RECORD OF PUBLIC COMMENTS

ADVANCED NOTICE OF PROPOSED RULEMAKING: ***Request for Public Comments Regarding Review of Commerce Control List for Items Transferred From United States Munitions List Categories IV and XV***

Publication in the *Federal Register*: March 8, 2019 (84 FR 8485)
Comments due April 22, 2019

	SOURCE	SIGNER(S) OF COMMENT	DATE
1.	Individual	William A. Root	3/14/19
2.	Harris Corporation, Space and Intelligent Systems	Michael Watson	4/22/19
3.	Northrop Grumman Corporation	Thomas P. Donovan	4/22/19
4.	Maxar Technologies	Mike N. Gold	4/22/19
5.	University of Miami, College of Engineering	Dr. Victoria Coverstone	4/22/19
6.	Aerojet Rocketdyne	Stacy S. Cristofferson	4/22/19
7.	Johns Hopkins University Applied Physics Laboratory	Greg Bourn	4/22/19
8.	Raytheon Company	James Ackerman	4/22/19
9.	The Boeing Company	Arthur Shulman	4/22/19
10.	Satellite Industry Association (SIA)	Tom Stroup	4/22/19
11.	Universities Space Research Association	Eric Hammond	4/22/19
12.	Commercial Spaceflight Federation	Jane Kinney	4/22/19
13.	Aerospace Industry Association (AIA)	Remy Nathan	4/22/19
14.	Virgin Orbit, LLC	Neil Ray	4/22/19
15.	SpaceX	Sarah Banco	4/22/19
16.	Honeywell	Michael Slonim	4/22/19

17.	**Consortium for Execution of Rendezvous Servicing Operations (CONFERS)**	**Brian Weeden**	**4/22/19**
18.	**Lockheed Martin**	**Mark Webber**	**4/22/19**
19.	**Communications & Power Industries LLC (CPI)**	**Creighton K Chin**	**4/22/19**

(i) Corrective Action

If any crack is found during any inspection required by paragraph (h) of this AD: Before further flight, obtain corrective actions approved by the Manager, International Section, Transport Standards Branch, FAA; or the European Aviation Safety Agency (EASA); or 328 Support Services GmbH's EASA Design Organization Approval (DOA); and accomplish the corrective actions within the compliance time specified therein. If approved by the DOA, the approval must include the DOA-authorized signature.

(j) No Reporting Requirement

Although 328 Support Services Alert Service Bulletin ASB–328–57–043, dated September 21, 2018, specifies to submit certain information to the manufacturer, this AD does not include that requirement.

(k) Other FAA AD Provisions

The following provisions also apply to this AD:

(1) *Alternative Methods of Compliance (AMOCs):* The Manager, International Section, Transport Standards Branch, FAA, has the authority to approve AMOCs for this AD, if requested using the procedures found in 14 CFR 39.19. In accordance with 14 CFR 39.19, send your request to your principal inspector or local Flight Standards District Office, as appropriate. If sending information directly to the International Section, send it to the attention of the person identified in paragraph (l)(2) of this AD. Information may be emailed to: *9-ANM-116-AMOC-REQUESTS@faa.gov.* Before using any approved AMOC, notify your appropriate principal inspector, or lacking a principal inspector, the manager of the local flight standards district office/certificate holding district office.

(2) *Contacting the Manufacturer:* For any requirement in this AD to obtain corrective actions from a manufacturer, the action must be accomplished using a method approved by the Manager, International Section, Transport Standards Branch, FAA; or EASA; or 328 Support Services GmbH's EASA DOA. If approved by the DOA, the approval must include the DOA-authorized signature.

(l) Related Information

(1) Refer to Mandatory Continuing Airworthiness Information (MCAI) EASA Airworthiness Directive 2018–0254, dated November 23, 2018, for related information. This MCAI may be found in the AD docket on the internet at *http://www.regulations.gov* by searching for and locating Docket No. FAA–2019–0117.

(2) For more information about this AD, contact Todd Thompson, Aerospace Engineer, International Section, Transport Standards Branch, FAA, 2200 South 216th St., Des Moines, WA 98198; telephone and fax 206–231–3228.

(3) For service information identified in this AD, contact 328 Support Services GmbH, Global Support Center, P.O. Box 1252, D–82231 Wessling, Federal Republic of Germany; telephone +49 8153 88111 6666; fax +49 8153 88111 6565; email *gsc.op@328support.de*; internet *http://www.328support.de.* You may view this service information at the FAA, Transport Standards Branch, 2200 South 216th St., Des Moines, WA. For information on the availability of this material at the FAA, call 206–231–3195.

Issued in Des Moines, Washington, on February 28, 2019.

Michael Kaszycki,

Acting Director, System Oversight Division, Aircraft Certification Service.

[FR Doc. 2019–04144 Filed 3–7–19; 8:45 am]

BILLING CODE 4910–13–P

DEPARTMENT OF COMMERCE

Bureau of Industry and Security

15 CFR Part 774

[Docket No. 181010936–8936–01]

RIN 0694–AH66

Request for Public Comments Regarding Review of Commerce Control List for Items Transferred From United States Munitions List Categories IV and XV

AGENCY: Bureau of Industry and Security, Commerce.

ACTION: Advanced notice of proposed rulemaking.

SUMMARY: As part of its work with the National Space Council, the Bureau of Industry and Security, Department of Commerce requests public comment to inform its review of the controls implemented in recent revisions to Categories IV and XV of the United States Munitions List (USML) and the related transfer of items to the Department of Commerce's Commerce Control List (CCL). These items include launch vehicles, guided missiles, ballistic missiles, rockets, torpedoes, bombs, and mines; and spacecraft and related articles. BIS's review seeks to ensure that the CCL describes these items clearly, captures those items in normal commercial use, accounts for technological developments, and implements the national security and foreign policy objectives of the United States properly.

DATES: Comments must be received by BIS no later than April 22, 2019.

ADDRESSES: Comments may be submitted through the Federal rulemaking portal (*http://www.regulations.gov*). The *regulations.gov* ID number for this rule is BIS–2018–0029. All comments (including any personally identifying information) will be made available for public inspection and copying.

FOR FURTHER INFORMATION CONTACT: For questions regarding launch vehicles, guided missiles, ballistic missiles, rockets, torpedoes, bombs, and mines (Export Control Classification Numbers (ECCNs) 0A604, 0B604, 0D604, 0E604, 9A604, 9B604, 9D604, and 9E604), contact Jeffrey Leitz, Senior Staff Engineer, Munitions Control Division, Office of Strategic Industries and Economic Security at (202) 482–7417 or *Jeffrey.Leitz@bis.doc.gov.* For questions regarding spacecraft and related items (ECCNs 9A515, 9B515, 9D515, and 9E515), contact Dennis Krepp, Director, Sensors and Aviation Division, Office of National Security and Technology Transfer Controls at (202) 482–1309 or *Dennis.Krepp@bis.doc.gov.*

SUPPLEMENTARY INFORMATION:

Background

The Bureau of Industry and Security (BIS), Department of Commerce, maintains the CCL under the Export Administration Regulations (EAR). To ensure controls align with the national security and foreign policy objectives of the U.S. Government, the USML and the CCL must be regularly reviewed and updated to account for technological developments, issues related to the practical application of these controls, and changes in the military and commercial applications of items covered by the USML or by the corresponding "600 series" and 9x515 ECCNs on the CCL.

