or modified for military use, that have no predominant civil application. The identified items are designated as “defense articles” or “defense services” on the USML, and their export is controlled by the strict rules of the International Traffic in Arms Regulations (ITAR) and administered by the Department of State (DoS). Items that can be used in both military and commercial applications are, by definition, dual-use, and should not be on the USML. Nevertheless, all satellites and related items, including technology, have required since more than a decade ago by Public Law (P.L.) 105-261, the Strom Thurmond National Defense Authorization Act (NDAA) for Fiscal Year 1999, Section 1513, to be placed on the USML. Since that time, many items have moved from military use to predominantly civil uses. Direct broadcast television, satellite communications, and earth mapping are prime examples.

The review determined that the following items do not contain technologies unique to military applications or critical for maintaining a military edge:

- Communications satellites (COMSATs) that do not contain classified components;
- Remote sensing satellites with performance parameters below (worse than) thresholds identified in Appendix 1 paragraphs (a)(7)(i) – (iv); and
- Systems, subsystems, parts and components associated with these satellites and with performance parameters below thresholds specified for items remaining on the USML.

The above items no longer meet the definition of a defense article. However, they can provide important military functionality. Although the United States and other space-faring nations have technologies and satellites far more capable than the items identified above, those dual-use technologies can be used by countries with less experience and expertise in space to generate basic, initial military communications, remote sensing assets, and satellite jamming capabilities.

The controls typically applied to dual-use items on the Commerce Control List (CCL) are sufficient to safeguard and monitor the export of the identified items. The export control provisions of the Export Administration Regulations (EAR) are intended to serve the national security, foreign policy, non-proliferation, and short-supply interests of the United States, and, in some cases, to carry out its international obligations. The EAR contains controls to restrict access to dual-use items by countries or persons that might apply such items to uses inimical to U.S. interests, e.g., controls to stem the proliferation of weapons of mass destruction or to limit the military and anti-terrorism support capability of certain countries. The effectiveness of many of the controls under the EAR is enhanced by their being maintained as part of multilateral control arrangements, such as the Nuclear Suppliers Group, the Australia Group, and the Missile Technology Control Regime. The EAR also includes controls that protect the United States from the adverse impact of the unrestricted export of commodities in short supply.

The items identified for transfer from the USML are dual-use items. They should be designated as such, included in the CCL, and controlled under the EAR. The EAR provides for flexible controls that can be applied or removed as technology becomes readily available on the global

market and transitions away from predominantly military uses to commercial purposes. It also can protect national security interests through licensing policies dedicated to certain countries or regions known to pursue technology for purposes that run contrary to the interests of the United States and its partners.

**Appendix 1** provides a draft USML Category XV for spacecraft and related items that identifies items and services that should continue to be controlled on the USML. **Appendix 2** provides a draft of the associated CCL regulations for items that could be transferred to the CCL. **Appendix 3** provides an abbreviated description of the Administration’s “Bright Line” USML re-write process used to assess satellites and related items for this report. Changes to existing regulations could only be implemented following the enactment of legislation that removes current restrictions on Presidential authority, publication of both draft texts as proposed rules for public notice and comment, and appropriate notifications to Congress.

***3. Without appropriate export controls on the CCL, removing space-related items identified in Finding #2 from the USML could significantly improve the military potential of another country.*** Space assets provide important military and intelligence capabilities ranging from strategic intelligence collection to improved tactical communications. Access to space is expensive, and nations strive to maximize access to space assets while minimizing costs. Thus, nations without established space capabilities seek to improve their indigenous assets by procuring commercial satellite services e.g., communications and imaging, operational satellite systems, or the parts and components needed to produce and launch a satellite. If they can succeed in acquiring the necessary and sufficient technology and expertise, it could translate into a significant enhancement of that nation’s military.

The satellites and related items identified in Finding #2 provide the initial, basic military functionality and can serve as the stepping stones to more advanced military space assets and operations. Therefore, the United States needs to retain control over and insight into the end-user and end-use of U.S. satellites and related items removed from the USML. However, many of the items identified are available from foreign suppliers. Because of the foreign availability, there is no benefit to U.S. national security from controls more stringent than those of the global community. In fact, stringent controls on exports are harmful because they will not stop development of foreign, and possibly adversarial, space assets. In addition, the global market’s reaction to strict export controls is that U.S. parts and components will not be bought, which in turn reduces U.S. insight into what space capabilities a country is pursuing. U.S. national security interests are best served by implementing controls similar to that of other nations with advanced space capabilities, and in the case of satellites and related items identified in Finding #2, “similar” controls are those of the CCL.

***4. Export of space-related items to our allies and closest partners presents a low risk to national security and should be subject to fewer restrictions than exports to other countries.*** Certain North Atlantic Treaty Organization (NATO) allies and other close partners are among the top-tier satellite and space-faring nations. Some western European countries have space-related design, manufacturing, and operational capabilities closest to that of the United States, and it is unlikely that exports of U.S.-origin satellites and related items, including technology, to these countries would result in harm to U.S. national security objectives. Moreover, there is a

likelihood that any improvement in their military capabilities would serve to enhance and strengthen our strategic partnership, and the Departments judge that these potential benefits outweigh the low risks associated with export.

NATO Allies and other partners present an unparalleled opportunity for international cooperation in space. France and Italy recently signed agreements to develop the Athena-Fidus telecommunications satellite systems that will share payloads and provide communications services for the governments of both nations as well as NATO Allies. Recently, Europe's Arianespace carried the first *commercially* hosted payload for the U.S. Air Force into geostationary transfer orbit. European nations are in discussions with the U.S. Government on possible cooperation in space exploration and space science.

Direct transfer to our allies and partners of the satellites and related items identified in Finding #2 presents low risk to national security and serves to advance U.S. interests. Continuing to enforce the current regulatory requirements associated with munitions controls on our partners for these satellites and related items places an unneeded administrative burden on transfers that the United States will ultimately approve. To give a sense of scale, considering all types of satellites and their associated parts and components, in 2011, DoD reviewed 1,935 licenses involving USML controlled satellite-related parts and components going to the 36 countries identified as "Strategic Partners" for CCL export control purposes. DoD approved 95.7% of these licenses with no additional provisos or restrictions, another 4% were approved with some additional provisos, and a mere 0.3% were denied or returned without action due to insufficient information. Under the CCL, many of these transfers could occur without obtaining a license at all. Neither U.S. regulators nor the U.S. space industrial base should expend personnel, time, or funding when there is no benefit gained or harm avoided. The more flexible controls of the CCL would promote this important cooperation while maintaining sensible controls given the level of foreign availability, trust we place in our partners, and the assessed impact of unauthorized transfer.

***5. The United States should maintain strict controls on transfers of non-critical space-related items to end-users and for end-uses that are likely to be used against the U.S. national interests.*** The Departments are aware that some countries are pursuing advanced missile and space-related technologies for use against U.S. national interests. These countries aggressively seek and exploit technology from the United States and other technologically advanced nations. Uncontrolled technology transfer has the potential to benefit their military modernization, research and development (R&D), and industrial capability beyond what they could achieve if these items were controlled on the CCL and at a commensurate level for foreign suppliers. The potentially harmful outcomes of transferring the identified satellites and related items include reverse engineering and gaining knowledge that enhances the military industrial base or improves the performance of a country's entire space system. For example, China implements active and effective technology acquisition techniques that target U.S. space-related technologies and, therefore, warrants special scrutiny. A detailed discussion of the People's Republic of China's (PRC) space-related strategic goals, capabilities, and methods for acquiring technology is provided in **Appendix 4**.

Countries do not need a direct transfer of a satellite or related item to derive benefit for their military capabilities. Valuable expertise is gained through interactions with technical personnel



supporting launch preparation, operations, or failure analyses of a U.S.-manufactured satellite or a foreign satellite containing U.S. origin items. Information on the design, manufacture, and performance of U.S. technology may be transferred during discussions or data exchanges on spacecraft-to-launch vehicle interfaces, characteristics of the spacecraft once attached to the launch vehicle and in-flight, launch failure analyses, or satellite anomaly analyses. This type of expert information or “know how” directly from U.S. or partner countries’ engineers on technologies or items for which the receiving countries have not developed an indigenous capability will assist them more than reverse engineering an item that they physically control.

The Departments agree that where there is a high likelihood of diversion to military purposes, proliferation of missile technology, or a reduction in the effectiveness of U.S. foreign policies, transfers of dual-use satellites and related items, including technology and “know how,” should be strictly controlled.

Transferring satellites and related items to the CCL could make these items eligible for export or re-export to embargoed countries. Section 902 of the Foreign Relations Authorization Act, Fiscal Years 1990 and 1991 (P.L.101-246; 22 U.S.C. 2151 note), commonly known as the Tiananmen Square Sanctions, currently prohibit the launch of any U.S. manufactured satellite by a launch vehicle owned by the PRC without a Presidential waiver, and prohibit transfer of any munitions item. Tiananmen Square Sanctions will prohibit CCL satellites from being launched in China. However, the sanctions do not prohibit dual-use items from being incorporated into a foreign-built satellite that is launched in the PRC or transferred directly to the PRC. For example, Tiananmen Square Sanctions would not prohibit transfer to China of a dual-use satellite already on orbit, nor could they be used to stop a transfer of a U.S. satellite to China for environmental testing so long as the launch is from some country other than China. Also, the satellite-related parts and components transferred to the CCL would no longer be considered munitions items, so they could be eligible for export to China. The same applies for any embargo that restricts the transfer of items based on their designation as munitions.

The Departments therefore recommend that the CCL adhere to broader U.S. nonproliferation policies and prohibit approval of licenses for the transfer of dual-use satellites and related items, including technology, for incorporation into satellites destined for Chinese launches until China brings its missile proliferation activities under control as it previously committed to do. It follows that for the same reasons of broader U.S. foreign policy, we recommend CCL licensing policies prohibit transfers to any embargoed country.

