National Space Society

NSS Response to:

State Department Request for Public Comment on ITAR

July 2013

Introduction

As part of the President's Export Control Reform effort, the Department of State proposes to amend the International Traffic in Arms Regulations (ITAR) to revise Category XV (Spacecraft Systems and Related Articles) of the U.S. Munitions List (USML) to describe more precisely the articles warranting control on the USML. The definition of "defense service" is to be revised to, among other changes, specifically include the furnishing of assistance for certain spacecraft related activities.
Below is the response from the National Space Society expressing concerns that the regulations as proposed could have a major negative impact on development and use of commercial suborbital and orbital manned space vehicles, satellite and spacecraft servicing and refueling, and space solar power.

NSS Response to State Department NOPR DOS_FRDOC_0001-2421 on International Traffic in Arms: Revision of U.S. Munitions List Category XV and Definition of Defense Service

General Comments

The National Space Society (NSS) hereby urges the State Department to make changes in the proposed new Munitions List, so as to more completely fulfill the guidance from Congress and the Administration, accounting for guidance from PL 112-239 (section 1261), from the National Export Initiative and from bipartisan guidance on the importance of energy and environment issues in defining current threats to national security (see Climate Change, National Security, and the

Quadrennial Defense Review; The Climate and Energy Nexus: Challenges and Opportunities for Transatlantic Security; and Climate Change and National Security). These policies clearly call for strong encouragement of exports of goods and services from US companies, not only in established markets but in new and potential markets, *in all cases* where such goods and service would (A) not be used as weapons by other nations; and (B) not support the development of weapons by other nations, except when such goods and services are already available for present or future delivery on the open market. Special efforts should be made to encourage such exports, and dispel any ambiguity about their legality, when these exports help address major issues of energy and environment, which are part of the national security consideration. Criteria (A) and (B) will be referred to in the specific recommendations below.

NSS urges special attention to editing the Munitions List (and section 120.9) so as to maximize five new markets for US companies with especially large potential: (1) the provision of space launch services, for *all* benign civilian purposes; (2) the effort to develop affordable, safe electricity to be beamed from space to Earth, as proposed in the Kalam-NSS Energy Initiative building on extensive prior work supported by the US government (see National Academy of Sciences: Laying the Foundation for Space Solar Power and NASA-NSF-EPRI Joint Investigation of Enabling Technologies for SSP) and by international collaborations including the US (see International Academy of Astronautics: The First International Assessment of Space Solar Power); (3) all forms of support (including refueling) for civilian manned space activities, such as space tourism and other activities by humans in space habitats, similar to the International Space Station (ISS), whenever these habitats are operated by transparent companies or organization, public or private, domestic or international and have little potential to be used as weapons; (4) open international efforts to develop geoengineering technology, which many leading scientists view as necessary insurance to cope with the worst case risks of climate change, regardless of the causes of climate change; and (5) vast increase in international communication, related both to internet technology and advanced potential improvements in space-based communication technology.

The authoritative citations above dispel many popular misconceptions about space solar power in particular.

NSS and the scientific societies we work with also see an urgent need to reform the treatment of information in general under ITAR, in order to account for changes in the global community and reflect the full spirit of National Security Directive NSDD 189.

Specific Comments on Category XV – paragraph (a)

a(4): Please change a(4) to "Provide space-based logistics, assembly or servicing of any spacecraft designated as a munition under the USML."

Comment: prohibiting support such as refueling to peaceful international habitats, similar to the ISS, whether public or private, is not consistent with the guidelines NSS has provided above. More precisely, in those cases where the spacecraft itself is not a munition, support for it is not either (criterion A). Another decisive consideration: space launch capability to carry fuel to space is not something available only from the US (criterion B); for example, the capacity to refuel satellites in orbit is now being developed by a Canadian company, MacDonald Dettweiler. Treating such technology as a munition in the US would simply exclude US companies from this emerging market, without any benefit to national security. The absence of US companies servicing this market would encourage other nations to develop technologies for engaging with other satellites which would do more harm than good for US national security.

a(11): Please change a(11) to: "Man-rated rocket-powered spacecraft with enough propulsion capability and re-entry shielding to be directed to selected locations on Earth at will, **or habitats designed to carry contain weapons such as missile bays or directed energy weapons**. **Launch services provided by companies organized in the US will be treated as defense services only when the cargo to be transported would itself be prohibited for export under ITAR; the international operations of such launch service companies shall be restricted only to the extent that international cargo service airlines are."**