Consistent with the objectives in Space Policy Directive–2 (available at *https://www.whitehouse.gov/presidential-actions/space-policy-directive-2-streamlining-regulations-commercial-use-space/*), this Advanced Notice of Proposed Rulemaking (ANPRM), seeks public comments to inform a review of those items on the CCL implemented in connection with the recent removal of articles from Categories IV (79 FR 34, January 2, 2014) and XV (82 FR 2889, January 10, 2017) of the USML and the placement of those items on the CCL. BIS seeks to ensure the CCL includes clear descriptions, captures items in normal commercial use, takes into account technological developments, and implements the national security and foreign policy objectives of the United States properly.

In particular, BIS seeks comment on ways to thoughtfully streamline export control regulations for both the U.S. commercial space industry as well as our international partners to lower administrative burden, decrease regulatory compliance costs as well as increase exports thereby bolstering the U.S. space commercial sector and industrial base.

Request for Comments

1. For technologies controlled under ECCN 9A515—examples include habitats, planetary rovers, and planetary systems such as communications and power—what factors or specific technologies should be considered for movement to a different ECCN or paragraph under ECCN 9A515 with less stringent licensing requirements?

2. The USG is considering further refinement or updated controls on the various technologies listed below. Are there additional specific space-related technologies not described in the list which warrant further review by State or Commerce given their current or anticipated near term commercial applications?

- Satellite thrusters (bi-propellant, electric, and liquid apogee engines);
- gyroscopes;
- inertial navigation systems;
- large aperture earth observation cameras;
- spacecraft antenna systems and adaptive Global Navigation Satellite System (GNSS) antennas;
- suborbital systems with propulsion systems currently controlled under USML;
- kapton tape;
- star trackers; and
- astrocompasses.

3. NASA continues to pursue development of the future Lunar Gateway, which may be described in USML Category XV(a). If moved to the CCL, what would be the appropriate controls to apply to items associated with the Lunar Gateway, *e.g.*, ECCNs 9A515 or 9A004?

4. Are there technologies controlled in the USML for either Category IV and XV, which are not currently described or not described with sufficient clarity which the commenter believes should be controlled under the EAR? While this notice discusses specific items based on initial communications with industry, the list is not exhaustive and commenters are encouraged to provide additional examples within both USML categories.

5. Are there specific defense articles which have entered into normal commercial use since the most recent revisions? If so, please provide sufficient detail in describing and identifying the article to support your claim. Commenters may include documentation to support this claim, *e.g.*, product information demonstrating what is currently in the market (web pages describing products and product brochures), or scientific and industry articles, in particular those also describing trends in commercial products, that resulted from new technologies or manufacturing methods.

6. Are there defense articles for which commercial use is proposed, intended, or anticipated in the next five years? If so, provide sufficient detail in describing and identifying the article to support your claim. Commenters may include documentation to support this claim, *e.g.*, product development or marketing information describing what products will soon to be in the market (web pages describing products under development, press releases related to products under development) or scientific and industry articles, in particular those describing new products that may soon enter the market place as a result of new technologies or manufacturing methods.

7. Are there other technical issues for these items which BIS should address, *e.g.*, the addition of technical notes or defined terms used in the control parameters to make the controls easier to understand and apply consistently?

8. What are the cost savings to private entities by shifting control of additional specific commercial items from the USML to the CCL? To the extent possible, please quantify the current cost of compliance with USML control of an item and any cost savings if a particular change was implemented. Cost savings could include time saved in terms of regulatory uncertainty over whether certain items are regulated as on the USML or the CCL. This reduced uncertainty, under the "bright line" approach of the USML to CCL review process, would allow both BIS and industry to avoid spending hours and resources on case by case determinations for certain items. As much as possible, please quantify time saved, reduction in compliance costs, and reduction in paperwork.

Please note general comments on other aspects of the CCL are outside of the scope of this inquiry.

Dated: February 22, 2019.

Richard E. Ashooh,

Assistant Secretary for Export Administration.

[FR Doc. 2019–04268 Filed 3–7–19; 8:45 am]

BILLING CODE 3510–33–P

DEPARTMENT OF STATE

22 CFR Part 121

[Public Notice 10568; Docket Number DOS–2018–0048]

RIN 1400–AE73

Request for Comments Regarding Review of United States Munitions List Categories IV and XV

AGENCY: Department of State.

ACTION: Advanced notice of proposed rulemaking; request for comments.

SUMMARY: As part of its work with the National Space Council, the Department of State requests comments from the public to inform its review of the controls implemented in recent revisions to Categories IV and XV of the United States Munitions List (USML). The Department periodically reviews USML categories to ensure that they are clear, do not inadvertently control items in normal commercial use, account for technological developments, and properly implement the national security and foreign policy objectives of the United States.

DATES: The Department will accept comments up to April 22, 2019.

ADDRESSES: You may send comments by any of the following methods:

- *Email: DDTCPublicComments@state.gov.* Please include "USML Categories IV and XV" in the subject line.
- *Internet:* At *www.regulations.gov.* Follow the instructions for sending comments using docket number, DOS–2018–0048.

Comments submitted through *www.regulations.gov* will be visible to other members of the public; the Department will publish all comments on the Directorate of Defense Trade Controls website (*www.pmddtc.state.gov*). Therefore, commenters are cautioned not to include proprietary or other sensitive information in their comments.

FOR FURTHER INFORMATION CONTACT: Mr. Robert Monjay, Office of Defense Trade Controls Policy, Department of State, telephone (202) 663–2817; email *publiccomments@state.gov.* ATTN: Request for Comments Regarding Review of USML Categories IV and XV.

SUPPLEMENTARY INFORMATION: One advantage of revising the USML into a more positive list is its controls can be tailored to satisfy the national security and foreign policy objectives of the U.S. government by maintaining control over those articles that provide a critical military or intelligence advantage, or otherwise warrant control under the

International Traffic in Arms Regulations (ITAR), without inadvertently controlling items in normal commercial use. This approach, however, requires that the list be regularly revised and updated to account for technological developments, practical application issues identified by exporters and reexporters, and changes in the military and commercial applications of items affected by the list.

Request for Comments

Consistent with the objectives in Space Policy Directive-2 (*see https://www.whitehouse.gov/presidential-actions/space-policy-directive-2-streamlining-regulations-commercial-use-space/*) the Department is requesting public comments on USML Categories IV (Launch Vehicles) and XV (Spacecraft). In particular, the Department is requesting comment on ways to thoughtfully streamline export control regulations for these categories for the benefit of U.S. industry as well as our international partners. Streamlining controls could lower administrative burden and regulatory compliance costs and present the opportunity for increased exports, thus bolstering the U.S. space commercial sector and industrial base.

For reference, Category IV was most recently fully revised on July 1, 2014 (*see* 79 FR 34, Jan. 2, 2014). Category XV was most recently revised on January 15, 2017 (*see* 82 FR 2889, Jan. 10, 2017). In order for your comments to be most useful, the Department encourages the public to provide comments responsive to the prompts described below. Please note general comments on other aspects of the ITAR, to include other categories of the USML, are outside of the scope of this inquiry. In particular, the Department requests comments on the following.