Some may argue that countries without embargoes or sanctions can present the same risks of diversion to military use or proliferation of missile technology and should be subject to similar prohibitions on transfers. For example, Russian commercial and military space industries are closely aligned, and likelihood of diversion from commercial to military purpose is a concern. Russia pursues space “defense” as a strategic priority. Therefore, the United States carefully reviews any export request for satellites and related items to Russia to ensure there is no harm to national security and believes it is important to continue to apply special export controls (see Finding #7) on launches of U.S. satellites by Russian launch platforms.

Such scrutiny to be able to address national security, regional security, and missile technology proliferation issues can and should continue under the CCL. However, Russia has an established history of manned space flight, space lift operations, and intercontinental ballistic missile capabilities. The United States relies on Russian launch vehicles to provide transportation to the International Space Station. Russia operates a large network of space surveillance sensors, second only in size to the U.S. space surveillance network. For commercial launch, Russia's facilities and services are established, insurable, and on par with western commercial launch providers. A blanket prohibition on dual-use transfers to Russia would not serve U.S. national security interests better than the recommended CCL security reviews to address national security, regional security, and missile proliferation issues, but would deny potential international cooperation efforts relating to space.

Since the United States is not the sole provider of space technologies, the U.S. Government cannot successfully prevent access to space-related technologies by countries of concern. There is an increasing number of nations that produce the equivalent or near-equivalent of U.S. space technologies. Wherever possible, the United States works with multilateral regimes and partner countries to ensure adequate controls over transfers of sensitive space and missile-related technologies. The Departments support continuing stringent controls on countries with which the United States maintains an arms embargo or otherwise prohibits exports or sales under ITAR Section 126.1. We believe that the proposed revisions to the control texts in Appendices 1 and 2, and the changes in control policy that would come with their publication as final rules, accomplish both objectives.

***6. If authorized by the Congress, the risks due to removing space-related dual-use items from the USML could be acceptably managed through controls and licensing policies under the CCL.*** The CCL and its associated regulations, the EAR, provide the controls needed for dual-use and other technologies. CCL controls offer the flexibility to restrict transfer for a number of reasons, such as national security or anti-terrorism, and at the same time, provide U.S. industry consistent, transparent processes and policies so it can more effectively compete in a global environment. Foreign manufacturers have been hesitant to use U.S. suppliers when the U.S. supplier cannot guarantee re-export of its item will be allowed by the U.S. Government. In fact, the uncertainty of obtaining a USML license has encouraged other countries to pursue development of "ITAR-free" satellites that remove U.S. suppliers altogether. If the dual-use satellites and related items identified above are transferred to the CCL, U.S. suppliers would be able to take advantage of CCL provisions that allow for, in certain circumstances, re-export without obtaining an additional license from the U.S. Government.

The Departments of State, Defense, and Commerce have agreed on a specific set of controls that would be used for satellite and related items transferred to the CCL. The Departments have agreed that space-related items moved from the USML would require a license for all countries, with certain exceptions. First, exports to Canada would not need a license, because it is exempt, by law, from the EAR licensing requirement for dual-use items. For our NATO Allies and multi-regime partners, the new EAR license exception, Strategic Trade Authorization (STA), *eliminates* the license requirement for transfers to or among the 36<sup>1</sup> countries specifically

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<sup>1</sup> Argentina, Australia, Austria, Belgium, Bulgaria, Canada, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Latvia, Lithuania, Luxembourg, Netherlands,

designated for the exception. However, a license would be required from the U.S. Government if the item is to be retransferred outside the 36 countries. The CCL starts with a presumption of approval for transfers to all countries. However, in order to address the risks identified in Finding #5 that are associated with embargoed countries, the Departments agreed that there would be a policy of presumptive *denial* for export or re-export of space-related items to any country prohibited to receive munitions exports under the ITAR, Section 126.1, including countries such as China, Iran, North Korea, and others.

A major difference between the controls placed on USML and CCL items is that a USML item requires an additional license for re-export, even when incorporated into a foreign, dual-use, or commercial item. Under the CCL, U.S. dual-use satellite components incorporated into a foreign satellite can be re-exported without first obtaining an additional license from the U.S. Government. The CCL's "de minimis" rule normally allows re-export without a U.S. license if the foreign satellite contains less than 25% by value of controlled U.S.-origin content. The "de minimis" rule provides a substantial benefit to the U.S. space industrial base, especially second and third tier suppliers. It means that foreign companies selling foreign-origin items from outside the United States do not need to come back to the U.S. Government for a specific authorization to transfer their foreign-origin item containing a de minimis amount of U.S.-origin content. The USML retransfer obligations, even for a de minimis amount of insignificant U.S.-origin content, motivate foreign companies to avoid U.S.-origin sellers or to develop production capability outside the United States that otherwise would exist in the United States.

However, the CCL "de minimis" rule, by itself, would not prevent a foreign satellite with U.S.-manufactured parts from being transferred for launch or use by an end-user with interests contrary to those of the United States or its partners. In order for the United States to appropriately mitigate the risks associated with transfers to countries of concern and to retain insight into what embargoed countries are using U.S. satellite-related technology, the "de minimis" rule would not be applicable for transfers to countries with which the United States maintains an arms embargo or otherwise prohibits exports or sales under ITAR Section 126.1. Thus, for example, the export to China from Europe of a European-made satellite containing even one U.S.-origin connector that was specially designed for a satellite would require a license from the U.S. Government, which would be presumptively denied. The transfer of the European satellite with that de minimis amount of U.S.-origin content to any other country in the world not subject to an arms embargo would, however, not require an authorization from the U.S. Government, so long as the item is not ultimately destined for China or any other country subject to an arms embargo.

In summary, the Departments used the flexibility of the CCL to design a set of controls that: mitigates the risks tied to transfers of satellites and related items to countries of concern, with a presumption of denial and no application of "de minimis"; relaxes controls on our Allies and partners, using the STA exception and availability of de minimis; and maintains the controls for transfer to all other nations as agreed upon in multilateral trade control arrangements, such as the WA.

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New Zealand, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, South Korea, Spain, Sweden, Switzerland, Turkey, and the United Kingdom.

***7. USML Special Export Controls (SECs) remain necessary to mitigate against the substantial risks associated with the following services that remain on the USML: satellite failures and anomaly resolution, launch know-how, launch services, and launch failure analysis. Space export control processes would also be improved if legislation allowed for flexible application of SECs and required industry to reimburse the DoD for all SECs.*** Inadvertent or deliberate transfer of space-related expertise poses the most significant potential harm to U.S. national interests. SECs require U.S. Government monitoring of technical discussions, review of technical data, and approval of Technology Transfer Control Plans and Launch Campaign Security Plans, and are an effective tool available through the USML to mitigate the risk of unauthorized technology transfers of space-related expertise associated with the aforementioned defense services provided by a U.S. manufacturer to a foreign launch provider. See **Appendix 5** for information on legislation, funding, and the effectiveness of SECs.

Current law, P.L. 105-261, Section 1514, and regulations, ITAR Section 124.15(c), dictate the provision of mandatory and discretionary SECs. Legislation requires SECs for *all* activities related to export of a satellite or related items for launch in a foreign country, unless it is a member of NATO or a major non-NATO ally of the United States. SECs *must* be applied, regardless of the actual risk of unauthorized disclosure. The ITAR permits discretionary SECs to be applied to other activities licensed under the USML for reasons of national security. For example, discretionary SECs have been used successfully by the U.S. Government on U.S. launch vehicle development programs between a U.S. company and a foreign entity, such as Orbital Sciences Corporation's Taurus II launch vehicle that subcontracted engine procurement to Aerojet and its Russian partner, United Engine Corporation/SNTK. The discretionary SECs provided the risk mitigations needed to protect U.S. national security interests.

Mandatory monitoring and oversight are paid for by industry, whereas the cost of discretionary monitoring is covered by DoD appropriated funds. DoD does not have the authority to waive or exempt a given license activity from mandatory monitoring based on the actual risk of an unauthorized transfer of expertise. In addition, current law focuses on the location of launch and does not account for recent experiences in which third country launch providers may be using launch facilities in a NATO country.

DoD's inability to waive or exempt an activity from monitoring results in the unnecessary expenditure of resources by industry and the U.S. Government. Conversely, the limitations on what can be reimbursed may restrict DoD's ability to monitor a higher risk activity. SECs should be flexible and allow for application of some or all SECs to any end-user, regardless of location, depending upon the risk associated with the end-users, end-use, and technologies involved. The U.S. Government should be authorized to require the applicant to reimburse the DoD for any SECs applied in its license.

## ***Recommendations***

### ***(1) Congress should:***

***(a) Return to the President authority to determine the export control jurisdictional status of satellites and related items; and***

*(b) Authorize DoD to determine the need for industry reimbursement for special export controls, e.g., monitoring and oversight, on satellite failures and anomaly resolutions, launch operations, launch failure analysis, and launch vehicle development programs regardless of location or parties in order to mitigate national security risks, and to require such reimbursements.*

*(2) The Administration then would:*

*(a) Begin implementation of a revised USML Category XV and a new CCL entry for satellites and related items as described in Appendices 1 and 2; which would:*

*(i) Move the following items from the USML to the CCL:*

- Communications satellites (COMSATs) that do not contain classified components;*
- Remote sensing satellites with performance parameters below (worse than) thresholds identified in Appendix 1 section (a)(7); and*
- Systems, subsystems, parts and components associated with these satellites and with performance parameters below thresholds specified for items remaining on the USML.*

*(ii) Retain the following on the USML:*

- Satellites that perform a purely military or intelligence mission as defined in Appendix 1 paragraph (a);*
- Remote sensing satellites with performance parameters equal to or above (better than) thresholds identified in Appendix 1 section (a)(7);*
- Systems, subsystems, parts and components unique to these satellite types and not common to dual-use satellites; and*
- Services in support of foreign launch operations for USML and CCL designated satellites.*

*(b) Create new rules for satellites and related items in both USML and CCL and assign, as described in the proposed rules, appropriate controls and licensing policies as agreed upon by the Departments of State, Defense, and Commerce, including a license exception for Allies and partners, and a policy of denial for exports and re-exports to countries of concern; and*

*(c) Establish processes for:*

*(i) Moving items to a lower level of control on the CCL only upon consensus of the Departments of State, Defense, and Commerce; and*

*(ii) Conducting periodic reviews by the relevant departments and agencies and using ECR's "Bright Line" USML review process to determine whether additional space items and related technologies on the USML should, for the sake of national and economic security, be transferred to the CCL, and vice-versa.*

## **Appendix 1**

### ***Draft Proposed USML Category XV Satellite and Related Items***

The draft Category XV presented herein reflects the Department's review of satellites and related items. Global Positioning System (GPS) receiving equipment, currently in XV(c), and radiation-hardened microelectronic circuits, currently in XV(d), are not exclusively satellite technologies, and their final disposition is dependent upon on-going reviews of other USML categories and interagency discussions. They will be included when Category XV is published in the Federal Register for public review and comment.