Comment: Without this change, if all man-rated habitats were treated as weapons, ITAR would restrict the International Space Station, private space hotels, or other habitats like the ISS (criterion A) even though they do not have the capability to deliver weapons to great distances. In general, it would restrict all support to expand the human presence in space, which is not only an important export opportunity but an important hope for the future of humanity. Likewise, suppose a British company decides to send a safe and peaceful expedition to Mars, using propulsion which could not be targeted to points on Earth any more than the falling SkyLab could. US national security does not require that US companies be excluded from the opportunity to support that effort.

Additional comment: All these recommendations have been discussed widely in NSS and its advisory committees, which include experts in national security. One of the problems here is that the US is on course to having "100% of nothing" in the area of reusable launch. US companies do have key technologies now, which they will protect anyway as part of intellectual property (IP) policy, but many of the most crucial technologies are being lost due to lack of investment. There is at least some hope (as in the Kalam-NSS Energy Initiative) that well-controlled new US ventures,

selling to civilian world markets, could restore these capabilities to the US. The risk to national security is very limited, under this proposed wording, but without new investment the risk of our losing the technology is very great indeed. US national security will be much better off with "50% of something" rather than "100% of nothing." Commercial launch service markets outside the US are currently dominated by foreign competitors (criterion B).

Specific Comments on Category XV – paragraph (e)

e(1): Please change "**Antennas" to "Antennas for receiving RF information."**

Comment: This is one of our strongest concerns, because the present language would completely exclude large space structure technology that is crucial to emerging civil space applications such as advanced communication satellites and space solar power using the safest low-frequency beaming of power to Earth (at frequencies under 50 GHz). Such technology is being developed in several countries for civil use.

If it is impossible to distinguish between an antenna intended for receiving information, versus a transmission antenna, some NSS members would suggest it is better to scrap this clause altogether, because other nations already can supply this market (criterion B); however, in specific cases where a US company applies for an export license, it should be able to get clarity on who is buying the antenna, for what purpose, if it is a legitimate power satellite or civilian communication satellite.
e(2): Please change ".35" meters to "1.5 meters," and, before the semicolon, insert: **",not to include lightweight plastic or inflatable mirrors suitable for focusing light from the sun for civilian applications."**

Comment: The US remote sensing industry reports that mirrors of larger aperture are already being sold by our competitors on the world market (criterion B). Restricting antenna size was once a way to avoid helping other nations build large aperture radars. However, for radar applications, use of an array of smaller apertures now provides more capability for the same price; thus this restriction is no longer so effective as it once was.

The change in bold is especially important, to remove all aperture restrictions **for the specific cases where a large aperture is specifically part of a design to provide energy, remote sensing or broadband communication. It is also crucial to the hope of developing geoengineering capabilities (ability to quickly reverse the worst impacts of global warming in case we discover that this is urgent, as predicted by many scientists such as James Hansen).**
It may be important to open the door to developing these capabilities now, while there is time; they are essentially a form of relatively low cost insurance against the worst case risks we are facing. Likewise, in the Kalam-NSS Energy Initiative, leading

scientists in India have expressed great interest in forms of space solar power relying on lightweight mirrors, and in the maturation of technology needed to make the price tag affordable.

e(3): Please insert the words "receiving" before the word "array." Also insert: "at frequencies above 50 GHz" after "900nm."

Comment: In the recent International Academy of Astronautics (IAA) report cited above (The First International Assessment of Space Solar Power), it is proposed to use phased array technology at safe frequencies (under 50 GHz) for transmitting electric power to Earth. Japan already has that technology (criterion B), but it would be good for US companies to be able to compete. Of course, the wavelength of 50GHz RF vastly exceeds 900 nm. As the IAA report shows, phased array technology allows focusing and splitting RF power, to send it to markets of greatest need and value which will be especially important in the initial deployment of SSP technology. Many who use the term "focal plane array" assume that such arrays are used as receivers only, by definition; however, the clarification is needed because, from a physical point of view, focal plane arrays do include phased arrays (see Wikipedia article on Focal Plane Arrays) which are fundamental to the IAA design for space solar power.

e(5): Before the final semicolon, please insert: ", except for use on habitats or other satellites operated by international consortia whose designs are openly available and validated well enough to verify that they cannot be used as weapons."