1. Are there emerging or new technologies that warrant control in one of the referenced categories, but which are not currently described or not described with sufficient clarity?

2. Are there specific defense articles described in the referenced categories that have entered into normal commercial use since the most recent revision of that category? If so, please include documentation to support this claim.

3. Are there defense articles described in the referenced categories for which commercial use is proposed, intended, or anticipated in the next five years? If so, please provide any documentation.

4. Are there other technical issues for these categories which the Department should address?

5. The export control system uses the size of space-based optical telescopes as the technical parameter differentiating between items controlled by the Department of Commerce in Commerce Control List (CCL) Export Control Classification Number (ECCN) 9A515.a.1and by the Department of State in USML Category XV(a)(7) and XV(e)(2). This is based on physics, and specifically the fact that larger optical telescopes generally can generate higher-resolution images than smaller ones. NASA tends to use larger optical telescopes for astrophysics missions because the celestial bodies these missions observe are many light years away, and smaller optical capabilities cannot physically meet the relevant science requirements. At the same time, because NASA missions are designed and calibrated to observe distant celestial objects, they are physically incapable of observing the Earth, which is so bright relative to distant objects that NASA's telescopes would suffer permanent physical damage if pointed at Earth. Essentially, NASA astrophysics missions form a class of spacecraft which meet the technical definition for national security-sensitive spacecraft regulated by the Department of State, but are incapable of observing the Earth.

In the past, this issue has been addressed by creating separate regulatory categories for specific missions. For example, the James Webb Space Telescope, NASA's next flagship astrophysics mission, was the subject of specific regulatory activity (*see,* 82 FR 2875 and 2889, Jan. 10, 2017) to ensure that it is controlled by the Department of Commerce under ECCN 9A004 even though it otherwise meets the control text of USML Category XV. However, since it would be impractical to issue an updated regulation every time NASA initiates a new astrophysics mission, the Department is seeking comments from the public on a way to provide technical differentiation within U.S. export control regulations between the space-based optical telescopes for astrophysics missions and those used for Earth observation.

6. The control in USML Category XV(a)(7) and XV(e)(2) is based, in part, on the size of the clear aperture of the telescope's optics. However, not all space-based telescopes use a disc-shaped viewer and thus it is not always possible to definitively determine the size of the "clear aperture" of a specific space-based electro-optical/infrared (E.O./IR) remote sensing system for the purpose of the regulations. Are there suggested revisions that would clarify the scope of Categories XV(a)(7) and XV(e)(2), such as a definition of "clear aperture"?

7. Many spacecraft are designed to provide supplies to the International Space Station and other future space stations. This activity is commonly referred to as "servicing" the space stations, which is an activity that can lead to USML control under Category XV(a)(12). Are there suggested revisions that would clarify the scope of this paragraph, such as a definition of "servicing"?

8. NASA continues to pursue development of the future Lunar Gateway, which may be described in Category XV(a). Are there any public comments regarding the potential control status of the future Lunar Gateway?

9. What are the cost savings to private entities from shifting control of a suggested specific item from USML to the CCL? To the extent possible, please quantify the current cost of compliance with USML control of an item and any cost savings if a particular change was implemented. Cost savings could include time saved in terms of regulatory uncertainty over whether a certain item is regulated as on the USML or the CCL. This reduced uncertainty, under the "bright line" approach described in the Administration's Export Reform Initiative, would allow both State and industry to avoid spending hours and resources on case by case determinations for certain items. As much as possible, please quantify time saved, reduction in compliance costs, and reduction in paperwork for a particular change.

The Department will review all comments from the public. If a rulemaking is warranted based on the comments received, the Department will respond to comments received in a proposed rulemaking in the **Federal Register**.

Dated: March 1, 2019.

Sarah Heidema,

Director, Defense Trade Control Policy Office, U.S. Department of State.

[FR Doc. 2019–04269 Filed 3–7–19; 8:45 am]

BILLING CODE 4710–25–P

March 14, 2019

From: William A. Root, Export Control Consultant
email billroot23@gmail.com; tel. 517 333 8707
To: DDTCPublicComments@state.gov
regulations.gov BIS-2018-0029

Subject: USML Categories IV and XV, DOS-2018-0048; DOC RIN 0694-AH66

References: Federal Register Vol. 84 No. 46/Friday, March 8, 2019, pages 8485- 8487

The References from DOC and DOS both request

> "comment on ways to thoughtfully strreamline export control regulations for these categories for the benefit of U.S. industry as well as our international partners."

Export controls were revived after WWII in a thoughtful, internationally coordinated, way in the form of COCOM. However, in the course of a few years, many different international agreements were signed, many international regimes were formed, many US laws were enacted, and many US agencies administered the controls.

In 1987 this fragmentation was greatly enlarged by the establishment of a Missile Technology Control Regime. Before that, COCOM administered the controls related to missiles. COCOM, and its 1989 Wassenaar successor, never transferred its missile controls to MTCR. Therefore, there is considerable overlap between MTCR and Wassenaar. In addition, both before and after establishment of MTCR, there was, and still is. considerable overlap between DOS USML and DOC CCL.

In 2009, President Obama and Defense Secretary Gates sought to reverse this diversity by announcing a "four singles" goal (single list, single administering agency, single enforcement agency, and single IT information technology). But, during the last ten years, an Export Control Reform (ECR) involving transfers from DOS USML to DOC CCL has compounded, rather than lessened, the fragmentation. ECR is a strictly US program. The U.S. made no effort to reach international agreement on either the technologies transferred nor the accompanying non-technical verbiage. There is a big difference now between the MTCR unique definition of "specially designed" and the US "catch-all plus release" definition of "specially designed."

Most US allies simply adopt internationally agreed lists as their national export control lists. The Export Control Reform Act of 2018 emphasizes the advantages of basing US controls on multilaterally agreed controls. Many of the technical differences between US and MTCR controls appear in USML Category IV.

The intent of the following recommendations is to reduce inconsistencies between MTCR and USML Category IV and related CCL controls.

Recommendations

1, Propose to MTCR that it eliminate "specially designed" and similar non-technical control modifiers.

2. Delete "specially designed" and similar non-technical modifiers from MT descriptions in USML Categories IV and XV and in related CCL ECCNs.

3. Add to each of the MT descriptions of commodity items on both the USML and the CCL a citation to the related MTCR Annex item, as follows (but also see further refinements below in Recommendations 4 , 5, 6, and 7 for commodities and 8 and 9 for technology and software):

IV	MTCR	ECCN
a1	1A1	
a2	19A1	
c	12A1	9A115
d1	2A1a, 20A1a	9A119, 9A604.f2
d2	2A1c	9A105
d3	20A1b1	9A107, 9A604.f3,4
d4	3A2	9A111, 9A118, 9A604c
h1	2A1d	7A117
h4	2A1e	9A106.c, 9A604,f5
h6	2A1eTNa,c, 3A3, 3A10, 6B2	9A108, 1B116
h8	2A1b, 20A1b	9A116. 9A604.f6
h9	2A1f	New 9A121. 9A604.f7
h11	3A4	9A117
h14	3A10	New 9A123
h15	2A1eTNb	
h17	2A1b	9A116
h20	3A3	9A108
h21	3A3, 3C1, 3C2	new 9C101, 9C102
h22	11A2, 18A3	6A103, 7A115
h26	3A8	9A103
h27	11A1	7A106
h28	10A1	7A116
h29	11A5	New 3A101.c
XVe12	20A1b1	9A107
XVe19	2A1b	9A116

4. Delete MT descriptions from the following USML commodity items for which no related MTCR Annex item has been found:

IV

b1 launch sites, mobile launcher mechanisms
In IVb, add following License Requirement Note:
IVb does not control what IVa1 or IVa2 controls.

h2 seeker
h7 nose tips
h10 self destruct
h13 motor mounts
h24 canisters
h25 fuzes
h30 classified

5 Exporters should be informed, on the USML and the CCL:
5a which USML sub-items cover a cited MTCR commodity item fully;
5b which USML sub-items cover a cited MTCR commodity item only partially; and
5c for each 5b instance, which ECCNs control the remainder.