#### **CATEGORY XV – SPACECRAFT SYSTEMS AND RELATED ARTICLES**

(a) Spacecraft, including satellites, manned or unmanned space vehicles, whether designated developmental, experimental, research or scientific, or having a commercial, civil, or military end-use, that:

- \* (1) Are “specially designed” to mitigate effects (e.g., scintillation) of or detect a nuclear detonation;
- \* (2) Track ground, airborne, missile or space objects using imaging, infrared, radar, or laser systems;
- \* (3) Conduct signals or measurement and signatures intelligence;
- (4) Provide space-based logistics, assembly or servicing of any spacecraft (e.g., refueling);
- \* (5) Are anti-satellite or anti-spacecraft (e.g., kinetic, RF, laser, charged particle);
- \* (6) Have space-to-ground weapons systems (e.g., kinetic or directed energy);
- \* (7) Have any of the following electro-optical remote sensing capabilities or characteristics:
  - (i) Electro-optical visible and near infrared (VNIR) (i.e., 400nm to 1,000nm) or Infrared (i.e., greater than 1,000nm to 30,000nm) with less than 40 spectral bands having an aperture greater than 0.35 meters;
  - (ii) Electro-optical Hyperspectral with 40 spectral bands or more in the VNIR, short-wavelength infrared (SWIR) (i.e., greater than 1,000nm to 2,500nm) or any combination of the aforementioned AND having a Ground Sample Distance (GSD) less than 30 meters;
  - (iii) Electro-optical Hyperspectral with 40 spectral bands or more in the mid-wavelength infrared (MWIR) (i.e., greater than 2,500nm to 5,500nm) having a narrow spectral bandwidth of  $\Delta\lambda$  less than or equal to 20nm full width at half

maximum (FWHM or having a wide spectral bandwidth with  $\Delta\lambda$  greater than 20nm FWHM AND a GSD less than 200 meters; or

(iv). Electro-optical Hyperspectral with 40 spectral bands or more in the long-wavelength infrared (LWIR) (i.e., greater than 5,500nm to 30,000nm) having a narrow spectral bandwidth of  $\Delta\lambda$  less than or equal to 50nm FWHM or having a wide spectral bandwidth with  $\Delta\lambda$  greater than 50nm FWHM AND a GSD less than 500 meters.

Note 1: Ground Sample Distance (GSD) is measured from a spacecraft's nadir (i.e., local vertical) position.

Note 2: Optical remote sensing spacecraft or satellite spectral bandwidth is the smallest difference in wavelength, (i.e.,  $\Delta\lambda$ ) that can be distinguished at full width at half maximum (FWHM) of wavelength  $\lambda$ .

Note 3: An optical satellite or spacecraft identified in (a)(7) is not SME if non-earth pointing.

\*(8) Have radar remote sensing capabilities or characteristics (e.g., active electronically scanned array (AESA), synthetic aperture radar (SAR), inverse synthetic aperture radar (ISAR), ultra-wideband SAR) except those having a center frequency equal to or greater than 1 GHz but less than or equal to 10 GHz AND having a bandwidth less than 300 MHz.

(9) Provide Positioning, Navigation, and Timing (PNT).

Note: This paragraph does not control a satellite or spacecraft that provides only a differential correction broadcast for the purposes of positioning, navigation, or timing.

\*(10) Are "specially designed" to be used in a constellation or formation that when operated together, in essence or effect, form a virtual satellite (e.g., functioning as if one satellite) with the characteristics of other items in paragraph (a);

(11) Are man-rated sub-orbital, orbital, lunar, interplanetary or habitat; or

\*(12) Are classified, contain classified software or hardware, are manufactured using classified production data, or are being developed using classified information (e.g., having classified requirements, specifications, functions, or operational characteristics or include classified cryptographic items controlled under Category XIII of this subchapter). "Classified" means classified pursuant to Executive Order 13526, or predecessor order, and a security classification guide developed pursuant thereto or equivalent, or to the corresponding classification rules of another government.

Note: Spacecraft that are not identified in paragraph (a) are subject to the EAR.

(b) Ground control systems and training simulators “specially designed” for telemetry, tracking, and control of spacecraft in paragraph (a) above;

*Note:* Individual items, equipment, components, or parts that are common to satellite ground systems or simulators used to control non-USML satellites are subject to the EAR.

(c) [Reserved – Disposition of articles controlled under this paragraph, is to be determined.]

(d) [Reserved – Disposition of articles controlled under this paragraph, is to be determined.]

(e) Spacecraft systems, subsystems, components, parts, accessories, attachments, or associated equipment as follows:

(1) Antennas having a diameter greater than 25 meters or are actively scanned, adaptive beam forming, or interferometric radar antennas;

(2) Space-qualified optics (i.e., lens or mirror), including optical coating, having active properties (e.g., adaptive or deformable) or having a largest lateral dimension greater than 0.35 meters;

(3) “Space-qualified” focal plane arrays (FPA) having a peak response in the wavelength range exceeding 900nm and readout integrated circuit (ROIC) “specially designed” therefor;

(4) “Space-qualified” mechanical cryocooler, active cold finger, and associated control electronics “specially designed” therefor;

(5) “Space-qualified” active vibration suppression, including isolation and dampening, and associated control electronics therefor;

(6) Optical bench assemblies for items in (a) and the multi-aperture assemblies; fast steering mirrors (i.e., greater than 300 rad/sec<sup>2</sup> acceleration), pushbroom assemblies, flexure mounts, beam splitters, mirror folds, focus or channeling mechanisms, alignment mechanisms. inertial reference unit (IRU), black body cavities, baffles and covers, and control electronics “specially designed” therefor;

(7) Non-communications space-qualified directed energy (e.g., lasers or RF) systems and “specially designed” for a spacecraft in paragraph (a);

(8) Space-based kinetic systems or charged particle energy systems, including power conditioning and beam-handling/switching, propagation, tracking or pointing equipment, and “specially designed” parts and components therefor;

(9) “Space-qualified” Cesium, Rubidium, Hydrogen Maser, or Quantum (e.g., based upon Al, Hg, Yb, Sr, Be Ions) atomic clocks, and “specially designed” parts and components therefor;



(10) Attitude Determination and Control Systems, and “specially designed” parts and components therefor that provide earth location accuracy without using Ground Location Points better than or equal to:

- (i) 5 meters from low earth orbit (LEO);
- (ii) 30 meters from medium earth orbit (MEO);
- (iii) 150 meters from geosynchronous orbit (GEO); or
- (iv) 225 meters from high earth orbit (HEO).

(11) Space-based nuclear thermionic or non-nuclear thermionic converters or generators; and “specially designed” parts and components therefor;

(12) Thrusters (e.g., rocket engines) that provide for orbit adjustment greater than 150 lbf (i.e., 667.23 N) vacuum thrust;

(13) Control Moment Gyroscope.

(14) “Space qualified” monolithic microwave integrated circuits (MMIC) that combine transmit and receive (T/R) functions on a single die as follows:

- (i) Having a power amplifier with maximum saturated peak output power (in watts),  $P_{sat}$ , greater than 200 divided by the maximum operating frequency (in GHz) squared [ $P_{sat} > 200 \text{ W} \cdot \text{GHz}^2 / f_{\text{GHz}}^2$ ];
- (ii) Having a common path (e.g., phase shifter-digital attenuator) circuit with greater than 3 bits phase shifting at operating frequencies 10 GHz or below, or greater than 4 bits phase shifting at operating frequencies above 10 GHz.

(15) “Space-qualified” oscillator for radar in (a) with phase noise less than  $-120 \text{ dBc/Hz} + (20 \log_{10}(\text{RF}))$  (in GHz) measured at  $2 \text{ KHz} \cdot \text{RF}$  (in GHz) from carrier.

(16) “Space-qualified” star tracker or star sensor with angular accuracy less than or equal to 1 arcsec in all three axes AND a tracking rate equal to or greater than 3.0 deg/sec.

\*(17) Secondary or hosted payload, and “specially designed” parts and components therefor, that perform any of the functions described in paragraph (a).

\*(18) Department of Defense-funded secondary or hosted payload, and “specially designed” parts and components therefor.

\*(19) Any component, part, accessory, attachment, equipment, or system that (i) is classified, or (ii) contains classified software, or (iii) is manufactured using classified production data, or (iv) is being developed using classified information. “Classified” means classified pursuant to Executive Order 13526, or predecessor order, and a security classification guide developed pursuant thereto or equivalent, or to the corresponding classification rules of another government.

Note 1: Parts, components, accessories, and attachments “specially designed” for spacecraft enumerated in this category but not listed in paragraph (e) are subject to the EAR.

Note 2: For the purposes of this paragraph, “space-qualified” means a product is “space-qualified” if it (a) is being or was designed and manufactured to meet the special electrical, mechanical, or environmental requirements required for use in the deployment of satellites or other spacecraft (i.e., systems, including equipment, capable of operating at altitudes greater than 100 km) or (b) was tested to, and met, such requirements.

Note 1: “Product” is synonymous with “commodity,” as defined in EAR § 772.1.

Note 2: A determination that a specific product (or commodity) (e.g., by product serial number) is “space qualified” by virtue of “(b)” does not mean that other such products in the same production run or model series are “space qualified” if not individually tested or intended to be used in satellites or spacecraft.