Comment: The technology to stabilize large space structures such as large communications or solar power satellites should not be a concern as such technology cannot be used as weapons. The provision of wider internet access and nonnuclear sources of 24-hour electricity to other nations would be of great positive value to US national security

e(7): Please change " (e.g. lasers or RF) systems" to **"systems (e.g. lasers or systems to transmit RF at frequencies above 50GHz) which can be used as a weapon.**"

Comment: It is most important to our community that no one exclude solar power satellites operating at geosynchronous orbit from transmitting useful energy in the form of RF in frequencies somewhere in the range between 2 and 50 GHz, from antennas inherently unable to focus that energy enough to provide a weapon (due to size, distance and frequency).

e(10): Please insert "or retrograde feedback signals from Earth" after Ground Location Points.

Comment: It is important, when beaming useful energy to Earth, that it goes to the right place. Retrograde feedback signals are an important tool in reaching the

required accuracy. Weapons would be unlikely to use that technique, since it requires that the people being attacked help the attacker.

Specific Comments on the General Section (120)

Please add a new subsection: Notwithstanding any other provisions in this section, there shall be no restriction on the free transmittal of technical data, papers or talks unless such release of information entails either: (1) knowing release of classified information that was either known or should have been known to be classified; or (2) release of intellectual property (IP) by those not authorized to release such IP, as determined by the owner of the IP.

Comment: These proposed change to the ITAR draft have been thoroughly reviewed in multiple committees of the National Space Society, and in other communities we work with. The outpouring of support for this "free speech" provision was great, even among those very familiar with technical national security issues and committed to the superiority of US industry. For example, there was feeling that we already have two highly refined systems for determining what is sensitive information and what is not, and we do not need a third fuzzier and more subjective system. Some of us considered whether there should be a third exception, for true nuclear technology information, where we wish ITAR could have cracked down on certain folks trying to promote risky nuclear technologies around the world; however, on balance, a public discussion of what is truly dangerous and what is not in the nuclear area might itself constitute an ill-advised release of information at this time; on balance, we feel that adding a third category would hurt more than it helps.

Additional comment: The new guidance from Congress and the White House clearly calls for major changes in ITAR. But in defense of the old system, many would say: (1) if a cake can explode and be used as a weapon, it is important to control the recipe itself, and not just the cake; (2) in specific cases, when international technical communications are needed, arrangements can be negotiated.

The problem here has to do with a presumption of secrecy versus a presumption of free speech, in specific cases which have yet to be negotiated. There is an analogy here to the criminal code, where in the US there is a presumption of innocence and guilt has to be proven. The sheer volume and complexity of international technology discussions worldwide (e.g. via the internet) has become so great that it would simply not be practical to require the time and expense of negotiations, especially for the normal kinds of discussions which occur within scientific societies, between universities, and at conferences. It is far more efficient if "bad recipes" (information on how to make weapons not available outside the US) are specifically labeled as such, through the security classification scheme, with ongoing clarity, rather than require ambiguous case-by-case prosecution, which can put a serious damper on engineers and scientists working in the US. The damage to the

US of relying so heavily on a "third system" for classifying information (beyond security classification and IP) is now much greater than the benefits.

Also please add a subsection: All results and published papers from research funded by the National Science Foundation or from 6.1 or 6.2 research funding shall automatically count as fundamental research and public domain for purposes of ITAR.

Comment: We have discussed these recommendations with colleagues in IEEE, the world's largest society of engineers (including research engineers). They agree that White House officials in both political parties have supported their recommendations in their 2002 letter to OSTP but that there is an ever more urgent need for ITAR regulations to dispel a pernicious ambiguity which currently inhibits US research and weakens it much more than it weakens any potential adversaries. They tell us that heads of OSTP from Reagan's time to Holdren have reaffirmed their support for this principle as stated in National Security Directive NSDD 189.

About the National Space Society (NSS): NSS is an independent non-profit educational membership organization dedicated to the creation of a spacefaring civilization. NSS is widely acknowledged as the preeminent citizen's voice on space, with over 50 chapters in the United States and around the world. The Society publishes *Ad Astra* magazine, an award-winning periodical chronicling the most important developments in space. To learn more, visit www.nss.org.