The following is a preliminary effort to classify all entries in recommendation 3 as either 5a or 5b + 5c, taking into consideration other recommendations in these public comments. Each ECCN recommended for entire text deletion assumes that the corresponding USML sub-item in recommendation 3 would use MTCR texts to confirm its 5a classification. The following changes would be needed for ECCNs recommended for 5b and 5c. These classifications could easily be revised, depending on drafting choices to describe MT content in USML and CCL.

6A103	Change “These items are subject to the ITAR” to “not controlled by USML IV.h22"
IVh22	Add “see also 6A103"
7A006	Delete MT control and add License Requirement Note: “7A006 also described in 7A106 is controlled by 7A106, not by 7A006"
7A106	Delete “, other than those controlled by 7A006"
	Change “These items are subject to the ITAR” to “not controlled by USML IV.h27"
IVh27	Add “see also 7A106"
7A115	Change “These items are subject to the ITAR” to “not controlled by USML IV.h22"
IVh22	Add “see also 7A115"

7A116	Add to heading “not controlled by USML IV.h28"
IVh28	Add “see also 7A116"
7A117	Delete entire text and substitute “Reserved”
9A103	Delete “These items are subject to the ITAR” and add “not USML IVh26"
IVh26	Add “see also 9A103”
9A104	Delete entire text and substitute “Reserved”
9A105	Delete entire text and substitute “Reserved”
9A006	Add following License Requirement Note: ``This entry does not control what 9A106 controls.”
9A106	Delete “,other than those controlled by 9A006,” Add to heading “not controlled by USML IVh4"
IVh4	Add “see also 9A106"
9A107	Delete entire text and substitute “Reserved”
9A108	Delete entire text and substitute “Reserved” Parts in 9A108 are US controls in excess of MTCR controls.
9A011	Delete entire text and substitute “Reserved”
9A115	Add “not USML IV.c
IV.c	Add “also see 9A115"
9A116	Delete entire text and substitute “Reserved”
9A117	Delete entire text and substitute “Reserved”
9A118	Delete entire text and substitute “Reserved”
9A119	Delete entire text and substitute “Reserved”
9A604.c	Delete entire text and substitute “Reserved”

6. Add following Note at beginning of USML Category IV:

“The cited MTCR Annex text in Category IV commodity sub-items marked MT determines the extent of ITAR MT controls.

Add following Note to USML Category XV.e12 and e19:

The cited MTCR Annex text determines the extent of ITAR MT controls

7 Additional recommended revisions to MT descriptions in USML commodity items in the order they appear in the USML follow:

Revise IVa1 to read:

Complete rocket systems, per MTCR 1A1, (including ballistic missiles, space launch vehicles, and sounding rockets) delivering at least a 500 kg "payload" to a "range" of at least 300 km.

Revise IVa2 to read:

Complete rocket systems, per MTCR 19A1, (including ballistic missiles, space launch vehicles, and sounding rockets) with a "range" equal to or greater than 300 km.

Revise IVd2 to read:

Rocket propulsion subsystems, per MTCR 2A1c for 1A1, USML IVa1, as follows;

i Solid propellant rocket motors or hybrid rocket motors having a total impulse capacity equal to or greater than 1.1×10^6 Ns; or

ii Liquid propellant rocket engines or gel propellant rocket motors integrated, or to be integrated, into a liquid propellant or gel propellant propulsion system which has a total impulse capacity equal to or greater than 1.1×10^6 Ns.

Note:

Liquid propellant apogee engines or station-keeping engines specified in IVd2, for use on satellites, may be treated as Category II, if the subsystem is exported subject to end-use statements and quantity limits appropriate for the excepted end-use stated above, when having a vacuum thrust not greater than 1kN.

Revise IVd3 to read:

Rocket propulsion subsystems, not specified in IVd2, per MTCR 20A1b for 19A1, USML IVa2, as follows:

i Solid propellant rocket motors or hybrid rocket motors having a total impulse capacity equal to or greater than 8.41×10^5 Ns, but less than 1.1×10^6 Ns;

ii Liquid propellant rocket engines or gel propellant rocket motors integrated, or to be integrated, into a liquid propellant or gel propellant propulsion system which has a total impulse capacity equal to or greater than 8.41×10^5 Ns, but less than 1.1×10^6 Ns.

IVd4 omits MTCR 3A2 Technical Note.

Revise IVd4 to read:

Ramjet/scramjet/pulse jet/'combined cycle engines', per MTCR 3A2 for 1A1, USML IVa1.

Technical Note: In Item IVd4, 'combined cycle engines' are the engines that employ two or more cycles of the following types of engines: gas-turbine engine (turbojet, turboprop, turbofan and turboshaft), ramjet, scramjet, pulse jet, pulse detonation engine, rocket motor (liquid/solid-propellant and hybrid).

See 9A111 and 9A604.c for remainder of MTCR 3A2

From 9A111 delete “These items are subject to the ITAR” and revise 9A111 to read:

Per MTCR 3A2 for 1A1, devices to regulate combustion in ramjet, scramjet, pulse jet, or combined cycle engines controlled by USML IVd4, and components with the characteristics of such devices or engines.

In IIId1, add following License Requirement Note:

III.d1 does not control what IVh1controls

Revise IVh1 MT description to read:

(MT 'Guidance sets', per MTCR 2A1d for 1A1, USML IVa1 achieving system accuracy of 3.33% or less of the "range" (*e.g.*, a 'CEP' of 10 km or less at a "range" of 300 km), except with a "range" under 300 km or manned aircraft.)

Technical Notes:

1 *A 'guidance set' integrates the process of measuring and computing a vehicle's position and velocity (i.e. navigation) with that of computing and sending commands to the vehicle's flight control systems to correct the trajectory.*

2 *'CEP' (circle of equal probability) is a measure of accuracy, defined as the radius of the circle centered at the target, at a specific range, in which 50% of the payloads impact.*

Revise IVh4 MT to read:

Thrust vector control subsystems, per MTCR 2A1e for 1A1, for USML IVa1.

Technical Note: IVh4 includes the following methods of achieving thrust vector control:

a *Flexible nozzle;*

b *Fluid or secondary gas injection;*

c *Movable engine or nozzle;*

d *Deflection of exhaust gas stream (jet vanes or probes);*

e *Use of thrust tabs.*

Note: IVh4 *may be treated as MTCR Category II if the system is exported subject to end-use statements and quantity limits appropriate for an end-use "payload" less than 500 kg or "range" less than 300 km.*

See 9A106.c and 9A604.f6 for remainder of MTCR 2A1e.