Note 3: An item designed and manufactured to meet the standards in (a) is “space-qualified” even if it is not tested to meet such requirements.

Note 4: An item designed and manufacture to meet the standards in “(a)” is, however, not “space-qualified” if it is tested and fails to meet the requirements of such standards.

Note 5: Technology and technical data “required” and directly related to design and manufacture an item to meet the standards in “(a)” remain controlled in the applicable USML category or ECCN regardless of whether the items produced there from passes a test described in “(b).”

(f) Technical data (as defined in §120.10) and defense services (as defined in §120.9) directly related to the defense articles enumerated in paragraphs (a) through (e) of this category. (See §125.4 for exemptions.)

## **§120.9 Defense service**

### **(a) A *defense service* means:**

(1) The furnishing of assistance (including training) using other than public domain data to foreign persons (see §120.16 of this subchapter), whether in the United States or abroad, in the design, development, engineering, manufacture, production, assembly, testing, intermediate or depot level repair or maintenance (see §120.38 of this subchapter), modification, demilitarization, destruction, or processing of defense articles (see §120.6 of this subchapter);

(2) The furnishing of assistance to foreign persons, whether in the United States or abroad, for the integration of any item controlled on the U.S. Munitions List (USML) (see §121.1 of this subchapter) or the Commerce Control List (see 15 CFR part 774) into an end item (see §121.8(a) of this subchapter) or component (see §121.8(b) of this subchapter) that is controlled as a defense article on the USML, regardless of the origin;

(3) Training or providing advice to foreign units and forces, regular and irregular, regardless of whether technical data is transferred to a foreign person, including formal or informal instruction of foreign persons in the United States or abroad by any means including classroom or correspondence instruction, conduct or evaluation of training and training exercises, in the employment of defense articles;

(4) Conducting direct combat operations for or providing intelligence services to a foreign person directly related to a defense article;

(5) The furnishing of assistance (including training) in the integration of a satellite or spacecraft to a launch vehicle, including both planning and onsite support, regardless of the jurisdiction of, the ownership of, or the origin of the satellite or spacecraft, or whether technical data is used; or

(6) The furnishing of assistance (including training) in the launch failure analysis of a satellite, spacecraft, or launch vehicle, regardless of the jurisdiction of, the ownership of, or the origin of the satellite, spacecraft, or launch vehicle, or whether technical data is used.

### **(b) The following is not a *defense service*:**

(1) Training in the basic operation (functional level) or basic maintenance (see §120.38 of this subchapter) of a defense article;

(2) Mere employment of a U.S. citizen by a foreign person;

(3) Testing, repair, or maintenance of an item “subject to the Export Administration Regulations” (see 15 CFR §734.2) administered by the Department of Commerce, Bureau of Industry and Security, that has been incorporated or installed into a defense article;

(4) Providing law enforcement, physical security or personal protective training, advice, or services to or for a foreign person (see §120.16 of this subchapter), using only public domain data; or

(5) Providing assistance (including training) in medical, logistical (other than maintenance), or other administrative support services to or for a foreign person.

## Appendix 2

### ***Draft Proposed CCL ECCN 9X515 Spacecraft and Related Commodities***

**9A515** “Spacecraft” and related commodities.

*Reason for Control:* NS, RS, AT

<b>Control(s)</b>	<b>Country chart</b>
NS applies to entire entry except 9A515.y	NS Column 1
RS applies to entire entry except 9A515.y	RS Column 1
AT applies to entire entry	AT Column 1

#### **License Exceptions**

*LVS:* \$1500

*GBS:* N/A

*CIV:* N/A

*APR:* N/A

*STA: Paragraph (c)(2) of License Exception STA (§ 740.20(c)(2)) of the EAR may not be used for any item in 9A515.*

#### **List of Items Controlled**

*Unit:* End items in number; parts, component, accessories and attachments in \$ value.

*Related Controls:* Spacecraft, launch vehicles and related articles that are enumerated in the USML, and technical data (including software) directly related thereto, launch services, and launch failure analysis for items in 9A515.a, are subject to the ITAR. A license is required under the ITAR for a U.S. person to provide any assistance to a foreign person for a spacecraft to be launched from outside the United States, even if that spacecraft may be exported under License Exception STA. See 22 CFR 120.9. All other “spacecraft,” as enumerated below and defined in section 772.1, are subject to the controls of this ECCN. See also ECCNs 3A001, 3A002, 3A991, 3A992, 6A002, 6A004, and 6A008 for specific “space-qualified” items and 9A004 for the International Space Station.

*Items:*

- a. Spacecraft, including satellites, manned or unmanned space vehicles, whether designated developmental, experimental, research or scientific, not enumerated in USML Category XV.

*Note: ECCN 9A515.a includes commercial communications satellites, certain remote sensing satellites, planetary rovers, and planetary and interplanetary probes.*

- b. Ground control systems and training simulators “specially designed” for telemetry, tracking, and control of the spacecraft in paragraph 9A515.a.

c. through w. [Reserved]

x. “Parts,” and “components,” “accessories and attachments” that are “space qualified” and not elsewhere specified on the CCL or USML.

Note 1: ECCN 9A515.x does not include “space-qualified” items enumerated in and controlled by other ECCNs, such as 3A001.b.1, 3A001.e.4, 3A002.a.3, 3A002.g.1 and .g.3, 3A991.k, 3A992.b.3, 6A002.a.1 and .a.3, 6A002.b.2, 6A002.d.1 and .d.2, 6A002.e, 6A004.c and .d, 6A008.j.1, or 6A998.b.

*Note 2: “Parts,” “components,” and “accessories and attachments” specified in USML subcategory XV(e) or enumerated in other USML categories are subject to the controls of that paragraph or category.*

y. Specific “parts,” “components,” and “accessories and attachments” that are “space qualified” and not elsewhere specified in the USML or the CCL as follows:

y.1. [Reserved]

y.26. to y.98. [RESERVED]

y.99. Commodities that would otherwise be controlled elsewhere in this entry but that (i) have been determined to be subject to the EAR in a commodity jurisdiction determination issued by the U.S. Department of State and (ii) are not otherwise identified elsewhere on the CCL.

**9B515 Test, inspection, and production “equipment” “specially designed” for the “development” or “production” of commodities enumerated in ECCN 9A515 or USML Category XV.**

**License Requirements**

*Reason for Control:* NS, RS, AT

<b>Control(s)</b>	<b>Country chart</b>
NS applies to entire entry except 9B515.y	NS Column 1.
RS applies to entire entry except 9B515.y	RS Column 1.
AT applies to entire entry	

**License Exceptions**

*LVS:* \$1500; \$5000 for 9B515.c

*GBS:* N/A

*CIV:* N/A

*[APR:* N/A]

*STA: Paragraph (c)(2) of License Exception STA (§ 740.20(c)(2)) of the EAR may not be used for any item in 9B515.*

**List of Items Controlled**

Unit: N/A

Related Controls: N/A

Related Definitions: N/A

Items:

- a. Test, inspection, and production “equipment” “specially designed” for the “production” or “development” of commodities enumerated in ECCN 9A515 or USML Category XV.
- b. “Equipment,” cells, and stands “specially designed” for testing, analysis and fault isolation of commodities enumerated in ECCN 9A515, 9A004 or USML Category XV.
- c. Environmental chambers capable of pressures below (10<sup>-4</sup>) Torr, and “specially designed” components therefor.
- d. through x. [RESERVED]

**9C515 [Reserved]**

**9D515 Software “specially designed” for the “development,” “production,” operation, or maintenance of commodities controlled by 9A515 or “equipment” controlled by 9B515.**

License Requirements

Reason for Control: NS, RS, AT

Control(s)	Country chart
NS applies to entire entry except for “software” “specially designed” for “development” or “production” operation, or maintenance of commodities controlled by 9A515.y, 9B515.c. or .y, or 9C515.y.	NS Column 1.
RS applies to entire entry except for “software” “specially designed” for “development” or “production” operation or maintenance of commodities controlled by 9A515.y.	RS Column 1.
AT applies to entire entry	AT Column 1

## License Exceptions

CIV: N/A

TSR: N/A

APR: N/A

*STA: Paragraph (c)(2) of License Exception STA (§ 740.20(c)(2)) of the EAR may not be used for any software in 9D515.*

*Note to License Exceptions Section: Supplement No. 4 to part 740 precludes use of License Exceptions GOV (other than those provisions authorizing exports and reexports to personnel and agencies for the U.S. government) and STA with respect to “source code” for specific types of items controlled by ECCN 9A515 and identified in the supplement.*

## List of Items Controlled

Unit: \$ value

*Related Controls:* Software directly related to articles enumerated in USML Category XV is subject to the control of USML paragraph XV(f). See also ECCNs 3D001, 6D001, and 6D002 for controls specific “space-qualified” items.”

*Related Definitions:* N/A

*Items:*

- a. “Software” “specially designed” for the “development,” “production,” operation, installation, maintenance, repair, overhaul, or refurbishing of commodities controlled by ECCN 9A515.b. to x. [RESERVED]
- y. Specific “software” “specially designed” for the “production,” “development,” or operation or maintenance of commodities enumerated in ECCN 9A515, as follows:
  - y.1. Specific “software” “specially designed” for the “production,” “development,” operation or maintenance of commodities enumerated in ECCN 9A515.y.
  - y.2 through y.98 [RESERVED]
  - y.99. Software that would otherwise be controlled elsewhere in this entry but that (i) has been determined to be subject to the EAR in a commodity jurisdiction determination issued by the U.S. Department of State and (ii) is not otherwise identified elsewhere on the CCL.

**9E515 Technology “required” for the “development,” “production,” operation, installation, maintenance, repair, refurbishment, or overhaul of commodities controlled by 9A515, equipment controlled by 9B515, or software controlled by 9D515.**

License Requirements

*Reason for Control:* NS, RS, AT



Control(s)	Country chart
NS applies to entire entry except “technology” “required” for the “development,” “production,” operation, installation, maintenance, repair or overhaul of commodities controlled by ECCN 9A515.y	NS Column 1.
RS applies to entire entry except “technology” “required” for the “development,” “production,” operation, installation, maintenance, repair, or overhaul of commodities controlled by ECCN 9A515.y	RS Column 1.
AT applies to entire entry	AT Column 1.

**License Exceptions**

CIV: N/A

TSR: N/A

GBS: Eligible for 9E515.b

*STA: Paragraph (c)(2) of License Exception STA (§ 740.20(c)(2)) of the EAR may not be used for any technology in 9E515.*

*Note to License Exceptions Section: Supplement No. 4 to part 740 limits use of License Exceptions GOV (other than those provisions authorizing exports and reexports to personnel and agencies for the U.S. Government) and STA with respect to “development” and “production” “technology” for specific types of items controlled by ECCN 9A515 and identified in the supplement other than “build-to-print technology.”*

**List of Items Controlled**

Unit: \$ value

*Related Controls:* Technical data directly related to articles enumerated in USML Category XV are subject to the control of USML paragraph XV(f). See also ECCNs 3E001, 3E003, 6E001, and 6E002 for specific “space-qualified” items.

*Related Definitions:* N/A

*Items:*

- a. “Technology” “required” for the “development,” “production,” operation, installation, maintenance, repair, or overhaul of commodities controlled by ECCN 9A515, 9B515, or 9D515.

- b. “Technology” “required” for passenger participation in space travel (e.g., sub-orbital, orbital, lunar, interplanetary or habitat) for space tourism, research or scientific endeavors, or transportation from one point to another for commercial purposes.

Note 1: 9E515.b includes technology for activities related to the spaceflight passenger or participant experience such as:

- i. spacecraft access, ingress, and egress;
- ii. physiological training (e.g., human-rated centrifuge training or parabolic flights, pressure suit training/operation);
- iii. medical evaluation or assessment of the spaceflight passenger or participant;
- iv. training in and operation by the passenger or participant of health- and safety-related hardware (e.g., environmental control and life support, hygiene facilities, food preparation, fire suppression, communications equipment, safety-related clothing or headgear) or emergency procedures;
- v. viewing of the spacecraft (including pre-flight checks, landing, and in-flight status); and
- vii. non-flight hardware integration, training, use and operation with the spaceflight vehicle.

Note 2: “Non-flight hardware” is equipment used for purposes other than to fly the spaceflight vehicle. It includes (i) the passenger or participant’s flight or pressure suit and personal equipment; (ii) spacecraft doors that the passenger or participant must learn to enter and exit; (iii) passenger or participant seating and related seatbelts and harnesses; (iv) passenger and participant’s gear for communications, safety, environmental control and comfort, or other similar purposes.

c through x. [RESERVED]

y. Specific “technology” “required” for the “production,” “development,” operation, installation, maintenance, repair, or overhaul of commodities enumerated in ECCN 9A515, or 9D515, as follows:

y.1. Specific “technology” “required” for the “production,” “development,” operation, installation, maintenance, repair, or overhaul of commodities enumerated in ECCN 9A515.y or 9D515.y.

y.2. through y.98. [RESERVED]

y.99. “Technology” that would otherwise be controlled elsewhere in this entry but that (i) has been determined to be subject to the EAR in a commodity jurisdiction determination issued by the U.S. Department of State and (ii) is not otherwise identified elsewhere on the CCL.

Part 740 is amended by adding a Supplement No. 4 to read as follows:

**Supplement No. 4 to Part 740 – 9D515 and 9E515 Items Subject to Limits Regarding License Exceptions GOV and STA**

This portion of the supplement lists certain 9D515 “source code” and 9E515 “technology” and imposes limitations on the use of License Exceptions GOV (§ 740.11 of the EAR) and STA (§ 740.20 of the EAR) with respect to exports, reexports, and transfers (in-country) of such “source code” and “technology.”

(a) *Restrictions applicable to Category 9.* License Exception STA may not be used to export, reexport, or transfer (in-country) ECCN 9D515 “source code” or ECCN 9E515 “technology” (other than “build-to-print technology”) listed below. In addition, License Exception GOV may not be used to export or reexport ECCN 9D515 “source code” or ECCN 9E515 “technology” (other than “build-to-print technology”) listed below, except with respect to exports, reexports, and transfers (in-country) to U.S. Government agencies and personnel identified in § 740.11(b)(2)(i) and (ii).

(1) 9D515

- a. “Source code” that contains the algorithms or control principles (e.g., clock management, precise orbit determination (e.g., ephemeris, pseudo range), signal construct (e.g., pseudo-random noise (PRN) anti-spoofing) “specially designed” for items controlled by ECCN 9A515.
- b. “Source code” “specially designed” for the integration, operation, or control (i.e., use) items controlled by ECCN 9A515.
- c. “Source code” that contains algorithms or modules “specially designed” for system, subsystem, component, part, or accessory calibration, manipulation, or control of items controlled by ECCN 9A515.
- d. “Source code” “specially designed” for data assemblage, extrapolation, or manipulation of items controlled by ECCN 9A515.
- e. “Source code” that contains the algorithms or control laws “specially designed” for attitude, position, or flight control of items controlled in ECCN 9A515.
- f. “Source code” “specially designed” for built-in test and diagnostics for items controlled by ECCN 9A515.

(2) 9E515

- a. “Technology” “required” for the “development” of items controlled by ECCN 9A515 (other than 9A515.b (e.g., ground control systems and simulators)).
- b. “Technology” “required” for the “production” of items controlled by ECCN 9A515 (other than 9A515.b (e.g., ground control systems and simulators)).

- c. “Technology” “required” for design verification, manufacturability, or quality control for items in ECCN 9A515 (other than 9A515.b (e.g., ground control systems and simulators)).
- d. “Technology” associated with major anomaly or failure investigation or review for items in 9A515.

## **Appendix 3**

### ***Methodology***

This appendix describes the background to and the process by which the U.S. Government reviewed and developed the proposed United States Munitions List (USML) Category XV, Spacecraft Systems and Associated Equipment. The review methodology was the same as the USML Rewrite methodology approved by the Deputies Committee on August 16, 2010 and used in the Administration's on-going Export Control Reform (ECR) effort.

Section 1248 of Public Law 111-84, the National Defense Authorization Act (NDAA) for Fiscal Year 2010, provides that the Secretary of Defense and the Secretary of State shall carry out an assessment of the national security risks of removing satellites and related components from the United States Munitions List (USML). The assessment is to include a review of space and space-related technologies currently on the USML, and the national security risks of removing certain space and space-related technologies from the USML. The report is to provide recommendations for candidates for removal from the USML based on this national security risk assessment; propose safeguards and verification necessary to prevent proliferation and diversion of space and space-related technologies; confirm appropriateness of end-uses and end-users; minimize the risk that such space and space-related technologies could be used in foreign missile, space, or other applications that may pose a threat to the security of the United States; and propose improvements to space export control policy and processes.

The Department of Defense (DoD) and Department of State (DoS) agree that space export control policies and processes would be improved if jurisdiction of space and space-related technologies were normalized, such that the same processes that are currently available to the Administration would apply to space-related items. The Administration is pursuing review and recommendations for other USML categories through its ECR control list review effort. Therefore, the review group used the methodology for the ECR control list review to provide recommendations for the Section 1248 report concerning satellites and related components. Using the ECR USML review process, the Category XV Interagency Technical Working Group created descriptions of the items to remain on the USML and thus any items not specified would transfer to the Commerce Control List (CCL). The descriptions when viewed as a whole create a "bright line" between the two lists, i.e., an item is controlled under the USML if its function or performance parameters match a description in the list and CCL if not. The "bright line" serves to clarify jurisdictional determinations and reduce government and industry uncertainty about whether particular items are subject to the jurisdiction of the International Traffic in Arms Regulations (ITAR) or the Export Administration Regulations (EAR).

In order to accomplish the assessment, the USML and, to a lesser degree, the CCL must be revised so that they are "positive lists." A "positive list" is a list that describes controlled items using objective criteria such as horsepower, microns, wavelength, speed, accuracy, hertz, or other precise descriptions rather than broad, open-ended, subjective, catch-all, or design intent-based criteria.

## ***Background to the Control List Review and Revision Effort***

A key element of ECR is that all items on the USML and the CCL must be screened against criteria the U.S. Government developed to align control levels with contemporary national security threats and other issues.

Many of the ITAR's USML controls are based on subjective or design-intent criteria. That is, regardless of an item's capability, sophistication, age, funding, lethality, end-use, or origins, it is, with some exceptions, USML-controlled if it was originally "specifically designed, modified, or adapted" for a military or space application, purpose, or use. In particular, most current USML categories contain a non-specific catch-all control over every "part" or "component" that was "specifically designed or modified" for any of the defense articles listed in that category. This means, for example, that a solar array sized to support a communications satellite, and all technical data and services directly related to that array, are controlled for almost worldwide export in a similar manner to a military imaging satellite.

Most of the EAR's CCL controls are based on the technical capabilities and specifications of items regardless of their intended end-use or the reasons for which they were designed. The CCL's controls are also more flexible in that different types of items are controlled differently to different groups of destinations and end-users depending on the significance of the item. In other words, the CCL is a more "positive" list with more flexible controls than the USML. The EAR do nonetheless have a significant number of export control classification numbers (ECCNs) with controls on items that are "specially designed" for some purpose or end-item. The issues involving the definition of this term – a term that must remain in many ECCNs to remain consistent with multilateral obligations – are addressed below.

Because the USML contains many broad, general descriptions of the types of articles controlled, the satellite USML category (Category XV) needed to be "opened" in order to assess further whether items within its scope still warranted control under the USML based on national security concerns and to screen them against the U.S. Government's criteria for creating a "positive list." "Screening" articles means determining which USML-controlled satellites and related items should remain on the USML, which items could be controlled under the CCL, and which items no longer require any control beyond EAR99 controls because they do not meet the criteria of any of the three future tiers. "Opening" the satellite category meant identifying and then creating specific, positive lists ( a "bright line") of the specific types of items the U.S. Government wanted to control rather than relying on broad, general descriptions of or subjective criteria for determining when something is controlled.