In IVh6 delete MT description and add following License Requirements Note:

IVh6 does not control what IVh20 controls.

In IVh8, add following License Requirement Note:

IVh8 does not control what IVh17 controls.

In IIId2, add following License Requirement Note:

IIId2 does not control what IVh9 controls.

USML IVh17 does not now explicitly include MTCR 2A1b3 (Electronic equipment specially designed for re-entry vehicles).

Conversely, US MT controls are broader than MTCR because of:

1 US control of parts;

2 Omission from US controls of "fabricated of ceramic or ablative materials," which narrows MTCR 2A1b1 heat shield controls; and

3 Omission from US controls of "fabricated of light-weight, high heat capacity materials," which narrows 2A1b2 heat sink controls.

In IVh17, change MT to:

(MT, per MTCR 2A1b for 1A1, re-entry vehicles for USML IVa1 and equipment therefor, as follows:

i Heat shields, and components therefor, fabricated of ceramic or ablative materials;

ii Heat sinks and components therefor, fabricated of light-weight, high heat capacity materials; and

iii Electronic equipment with characteristics of these re-entry vehicles.)

See also 9A604.f7 and USML XV.e.19 for remainder of MTCR 2A1b

In XVe19 add following License Requirement Note:

XVe19 does not control what IVh17i controls.

Parts in IVh20 and 9A108 are US controls in excess of MTCR controls.

Revise IVh20 MT to read:

(MT Rocket motor cases, 'insulation' components and nozzles therefor, per MTCR 3A3, for USML IVd2i or IVd3i.

Technical Note: In IVh20, 'insulation' intended to be applied to the components of a rocket motor, i.e., the case, nozzle inlets, case closures, includes cured or semi-cured compounded rubber components comprising sheet stock containing an insulating or refractory material. It may also be incorporated as stress relief boots or flaps.

Note: Refer to 9C102 for 'insulation' material in bulk or sheet form.)

In IVh21, delete MT description and add following License Requirements Note:

IVh21 does not control what IVh20 controls.

8 ITAR Technology and Software Recommendations

The following technical data revisions in ITAR are needed to conform with MTCR:

Revise 120.6 as follows:

Defense article means any ~~item or technical data~~ commodity, software, or tangible technology designated in 121.1 of this subchapter. ...

Revise 120.10 as follows: ~~Technical data~~ Technology

(a) ~~Technical data~~ Technology means, for purpose of this subchapter

(1) Tangible Information, other than software as defined in ~~120.10a4~~ 120.45f, which is required for the design, development, production, manufacture, assembly, operation , repair, testing, maintenance or modification of defense articles~~. This includes~~ , including information in the form of blueprints, drawings, photographs, plans, instructions or documentation , plus intangible technology as defined in 120.9 Defense service.

(2) ...; or

(3) ... ~~; or~~

~~(4)~~ ~~Software (see 120.45(f) directly related to defense articles~~.

In part 125 and elsewhere throughout ITAR, including USML technical data subitems IVi and XVf, change “technical data” to “software, tangible technology, or defense service”

In USML IVi also add the following Note:

. IVi does not control for MT purposes the following software or technology related to IV.a through .h, because MTCR itself does not control such software or technology:

IVi Software for:
1A1 rocket systems (except to coordinate subsystems) (IVa1)
2A1a individual rocket stages (IVd1)
20A1a Individual rocket stages (IVd1)
20A1b Motors for 19A1,2 (IVd3)
3A10 combustion chambers and nozzles (IVh6)
6B2 nozzles (IVh6)
3A10 combustion chambers and nozzles (IVh14)
2A1b reentry vehicles (IVh17)
18A3 radomes (IVh22)
3A8 propellant tanks (IVh26);
11A5 umbilical and interstage connectors (IVh29)

IVi Technology for:
20A1a Individual rocket stages (IVd1)
19D1 software for 19A1 rockets (IVi)

But MTCR does control software for use of the following other MT portions of Category IV:

IV	MTCR
a2	19A1
c	12A1
d3	20A1b1
d4	3A2
h1	2A1d
h4	2A1e
h8	2A1b, 20A1b
h9	2A1f
h11	3A4
h15	2A1eTNb
h20	3A3
h21	3A3, 3C1, 3C2
h27	11A1
h28	10A1

And MTCR does control technology for development, production, or use of all the MT portions of Category IV except IVd1 individual rocket stages and IVi software for IVa2 rockets

In USML XVf also add the following Note:

. XVf does not control for MT purposes software for:

2A1b1 heat shields (XVe19).

But it does control software for use of:

2A1e thrusters (XVe12)

and technology for development, production, or use of the MT portions of both XVe12 and XVe19

9. EAR Technology and Software Recommendations

. CCL MT controls on software and technology for remainder of partial USML MT software and technology controls need to take into consideration that there is no MTCR control of software for radomes (MTCR 18A3 ECCN 6A103) or tanks (MTCR 3A8 ECCN 9A103). Therefore, US CCL MT controls related to USML Category IV for use software and development, production, or use technology are as follows:

MTCR			CCL		
Commodity	Software	Technology	Commodity	Software	Technology
18A3	- 0 -	18E1	6A103	- 0 -	6E101
11A1	11D1	11E2	7A106	7D101	7E101
11A2	11D1	11E2	7A115	7D101	7E101
10A1	10D1	10E3	7A116	7D101	7E101
3A8	- 0 -	3E1	9A103	- 0 -	9E604*
2A1e	2D5	2E1	9A106	9D604*	9E604*
12A1	12D1	12E1	9A115	9D604*	9E604*

* USML IVi explicitly controls 9D604 and 9E604

In 6D001 and 6D002, move MT applies to 6D102
In 6D001 add License Requirement Note:
6D001 also described in 6D102 is controlled by 6D102, not by 6D001.
In 6D002 add License Requirement Note:
6D002 also described in 6D102 is controlled by 6D102, not by 6D002.

Revise 6D102 to read:
"Software" per MTCR 11D1 or 12D3 not controlled by USML IVi "required" for the "use" of 6A108
In 6E001 and 6E002, move MT applies to 6E101
In 6E001 add License Requirement Note:
6E001 also described in 6E101 is controlled by 6E101, not by 6E001.
In 6E002 add License Requirement Note:
6E002 also described in 6E101 is controlled by 6D101, not by 6E002.
Revise 6E101 to read:
"Technology" per MTCR 11E2, 12E1, 17E1, or 18E1 "required" for the "development," "production," or "use" of 6A102, 6A103, 6A107, 6A108. 6B108, 6D102, or 6D103