## ***Steps for Category XV Spacecraft Systems and Associated Equipment Review and Recommendations***

The following are the steps and the guidelines the U.S. Government agencies involved in the review effort followed when preparing proposed amendments to the USML and the CCL so that they are, with rare exceptions, aligned "positive lists" that do not overlap and are consistent with the tiered criteria. The guidelines are set out in ordered steps.

### **1. Identify and Involve Agencies with Equities**

Departments of Defense including National Geospatial-Intelligence Agency (NGA), National Reconnaissance Office (NRO), National Air Intelligence Center (NAIC), State, and Commerce; National Aeronautics and Space Administration (NASA); and the Director of National Intelligence (DNI) and DNI staff worked together on the review of Category XV, Satellites and Related Items. Each agency committed to the effort by making available their staff with technical expertise in the specific items.

## **2. Generally Identify the Broad Types of Satellite and Related Items that Should Remain as ITAR-Controlled**

The first task of the review team was to decide what general types of USML articles should remain ITAR-controlled and, thus, not transferred to the EAR or off the control lists altogether. The following are general types of issues the review teams had in mind when making subjective determinations about whether an item should remain USML-controlled:

- Is the item “specially designed” for a military or intelligence application?
- Are the end-users of the items predominately or exclusively governments or militaries? For example, is it equipment to be used for national security purposes that is only legal for use by governments?

None of these issues alone determined whether an item should remain or become USML-controlled, but they were nonetheless the general types of considerations the review teams had in mind before proceeding.

After the review team mapped out the broad scope of items that should be USML-listed defense articles, it then translated their judgments into objective, positive control lists consistent with the ECR objectives. They also, at the same time, decided what, if any, types of items should become EAR-controlled in order to (a) differentiate items that may not need the more rigid national security and foreign policy controls of the ITAR, (b) take advantage of the EAR’s more flexible country group-based controls, and (c) create a bright line between the two lists. *This task of translating subjective judgments into objective criteria is the key to the success of the entire positive list review and revision effort.*

For example, commercial communications satellites under the ITAR are for commercial (non-governmental) end-use. The rewrite of Category XV acknowledged that these satellites could move to the CCL. Under the CCL, satellites could be controlled under the more flexible country-based controls of the EAR instead of the worldwide ITAR controls.

## **3. Identify Characteristics of the Remaining Defense Articles**

The team then described and identified characteristics of each item, such as whether the item is (1) almost exclusively available from the United States and provides a critical military or intelligence advantage; (2) is almost exclusively available from Regime Partners or Adherents and provides a substantial military or intelligence advantage; (3) makes a substantial contribution to the indigenous development, production, use, or enhancement of an item meeting (1) or (2)

above; or (4) provides a significant military or intelligence advantage, or makes a significant contribution to the indigenous development, production, use, or enhancement of an item meeting (1) or (2) above.

Items controlled pursuant to multilateral agreements – i.e., Wassenaar Arrangement, Missile Technology Control Regime (MTCR), Australia Group, Chemical Weapons Convention, and Nuclear Suppliers Group – that do not meet the availability or “military or intelligence advantage” characteristics above were identified by the teams as potential CCL items until and unless their control status is adjusted consistent with the procedures of the applicable multilateral agreement.

#### **4. Describe the Remaining Controlled Defense Articles in a “Positive” Way**

When developing “positive” description for items to remain on the USML, the review team followed the guidelines established for the ECR control list review effort:

Positive List Guideline #1: The review team should, to the extent possible, use objective criteria, such as precise descriptions or technical parameters that do not lend themselves to multiple interpretations by reasonable people.

Positive List Guideline #2: Revised USML categories should not contain (i) catch-all controls for generic “parts,” “components,” “accessories,” “attachments,” or “end-items”; or (ii) other types of controls for specific types of defense articles because, for example, they were “specifically designed or modified” for a defense article.

Positive List Guideline # 3: Items are not to be listed on both the CCL and the USML unless there are specific technical or other objective criteria – regardless of the reason why any particular item was designed or modified – that distinguish between when an item is USML-controlled and when it is CCL-controlled.

Positive List Guideline #4: In cases where technical characteristics are classified and need to be protected, the objective descriptions of the products controlled should be set at an unclassified level below the classified level.

Positive List Guideline #5: Use “Specially Designed” as a control criterion only when required by multilateral obligations or when no other reasonable option exists.

#### **5. Verify that USML Controls over “Parts” and “Components” Are Significantly Narrowed after the USML Is Screened Against the Criteria**

The majority of “parts” and “components” that are USML-controlled are controlled on the USML solely because their “form” or “fit” has been modified in some way specifically for a defense article even though their essential “function” is not inherently military. For example, the mechanisms that deploy an antenna of a satellite are “specially designed” for the particular satellite (size, connection points, etc.), but the function they provide – moving an



object into a predetermined position -- is not uniquely military. Then-Secretary Gates specifically called out the issue of unnecessary controls on parts like nuts and bolts during his April 20, 2010 speech on export control reform as one that needs to be resolved. Moreover, the largest impact on licensing in a manner consistent with Secretary Gates' vision likely will be achieved as a result of screening the USML against the Criteria with respect to generic controls on "parts" and "components."

## **Appendix 4**

### ***China's Space-related Strategic Goals, Capabilities, and Methods for Acquiring Technology.***

China's rise as a major international actor is likely to stand out as a defining feature of the strategic landscape of the early 21st century. Sustained economic development has raised the standard of living for China's citizens and elevated China's international profile. This development, coupled with an expanding science and technology base, has also facilitated a comprehensive and on-going military modernization program. China's 2010 Defense White Paper asserts China's *"future and destiny have never been more closely connected with those of the international community."* Nonetheless, China's modernized military, and especially its space-related capabilities, could be put to use in ways that increase China's ability to gain diplomatic advantage or resolve disputes in its favor, and possibly against U.S. national security interests.

This appendix will address the following:

- DoD's understanding of the importance of the Chinese government efforts to acquire space capabilities;
- China's current and developing space capabilities;
- China's employment of those capabilities that could potentially run counter to U.S. national interests; and
- China's decision regarding its pursuit of space technologies.

Space assets, operational capabilities, and missile technologies are indispensable to China. *China's National Medium- and Long-Term Program for Science and Technology Development (2006-2020)*, issued by the State Council in February 2006, seeks to transform China into an *"innovation-oriented society by 2020."* The plan defines China's science and technology focus in terms of *"basic research," "leading edge technologies," "key fields and priority subjects,"* and *"major special items,"* each of which contain space-related technologies and are all military-related. According to the 2010 Chinese Academy of Sciences publication *Pace of Science & Technology in China: A Roadmap to 2050*, China identified the following space-related areas: material design and preparation, manufacturing in extreme environmental conditions, and aeronautic and astronautic mechanics. China identified radar, counter-space capabilities, secure Command, Control, Communications, and Computer (C4) Intelligence, Surveillance, and Reconnaissance (C4ISR) and all defense technologies, as key fields and priority subjects due to their potential to provide technological breakthroughs, remove technical obstacles across industries, and improve international competitiveness. Under major special items, China plans to develop or expand indigenous capabilities to produce high-resolution satellites, manned spaceflight, and lunar exploration. China's most recent Defense White Paper published on March 31, 2011 included *"accelerating the modernization of national defense and the armed forces"* as one of its strategic goals. Space and satellite manufacturing capabilities directly support these stated goals.

In 2010, China had a national record of 15 space launches. As a comparison, the United States had 14 launches in 2010. Russia had 31, and Europe had eight. These numbers include government as well as commercial launches. All of China's launches were for domestic programs, including space-based intelligence, surveillance, reconnaissance, navigation, meteorology, and communications satellite constellations. In parallel, China is developing a multi-dimensional program to improve its capabilities to limit or prevent the use of space-based assets by adversaries during times of crisis or conflict.

- During 2010, Beijing launched five satellites for its Compass navigation constellation. China plans to complete the regional network by 2012 and a global network by 2020.
- China launched nine new remote sensing satellites in 2010, which can perform both civil and military applications.
- In 2010, Beijing also launched two communications satellites (one military and one civil), a meteorological satellite, two experimental small satellites, and a second lunar mission during the year.
- China continues to develop the Long March V (LM-V) rocket, which is intended to lift heavy payloads into space. LM-V will more than double the size of low earth orbit and geosynchronous orbit payloads China is capable of placing into orbit.
- To support these rockets, China began constructing the Wenchang Satellite Launch Center in 2008. Located on Hainan Island, the launch facility is expected to be complete by 2012, with initial LM-V launch scheduled for 2014.

China is deploying imagery, reconnaissance, and earth resource systems with military utility. Examples include Yaogan satellites, the Haiyang-1B, and the Huanjing disaster/environmental monitoring satellite constellation. China is planning eight satellites in the Huanjing program that are capable of visible, infrared, multispectral, and synthetic aperture radar imaging. In the next decade, even as Beijing fields a larger and more capable array of reconnaissance satellites, it probably will continue to employ commercial satellite imagery to supplement its coverage. China currently accesses high-resolution, commercial electro-optical, and synthetic aperture radar imagery from all the major providers including Spot Image (Europe), Infoterra (Europe), MDA (Canada), Antrix (India), GeoEye (United States), and Digital Globe (United States). Recently, China attempted to acquire a fully functional, European imaging satellite constellation, but was blocked by USML re-export laws due to U.S. technology being on the satellites. As part of the Administration's recommendations in this report, this technology would remain subject to the USML.

China is developing and testing several new classes and variants of offensive missiles, upgrading older missile systems, and developing space-based methods to counter ballistic missile defenses of the United States and our allies, including anti-satellite (ASAT) weapons. China produces a broad range of sophisticated ballistic, cruise, air-to-air, and surface-to-air missiles. Many of China's final assembly and rocket motor production facilities have received upgrades over the past few years, likely increasing production capacity. In addition to supplying China's military, complete systems and missile technologies could be marketed for export. China's space launch vehicle industry is expanding to support satellite launch services and the manned space program.