In 7D001, 7D002, 7D003, move MT applies to 7D101
In 7D001 add License Requirement Note:
7D001 also described in 7D101 is controlled by 7D101, not by 7D001.
In 7D002 add License Requirement Note:
7D002 also described in 7D101 is controlled by 7D101, not by 7D002.
In 7D003 add License Requirement Note:
7D003 also described in 7D101 is controlled by 7D101, not by 7D003.
Revise 7D101 to read:
"Software" per MTCR 2D3, 9D1, 10D1, 11D1,11D2 not controllled by USML IVi "required" for the "use" of 7A101-7A107, 7A115-7A117, or 7B101-7B103
In 7E001, 7E002, 7E003, 7E004, move MT applies to 7E101
In 7E001 add License Requirement Note:
7E001 also described in 7E101 is controlled by 7E101, not by 7E001.
In 7E002 add License Requirement Note:
7E002 also described in 7E101 is controlled by 7D101, not by 7E002.
In 7E003 add License Requirement Note:
7E003 also described in 7E101 is controlled by 7E101, not by 7E003.
In 7E004 add License Requirement Note:
7E004 also described in 7E101 is controlled by 7D101, not by 7E004.
Revise 7E101 to read:
"Technology" per MTCR 9E1, 10E3, 11E2, 16E1 not controlled by USML IVi "required" for the "development., "production," or "use" of equipment or "software" controlled by 7A101 to 7A107, 7A115 to 7A117. 7B101 to 7B103, or 7D101 to 7D103

In 9D001, 9D002, 9D003, move MT applies to 9D101
In 9D001, 9D002, 9D005, 9D101, 9D104, 9D105 change "specially designed or modified" to "required"
Revise 9D001 to read:
"Software"per MTCR 3D3, 19D1 not controlled by USML IVi, not specified in 9D003 or 9D004, "required" for "development" of equipment or "technology" controlled by ECCNs 9A001 to 9A004, 9A012, 9B001 to 9B010, or 9E003
In 9D001 add License Requirement Note:
9D001 also described in 9D104 is controlled by 9D104, not by 9D001.
Revise 9D002 to read:
"Software" per MTCR 20D1 not controlled by USML IVi, not specified in 9D003 or 9D004, "required" for the "production" of equipment controlled by ECCNs 9A001 to 9A004, 9A012, or 9B001 to 9B010
In 9D002 add License Requirement Note:
9D002 also described in 9D104 is controlled by 9D104, not by 9D002.
Revise 9D103 to read:
"Software" per MTCR 16D1, not controlled by USML IVi "required" for modelling, simulation, or design integration of "MTCR 1A1" or MTCR 2A or 20A subsystems.

Revise 9D104 to read:

"Software" per MTCR 2D2, 2D4, 2D5, 2D6, 3D2, 12D1, 20D2 not controlled by USML IVi "required"for the "use" of 9A101, 9A106, or 9A115

Revise 9D105 to read:

"Software" per MTCR 1D2, 19D1 not controlled by USML IVi that coordinates the functions of more than one subsystem, in "MTCR 1A1"

Delete 9D604 in its entirety and substitute "Reserved (see USML IVi)"

In 9E001, 9E002, move MT applies to 9E101

Revise 9E001 to read:

"Technology" per MTCR 2E1, 3E1, 12E1,15E1, 16E1, 20E1, not controlled by USML IVi, "required" for the "development" of equipment or "software" controlled by ECCNs 9A001 to 9A004, 9A012, 9B001 to 9B010, or 9D001 to 9D004.

In 9E001 add License Requirement Note:

9E001 also described in 9E101 is controlled by 9E101, not by 9E001.

Revise 9E002 to read:

"Technology" per MTCR 2E1, 3E1, 12E1,15E1, 16E1, 20E1, not controlled by USML IVi, "required" for the "production" of equipment controlled by ECCNs 9A001 to 9A004, 9A012, or 9B001 to 9B010.

In 9E002 add License Requirement Note:

9E002 also described in 9E101 is controlled by 9E101, not by 9E002.

9E002 add License Requirement Note:

9E002 "technology" also described in 9E101 is controlled by 9E101, not by 9E002.

Revise 9E101 to read:

"Technology" per MTCR 2E1, 3E1, 6E1, 12E1, 15E1,16E1, 19E1,20E1 not controlled by USML IVi for the "development." "production," or "use" of equipment or "software" controlled by ECCNs 9A101, 9A103, 9A106, 9A115

Delete 9E102

Delete 9E604 in its entirety and substitute "Reserved (see USML IVi)"

HARRIS®
TECHNOLOGY TO CONNECT, INFORM AND PROTECT™

HARRIS CORPORATION

Space and Intelligence Systems
P.O. Box 37
Melbourne, FL USA 32902-0037
phone 1-585-269-6631

www.harris.com

Subject: BIS Request for Comment

Ref: BIS-2018-0029

Date: April 22, 2019

We are supportive and appreciative of the government's continued review and update to the export controls of space technologies. The following comments are submitted for the Department's consideration.

A. USML XV(e)(1)(i) currently states: *"Have a dimension greater than 25 meters in diameter or length of the major axis;".* As written it is unclear if the "25 meter" dimension applies to the active reflector surface or to the mechanical structure that supports the reflector. Harris suggests the following edit: *(i) "Have a* ***reflector surface*** *dimension greater than 25 meters in diameter or length of the major axis;"*.

B. Harris proposes an increase in the clear aperture diameter threshold for space-qualified optics in USML XV(a)(7)(i), XV(e)(2), and ECCN 9A515.g.1 from "0.50 meters" to "**0.80 meters**." The U.S. has been building high-resolution commercial imaging satellites with similar sized optics since the 1990's. Today, U.S. industry faces global competitors from at least eight countries that can produce one meter-class space-qualified optics.

C. The meaning of USML XV(a)(4) is ambiguous. Given the proliferation of commercial small satellite "constellations" it is unclear which satellites are included in the scope of XV(a)(4). Harris suggests that DDTC add a note to explain what "functioning as if one satellite" means and provide examples of what is and what is not covered by XV(a)(4).

D. In anticipation of potential foreign participation in support of NASA's Wide Field Infrared Survey Telescope (WFIRST), Harris suggests the government consider transitioning export control of the overall WFIRST system to ECCN 9A004.s-.t. This would be consistent with past export control practices for similar programs such as JWST and the ISS, which are controlled under 9A004.u-.x.

Thank you for your consideration.

NORTHROP GRUMMAN

Northrop Grumman Corporation
Corporate Office

Global Trade Management
2980 Fairview Park Drive
Falls Church, VA 22042

April 22, 2019

Department of Commerce
Bureau of Industry and Security

ATTN: Richard E. Ashooh
Assistant Secretary for Export Administration

SUBJECT: BIS–2019-04268, Request for Public Comments Regarding Review of Commerce Control List for Items Transferred From United States Munitions List Categories IV and XV

Dear Mr. Ashooh:

Northrop Grumman Corporation wishes to thank the Department for the opportunity to submit comments in review of the Commerce Control List (CCL) items transferred from the United States Munitions List (USML) Categories IV and XV. We list the Department's individual requests below in bold type followed by our comments and recommendations:

1. **For technologies controlled under ECCN 9A515—examples include habitats, planetary rovers, and planetary systems such as communications and power—what factors or specific technologies should be considered for movement to a different ECCN or paragraph under ECCN 9A515 with less stringent licensing requirements?**

   A. <u>Planetary Rovers and Space Robotics</u>
   Rovers do not meet the definition of a satellite, spacecraft or space vehicle. Autonomous or manned planetary rovers are designed to be ground vehicles to travel across a lunar or other planetary surface.