China continues to develop and refine its ASAT capabilities as one component of a multi-dimensional program to limit or prevent the use of space-based assets by potential adversaries during times of conflict. In addition to the direct-ascent ASAT program, China is developing other technologies and concepts for kinetic and directed energy for ASAT missions. Foreign and indigenous systems give China the capability to jam common satellite communications bands and Global Positioning satellites (GPS) receivers. Specifically, the Chinese navigation constellation, Compass, has been designed so that the PLA is using the same downlink frequencies as Europe's burgeoning Galileo Global Navigation System. The United States is now investigating Compass's impact on our GPS network. Citing the requirements of its manned and lunar space programs, China is improving its ability to track and identify satellites -- a prerequisite for effective, precise counter-space operations.

The People's Liberation Army (PLA) is acquiring a range of technologies to improve China's space and counter-space capabilities. A PLA analysis of U.S. and coalition military operations reinforced the importance of operations in space to enable informationalized warfare. This analysis claimed that *"space is the commanding point for the information battlefield. Battlefield monitor and control, information communications, navigation and position guidance all rely on satellites and other sensors."*

PLA writings emphasize the necessity of *"destroying, damaging, and interfering with the enemy's reconnaissance ... and communications satellites,"* suggesting that such systems, as well as navigation and early warning satellites, could be among initial targets of attack to *"blind and deafen the enemy."* The same PLA analysis of U.S. and coalition military operations also states that *"destroying or capturing satellites and other sensors ... will deprive an opponent of initiative on the battlefield and [make it difficult] for them to bring their precision guided weapons into full play."*

One example of how China's advance in space-related capabilities could directly harm U.S. national security interests is in the Taiwan Strait. Beijing could use a variety of disruptive, punitive, or lethal space capabilities in a limited action against Taiwan. Limited Short Range Ballistic Missile attacks against, and precision strikes directed by, imaging and navigation satellites on Taiwan's radar sites, missiles, and space-assets could be designed to degrade its defenses or neutralize its leadership. The PLA builds capabilities aimed not only at Taiwan, but also to deter, delay, or deny possible U.S. or allied intervention in a cross-Strait conflict. China's ASAT programs have significant implications for anti-access/area-denial efforts against the United States in Taiwan Strait contingencies.

Operational space capabilities are a source of Chinese national pride as well as a new international engagement leverage point that may run counter to U.S. national security objectives. As an example, from Futron's 2011 Space Competitiveness Index, Yin Liming, the president of China Great Wall Industry Corporation, stated in April of 2010 that China was aiming for 20 percent of the world's space business by 2015. Public statements, like these, demonstrate its intent to expand and extend their satellite and launch services to international customers. Moreover, China's expanding space agreements are part of broader bi-lateral trade and natural resources access strategy. Many of these arrangements are with countries that are not supportive or are openly opposed to U.S. foreign policy objectives. For

example, China entered the world market by exporting satellites and infrastructure to nations throughout South America, Africa, the Middle East, and Asia. China is developing niche markets, introducing space-related technologies in systems not offered by Russian or western suppliers. These systems include GPS and GLONASS-equipped multiple rocket launcher systems and short-range ballistic missiles that have been marketed and sold to Middle East and African partners. China offers generous repayment options and technology transfer to persuade other countries to purchase from PRC firms.

The pace and scope of China's military development, combined with a relative lack of transparency, remains a point of concern in the United States and among our regional allies and partners. PRC officials continue to support publicly a reliable military-to-military relationship with the United States, but China has also suspended military-to-military relations in 2008 and 2010. PRC officials have repeatedly linked continuation of engagement to "*respect*" China's "*core interests*." As recently as October 2011, China canceled meetings with U.S. officials because of U.S. arms sales to Taiwan. The Chinese commitment to engaging with the United States military remains challenging. With regard to the reliability and fidelity of civil-only end-use of U.S. technologies with China, the United States must remain vigilant against any unauthorized end-use or diversion of U.S. satellite technologies for China's military modernization or enhancement of its military capability.

Chinese leadership's top priority is to develop innovative dual-use technology and an industrial base that serves both military and civilian needs. China's defense industry has benefited from its integration with a rapidly expanding civilian economy and science and technology sector, particularly elements that have access to foreign technology. Progress within individual defense sectors appears linked to the relative integration of each, through China's civilian economy, into the global production and research and development chain. For example, the defense electronics sectors benefitted from China's leading role in producing information technologies over the last decade. China's continued integration of civil and military sectors is evident in the field of information technology. Several well-known national level civil information technology companies maintain close ties to the PLA.

China's capability for overall space systems design and integration relies heavily on foreign designs obtained through reverse engineering. It is widely known that China pursues foreign technologies, in part, for the purpose of reverse engineering or to supplement indigenous military modernization efforts. China's continuing efforts to acquire U.S. military and dual-use technologies are enabling China's science and technology base to advance its defense industrial capability and to improve its technological acumen in areas critical to the development of military weapons and communications systems. China utilizes a large, well-organized network of enterprises, defense factories, affiliated research institutes, and computer network operations to facilitate the collection of sensitive information and export-controlled technology, as well as basic research and science that support U.S. defense system modernization.

Many of the organizations comprising China's military-industrial complex have both military and civilian research and development functions. This network of government-affiliated companies and research institutes enables the PLA to access sensitive and dual-use

technologies under the guise of civilian research and development. The enterprises accomplish this through technology conferences and symposia, legitimate contracts and joint commercial ventures, partnerships with foreign firms, and joint development of specific technologies.

In the case of key national security technologies, controlled equipment, and other materials not readily obtainable through commercial means or academic exchange, China has utilized its intelligence services and employed other illicit approaches that circumvent or outright violate U.S. laws and export control regulations. For example, in September 2010, Chi Tong Kuok was convicted for conspiracy to export U.S. military encryption technology illegally to China via Hong Kong. The relevant technology included encryption, communications equipment, and GPS equipment used by U.S. and NATO forces.

Economic espionage, supported by extensive open-source research, computer network exploitation, and targeted intelligence operations also enables China to obtain technologies to supplement indigenous military modernization efforts. According to Defense Security Service, collection activity associated to countries from the East Asia and Pacific region focused their efforts on "information systems" technology, specifically targeting various components of military command, control, communications, computers, Intelligence, Surveillance and Reconnaissance (C4ISR) applications. Other technologies targeted included Aeronautics, Armaments and Energetic Materials and Biological. DSS attributes the targeting of Information systems to research and development shortcomings and ongoing efforts to modernize aging military and C4ISR capabilities.

The DoC's Bureau of Industry Security and the Department of Justice identified at least 26 major cases since 2006 linking China to the acquisition of controlled power amplifiers with military applications, space launch technical data and services, Delta IV rockets, information related to cruise missile design, and military grade accelerometers. Additional space related items included satellite/missile thermal insulation blankets, controlled electronic components, traveling wave tubes used with satellite and radar systems, microwave amplifiers with radar applications, and carbon fiber material for aircraft, rockets, and spacecraft.

China's continuing efforts to acquire U.S. military and dual-use technologies are enabling China's science and technology base to diminish the U.S. technological edge in areas critical to the development of weapons and communications systems. Additionally, the technologies China has acquired could be used to develop more advanced technologies by shortening Chinese R&D cycles.

In summary, China has the political/governmental will and resources to modernize its military, and it has chosen to focus specifically on space-related capabilities as one of its highest priorities. China is progressing at a steady pace in its indigenous space capabilities. Unfortunately, it was often able to accomplish this progress by exploiting foreign technologies and items, especially those from the United States. China's civilian and military space industry are fused together such that reasonable regulators must consider the high likelihood that space-related items and technology will be diverted from a civil use and applied to military programs. As China advances in operational space capabilities, it is

actively focusing on how to destroy, disrupt, or deny U.S. access to our own space assets. The United States cannot ignore the significant advances in space operational capability achieved while China has been under munitions sanctions and denied legal access to U.S. space-related technology. The logical assumption to be drawn is that if the United States were to relax controls on satellite and related items, China would purchase and acquire more of these items, and in turn, further reduce the technological edge of the United States' and its allies' space assets. The United States must walk a fine line and limit its transfers to China to only those non-sensitive items that are readily available from non-U.S. sources.

NOTE: Source for the information provided in this appendix, unless otherwise stated, is from the Office of the Secretary of Defense's Annual Report to Congress for 2011 on Military and Security Developments Involving the People's Republic of China.

## **Appendix 5**

### ***Special Export Controls (Monitoring)***

Public Law (PL) 105-261, the Strom Thurmond National Defense Authorization Act (NDAA) for Fiscal Year (FY) 1999, Section 1513, reversed the 1996 decision concerning the export jurisdiction of commercial communications satellites (COMSATs) by placing them back on the United States Munitions List (USML). This action resulted from the findings and concerns expressed in the Cox Committee investigation. The law also requires that Special Export Controls (SECs) be used in conjunction with USML licenses for the launch of satellites by certain foreign launch providers. To implement the law, the ITAR (22 C.F.R. §§120-130) articulates the use of SECs in §124.15. SECs are applied by the Department of State (DoS) through export licenses, and implemented by the Department of Defense (DoD). SECs are intended to minimize the risk of unauthorized technology transfers from U.S. satellite manufacturers to the foreign launch service providers. The SECs consist of risk mitigation measures, namely: mandatory Technology Transfer Control Plans (TTCPs) developed by the exporter and approved by DoD; the DoD review and approval of technical data prior to export; and the monitoring of technical assistance and defense services (for example, technical interchange meetings (TIMs) and factory/launch operations). PL 106-65, the NDAA for FY 2000, Section 1409, further defined and expanded upon PL 105-261 with respect to the implementation of SECs by DoD.