   A new 9A category should be created to address rovers and other robotic space equipment that are designed to operate in outer space but are not hardware "specially designed" for a satellite or spacecraft. Such items should not fall under 9A515.

   B. <u>Servicing Spacecraft</u>
   Spacecraft that provide logistics, assembly or servicing of another spacecraft are presently subject to a worldwide license requirement (9A515.a.4). We suggest that the Department consider removing the worldwide licensing requirement for logistics and move Logistics Spacecraft to 9A515.a.5.

   In addition, we recommend that the Department develop a definition of "service" to distinguish between a servicing spacecraft that augments or enhances existing performance capabilities of an on-orbit spacecraft, which may merit a higher level of control under 9A515.a.4 as compared to a servicing spacecraft that is merely repairing or providing maintenance and life extension services without adding to existing performance capabilities, which should be subject to a lesser level of control under 9A515.a.5.

2. **The USG is considering further refinement or updated controls on the various technologies listed below. Are there additional specific space-related technologies not described in the list which warrant further review by State or Commerce given their current or anticipated near term commercial applications?**
    - **Satellite thrusters (bi-propellant, electric, and liquid apogee engines)**
    - **Gyroscopes**
    - **Inertial navigation systems**
    - **Large aperture earth observation cameras**
    - **Spacecraft antenna systems and adaptive Global Navigation Satellite System (GNSS) antennas**
    - **Suborbital systems with propulsion systems currently controlled under USML**
    - **Kapton tape**
    - **Star trackers**
    - **Astrocompasses**

    For the items listed above that remain on the USML or that are subject to a higher level of control than 9A515.x hardware, these items cause licensing challenges for spacecraft manufacturers in having to obtain multiple export authorizations (DDTC / BIS) for technical data / technology required for one spacecraft program. We recommend that the Department make a clear distinction between hardware specially designed for a satellite / spacecraft versus hardware specially designed for a launch vehicle or missile to minimize this multi-jurisdiction licensing burden.

3. **NASA continues to pursue development of the future Lunar Gateway, which may be described in USML Category XV(a). If moved to the CCL, what would be the appropriate controls to apply to items associated with the Lunar Gateway, *e.g.,* ECCNs 9A515 or 9A004?**

    The Lunar Gateway is intended to be a lunar-orbit space station and should be controlled under 9A004 in the same manner as the James Webb Space Telescope and the International Space Station, including all specially designed parts, components, accessories, and attachments.

4. **Are there technologies controlled in the USML for either Category IV and XV, which are not currently described or not described with sufficient clarity which the commenter believes should be controlled under the EAR? While this notice discusses specific items based on initial communications with industry, the list is not exhaustive and commenters are encouraged to provide additional examples within both USML categories.**

    A. <u>Thermal Batteries</u>

    Thermal batteries for Category IV items are captured in both the USML and the CCL. Please consider removing these specific types of thermal batteries from the Cat XIII(h)(3) entry, as they are sufficiently controlled under CCL ECCN 9A604.a, and the double entry introduces opportunities for misunderstanding within industry. Note that the 9A604.a CCL category was created when USML Category IV was revised (see - 79 Fed. Reg. 265, 278 (Jan. 2, 2014))

    Current USML and CCL Categories referencing thermal batteries include:

USML XIII(h)(3) - Thermal batteries (MT if designed or modified for rockets, SLVs, missiles, drones, or UAVs capable of achieving a range equal to or greater than 300 km. *See* note to paragraph (d) of this category);

9A604 a - Thermal batteries "specially designed" for systems controlled under USML Category IV capable of a range equal to or greater than 300 km; and

9A604 b - Thermal batteries, except for thermal batteries controlled by 9A604.a, that are "specially designed" for systems controlled under USML Category IV.

Thermal batteries are also used in other applications besides those cited in USML Category IV. If additional controls are required, recommend creating a new category under CCL 3A.

B. <u>Servicing Spacecraft</u>

USML Category XV (a)12 covers spacecraft that "Are specifically designed to provide inspection or surveillance of another spacecraft, or service another spacecraft via grappling or docking."

We recommend that the Department remove this paragraph. All inspection, surveillance and servicing spacecraft, regardless of a grappling or docking feature, should be controlled under the jurisdiction of the US Department of Commerce under 9A515.a.4. These particular methods of attachment do not merit a USML control.

In addition, a definition of "service" would be helpful to distinguish between servicing spacecraft that augment or enhance the existing capabilities of an on-orbit spacecraft, which may merit a higher level of control as compared to a servicing spacecraft that repairs or provides maintenance and life extension services without enhancing existing on-orbit spacecraft capabilities.

Clarification is also needed to highlight that providing supplies or cargo does not meet the definition of "servicing".

C. <u>Payload Adaptor</u>

The adapter which connects the Space Launch Vehicle (SLV) to the Spacecraft is alternately called a payload adapter (by SLV manufacturers) and a launch vehicle adapter (by spacecraft manufacturers). It is the interface hardware necessary to launch a spacecraft on a SLV. The adaptor does not appear to be specifically enumerated on the USML or the CCL.

It is important to note that the adapter is not required for the space launch vehicle; a space launch vehicle can launch without a payload adapter. We recommend that the Department add a note to clarify that: 9A515.x includes payload adapters used to integrate payloads to space launch vehicles.

5. Are there specific defense articles which have entered into normal commercial use since the most recent revisions? If so, please provide sufficient detail in describing and identifying the article to support your claim. Commenters may include documentation to support this claim, *e.g.,* product information demonstrating what is currently in the market (web pages describing products and product brochures), or scientific and

industry articles, in particular those also describing trends in commercial products, that resulted from new technologies or manufacturing methods.

No comment.

6. **Are there defense articles for which commercial use is proposed, intended, or anticipated in the next five years? If so, provide sufficient detail in describing and identifying the article to support your claim. Commenters may include documentation to support this claim, *e.g.,* product development or marketing information describing what products will soon to be in the market (web pages describing products under development, press releases related to products under development) or scientific and industry articles, in particular those describing new products that may soon enter the market place as a result of new technologies or manufacturing methods.**

   No Comment.

7. **Are there other technical issues for these items which BIS should address, *e.g.,* the addition of technical notes or defined terms used in the control parameters to make the controls easier to understand and apply consistently?**

   A. **Space Vehicle Definition**
   We recommend that the Department provide a definition of a "Space Vehicle" in both the ITAR and EAR to clarify the differences between a "Space Launch Vehicle", "Spacecraft" and "Space Vehicle".

   B. **Classified Components, Encryption, Hosted Payloads**
   CCL Category 9, 9A515 states that "Spacecraft" and other items described in ECCN 9A515 remain subject to the EAR even if exported, reexported, or transferred (in-country) with defense articles "subject to the ITAR" integrated into and included therein as integral parts of the item. In all other cases, such defense articles are subject to the ITAR.

   USML Cat XV(a)(13) controls spacecraft that "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 USML Category XIII of this subchapter)."

   Note 1 to paragraph (a) states, in part, that: "Spacecraft described in ECCNs 9A004 and 9A515 remain subject to the EAR even if defense articles described on the USML are incorporated therein, except when such incorporation results in a spacecraft described in this paragraph." This means that an EAR-controlled spacecraft that has a single classified component/sensor suite or Military hosted payload with classified encryption arguably becomes a wholly ITAR spacecraft controlled under XV(a)(13).