DoD is required by law to monitor all activities related to export of a satellite or related items for launch in a foreign country, unless it is a member of the North Atlantic Treaty Organization (NATO) or a major non-NATO ally of the United States. To ensure that unauthorized transfers do not take place, all aspects of the launch are monitored including technical assistance, defense services, and reviews of technical data. Since PL 105-261 was enacted, the DoD has created a dedicated cadre of engineers with significant experience and expertise in satellite and launch vehicle technologies. From FY 2000 through the first quarter of FY 2010, DoD monitoring of more than 100 launches has contributed to the prevention of any known unauthorized technology transfers. DoD oversight and monitoring have created a cooperative export control awareness and compliance culture in U.S. industry. The review and approval of TTCPs and technical data, and the scheduling of monitoring activities are conducted using a near real-time, web-based tool that maximizes responsiveness to industry. This risk mitigation approach has been proven effective since the enactment of P.L. 105-261.

Current law requires SECs regardless of the assessed risk of unauthorized disclosure. The law does not permit DoD discretion to waive or exempt a given license activity from mandatory monitoring. By statute, the costs associated with mandatory monitoring are fully reimbursed by industry to DoD. PL 105-261, Section 1514, states that “the costs of such monitoring services shall be fully reimbursed to the DoD by the person or entity receiving such services.” Reimbursed costs include employee, administrative, and direct travel costs. Discretionary monitoring, not reimbursed under the statute, is employed to mitigate risks for launch programs not addressed by the law. Authority for discretionary monitoring resides in ITAR §124.15(c), which states:



*“although PL 105-261 does not require the application of SECs for the launch of U.S.-origin satellites and components from or by nationals of countries that are members of NATO or major non-NATO allies, such export controls may nonetheless be applied. Further, the export of any article or defense service controlled under this subchapter to any destination may also require that the special export controls identified in paragraphs (a) (1) and (a) (2) of this category be applied in furtherance of the security and foreign policy of the United States.”*

Discretionary SECs are implemented at various levels, commensurate with the assessed risks of the activity. For example, activities associated with launch vehicle and rocket engine design and development represent a much higher level of risk of diversion than activities for marketing or insurance placement. SECs can range from technical data reviews to physical on-site monitoring depending on the level of risk involved in the program. Although the law does not require monitoring for some of the highest risk scenarios, DoD implements discretionary SECs to mitigate such risks. Mandatory monitoring and oversight is paid for by industry, whereas the cost of discretionary monitoring is covered by DoD appropriated funds. Furthermore, in the event of a launch failure, a separate license requiring SECs is mandatory in accordance with PL 105-261 and ITAR §124.15.

The primary launch service providers for commercial COMSATs are France (Ariane and Soyuz launched from French Guiana), Russia (Proton and Soyuz), and Ukraine/Russia (Zenit – Sea Launch/Land Launch). China can provide launch services with its Long March rocket. However, U.S. satellites or foreign satellites with U.S. ITAR content cannot be launched on the Long March without a Presidential waiver, due to statutory limitations, including the Tiananmen Square sanctions. Such a waiver has never been approved for satellites licensed under the USML since enactment of the NDAA for 1999. However, soon after the NDAA for 1999 was passed in October 1998, there were four U.S. satellites launched from China, two on a launch in December 1998 and two on another launch in June 1999. Presidential certifications/waivers were granted for the launch of these satellites that had previously been approved for export under the EAR. There are additional U.S. and foreign entities developing launch vehicles. These launch vehicles are at different stages of developmental maturity, with SpaceX's Falcon operational and Orbital Science's Taurus II close to being operational. Although virtually all U.S. launch capacity is committed to military and civilian government missions, these new vehicles are focused on commercial markets including providing launch services for foreign-built satellites.

The greatest risk of unauthorized transfer of technology is during satellite or launch failure analyses and investigations. The exchange of technical data and defense services for such analyses and investigation, regardless of the jurisdiction/origin of the satellite or related item, should require an ITAR license with monitoring required at the discretion of DoD and DoS and reimbursed by the license applicant. These activities should remain under USML control and continue to require strong oversight.

Regardless of jurisdiction, the risk of unauthorized technology transfers remains during the U.S. satellite build, test, and integration onto a foreign launch vehicle and subsequent launch. Such

risk is equally present during the same activities for a foreign satellite launched on a U.S. vehicle. This risk can best be mitigated by applying SECs on a case-by-case basis, taking into account the foreign parties (end-users) and the scope of activities (technical data and defense services). This approach implements SECs in direct relation to risk associated with the specific licensed activities. Those activities that may warrant oversight and monitoring via SECs include:

- 1) technical discussions and activities, including the design, development, operation, maintenance, modification and repair of satellites, satellite components, and associated equipment;
- 2) technical discussions and activities related to satellite processing and launch activities, including launch preparation, launch facilities, launch vehicles, satellite transportation, satellite-to-launch vehicle integration, testing and checkout prior to launch, satellite launch, launch site storage of the satellite and associated equipment, return of equipment to the United States, and post-launch reviews; and
- 3) technical discussions and activities related to satellite and launch vehicle anomalies and failures.

Currently under the ITAR, the U.S. Government has the discretion to impose SECs for satellite or launch vehicle programs or services, for which it has determined that significant risk of unauthorized technology transfer exists. The decision to apply discretionary SECs is made during the license review process based on a risk analysis of the scope of activities identified in the license application and the license participants (end-users). The level of SECs recommended by DoD and imposed on USML licenses by DoS is tailored to the given license based on feedback from a separate DoD group responsible for monitoring.

With respect to satellite-to-launch vehicle integration, the commercial COMSAT manufacturer supplies interface data to the launch service provider in order to ensure the successful integration of the satellite onto the launch vehicle and provides data necessary to enable the launch provider to define the mission parameters and events for the satellite's orbit insertion. The commercial COMSAT manufacturer's data includes form (e.g., clearance requirements), fit (e.g., interface tolerances), mass, electrical (e.g., battery charging), mechanical (e.g., lift requirements), environmental requirements (e.g., temperature, vibration, and acoustics), dynamic load limits, telemetry, fairing access, launch pad access, launch parameters, safety, transportation, and facility requirements. More specifically, the commercial COMSAT manufacturer does not assist the launch service provider in the launch vehicle configuration, mission profile design, launch vehicle checkout, actual launch preparation, and launch, including fuel loading, guidance updates, orbit targets, weather input, flight profile events such as engine shutdown, maximum aerodynamic coast, separation, etc. Conversely, the launch service provider does provide assistance with spacecraft design, configuration, or orbital analysis. The satellite manufacturer and the launch service provider exchange technical data through a document called the Interface Control Document (ICD). The ICD is based upon the data from the satellite manufacturer (delineated above) and the launch service provider. The launch service provider also provides form, fit, and function data for the launch vehicle to the satellite manufacturer. The ICD is a

contractual document that describes each party's responsibilities concerning the integration and mission requirements.

DoD oversight and monitoring ensures that the U.S. parties maintain export control discipline. It is noteworthy that the ITAR violations by U.S. commercial COMSAT manufacturers, which commenced in 1996 and drove the transfer of commercial COMSATs from the CCL back to the USML, were not caused by U.S. satellite manufacturers during launch integration activities. Instead, these violations of the law were subsequent to the failure of the launch vehicle to place the satellite in orbit and the result of U.S. satellite manufacturers' providing defense services by assisting in the failure review of a foreign launch vehicle without a license. Since these launches occurred under EAR jurisdiction, no U.S. monitors were present, and the U.S. manufacturers did not secure the necessary ITAR licenses to engage in launch failure discussions.

Subsequent to 1999, U.S. commercial COMSATs were placed under ITAR jurisdiction. Since 1999, SECs have been applied to all licenses for launch services in countries that are not a member of NATO or are not a major non-NATO ally. During the 10 years of oversight and monitoring of more than 100 satellite launch programs, there have been no known unauthorized technology transfers. DoD oversight and monitoring have thus been effective in mitigating the risks of unauthorized technology transfers.

The application of SECs will be necessary to preclude the recurrence of events that led to the enactment of P.L. 105-261, if commercial communication satellites are moved from the USML to the CCL. SEC safeguards and verifications must be maintained and applied at an appropriate level for satellite-to-launch vehicle integration export authorizations. The history of SEC implementation since 1999 validates that SECs have prevented a recurrence of the violations that occurred in 1996. Those violations occurred, in large part, because SECs on CCL items were not allowed.

## **Appendix 6**

### **Congressional Requirement**

#### **National Defense Authorization Act for Fiscal Year 2010, P.L. 111-084, October 28, 2009**

##### **Sec. 1248. RISK ASSESSMENT OF UNITED STATES SPACE EXPORT CONTROL POLICY.**

(a) Assessment Required.--The Secretary of Defense and the Secretary of State shall carry out an assessment of the national security risks of removing satellites and related components from the United States Munitions List.

(b) Matters to Be Included.--The assessment required under subsection (a) shall included the following matters:

(1) A review of the space and space-related technologies currently on the United States Munitions List, to include satellite systems, dedicated subsystems, and components.

(2) An assessment of the national security risks of removing certain space and space-related technologies identified under paragraph (1) from the United States Munitions List.

(3) An examination of the degree to which other nations' export control policies control or limit the export of space and space-related technologies for national security reasons.

(4) Recommendations for--

(A) the space and space-related technologies that should remain on, or may be candidates for removal from, the United States Munitions List based on the national security risk assessment required paragraph (2);

(B) the safeguards and verifications necessary to--

(i) prevent the proliferation and diversion of such space and space-related technologies;

(ii) confirm appropriate end use and end users; and

(iii) minimize the risk that such space and space-related technologies could be used in foreign missile, space, or other applications that may pose a threat to the security of the United States; and

(C) improvements to the space export control policy and processes of the United States that do not adversely affect national security.

(c) Consultation.--In conducting the assessment required under subsection (a), the Secretary of Defense and the Secretary of State may consult with the heads of other relevant departments and agencies of the United States Government as the Secretaries determine is necessary.

(d) Report.--Not later than 180 days after the date of the enactment of this Act, the Secretary of Defense and the Secretary of State shall submit to the congressional defense committees and the Committee on Foreign Affairs of the House of Representatives and the Committee on Foreign Relations of the Senate a report on the assessment required under subsection (a). The report shall be in unclassified form but may include a classified annex.

(e) Definition.--In this section, the term "United States Munitions List" means the list referred to in section 38(a)(1) of the Arms Export Control Act (22 U.S.C. 2778(a)(1)).