   Spacecraft platforms that are built to accommodate multiple payloads, including a mix of classified and unclassified, and/or laser communication terminal components that communicate separately from classified encryption channels should not be subject to blanket USML XV(a)(13) classification because of one classified component/sensor suite or classified encryption utilized on Military hosted payload. By definition in XV(e)(17), a hosted payload "performs an additional, independent mission which does not dictate control or operation of the spacecraft." Note 2 to paragraph (e)(17) recognizes that an

EAR-controlled spacecraft does not become subject to the ITAR even when incorporating a hosted payload performing a function described in XV(a). In addition, Note 2 to paragraph XV(e) specifically states that "The articles described in this paragraph are subject to the EAR when, prior to export, reexport, retransfer or temporary import, they are integrated into and included as an integral part of an item to the EAR (see note 2 to paragraph (e)(17) of this category).

We request that the Department resolve the inconsistency between these notes and XV(a) and clarify that a spacecraft which includes a classified component/sensor suite or military hosted payload utilizing classified encryption remain subject to the EAR, and only becomes a USML XV(a)(13) spacecraft once the spacecraft mission, in total, becomes classified. .

C. <u>Telemetry for Launch Vehicles</u>

Note 3 to USML Cat XV paragraph (f) and Note 2 to EAR Category 9E state that the regulations "do not control the data transmitted to or from a satellite or spacecraft, whether real or simulated, when limited to information about the health, operational status, or measurements or function of, or raw sensor output from, the spacecraft, spacecraft payload(s), or its associated subsystems or components. Such information is not within the scope of information captured within the definition of technology in the EAR for purposes of Category 9 Product Group E. Examples of such information, which are commonly referred to as "housekeeping data," include (i) system, hardware, component configuration, and operation status information pertaining to temperatures, pressures, power, currents, voltages, and battery charges; (ii) spacecraft or payload orientation or position information, such as state vector or ephemeris information; (iii) payload raw mission or science output, such as images, spectra, particle measurements, or field measurements; (iv) command responses; (v) accurate timing information; and (vi) link budget data. The act of processing such telemetry data—i.e., converting raw data into engineering units or readable products—or encrypting it does not, in and of itself, cause the telemetry data to become subject to the ITAR or to ECCN 9E515 for purposes of 9A515, or to ECCNs 9E001 or 9E002 for purposes of 9A004."

We request that the Department include an identical note in USML Cat IV and EAR Category 9E to specifically state that Launch Vehicle housekeeping / telemetry data is also not controlled. This request is premised on our understanding that guidance to this effect was provided to NASA in 2008 in a response to a General Correspondence that telemetry data from sounding rockets does not meet the definition of technical data as defined in 22 CFR 120.10 and therefore is not controlled as a defense article.

D. <u>9A515.y category</u>

The added .y components result from an interagency-cleared commodity classification (CCATS) and only the requesting company has access to the CCATS documentation. The description included in the .y paragraphs is brief. Further amplification of the hardware identified in .y paragraphs is necessary, for industry to properly classify these articles.

E. ECCN 9A004

We recommend deleting 9A004.b through .f, and License Requirement Note 9A004 that states that "9A004.b through .f are controlled under ECCN 9A515." to avoid confusion and potential misclassification.

We also recommend deleting 9A004.a, Space Launch Vehicles, as such vehicles are controlled under USML Category IV.

F. Star Tracker Technology 7E001 and 7E002

We request that the Department allow technology related to star trackers controlled in ECCN 7A004 (7E001 and 7E002) to be added to the list of ECCNs in 740.2(a)(5)(i) that are subject to MT controls but are nevertheless eligible for certain License Exceptions, similar to ECCNs 7E003 and 7E101.

G. Spacecraft Thrusters / Electric Propulsion Systems

We recommend distinguishing propulsion systems specially designed for a satellite / spacecraft and systems specially designed for a launch vehicle or missile.

We recommend moving spacecraft thrusters from XV(e)(12) and electric propulsion from XV(e)11(iv) to the jurisdiction of the US Department of Commerce under 9A515.h, which would be controlled for MT reasons "when the total impulse capacity is ≥ $8.41X10^5$ ns.

8. What are the cost savings to private entities by shifting control of additional specific commercial items from the USML to the CCL? To the extent possible, please quantify the current cost of compliance with USML control of an item and any cost savings if a particular change was implemented. Cost savings could include time saved in terms of regulatory uncertainty over whether certain items are regulated as on the USML or the CCL. This reduced uncertainty, under the ''bright line'' approach of the USML to CCL review process, would allow both BIS and industry to avoid spending hours and resources on case by case determinations for certain items. As much as possible, please quantify time saved, reduction in compliance costs, and reduction in paperwork.

To date, Spacecraft and launch vehicle manufacturers have not seen a cost benefit from export control reform. As the categories are more complex, industry utilizes more resources to classify hardware and associated data/technology.

Because all spacecraft components are not in the same .X category, spacecraft manufacturers utilize more resources to develop and manage export authorizations. In many cases, multiple authorizations are required for the one program:

- DDTC authorization for the Electric Propulsion
- Commerce License to discuss star tracker technology
- Commerce Licenses covering multiple technology ECCNs for data
- STA Exception for certain customers

To the extent that future regulatory changes clarify existing ambiguities and minimize the need for export authorizations under the ITAR and EAR for a single program, such changes would be expected to result in quantifiable cost savings.

Should clarification or subsequent technical discussions be necessary, please contact either Steve Headley at james.headley@ngc.com, (703-280-4806), or myself at thomas.p.donovan@ngc.com (703-280-4045).

Sincerely,

Thomas P. Donovan

Thomas P. Donovan
Director, Global Trade Management
Northrop Grumman Corporation

4350 Fairfax Drive Suite 950
Arlington, VA 22203
USA
MAXAR.COM

April 22, 2019

Via Electronic Submission on the Federal eRulemaking Portal:
http://www.regulations.gov

Richard E. Ashooh
Assistant Secretary for Export Administration
Bureau of Industry and Security
U.S. Department of Commerce
14th Street and Pennsylvania Avenue NW
Washington, DC 20230

Re: Maxar Technologies Comments on Advance Notice of Proposed Rulemaking: Request for Public Comments Regarding Review of Commerce Control List for Items Transferred From United States Munitions List Categories IV and XV
BIS–2018–0029
RIN 0694–AH66

Dear Assistant Secretary Ashooh:

Maxar Technologies ("Maxar") submits these comments in response to the Advance Notice of Proposed Rulemaking ("ANPRM") entitled Request for Public Comments Regarding Review of Commerce Control List for Items Transferred From United States Munitions List Categories IV and XV, issued March 8, 2019. 84 Fed. Reg. 8485. The ANPRM seeks public comment to inform the Bureau of Industry and Security's ("BIS's") review of space-related controls implemented in recent revisions to Categories IV (Launch Vehicles) and XV (Spacecraft) of the U.S. Munitions List ("USML") and the related transfer of items to the Commerce Control List ("CCL").

Maxar is a leading global provider of advanced space technology solutions and, as such, has a strong interest in the ANPRM and in space-related export controls. Maxar appreciates this opportunity to assist the Departments of Commerce and State in reviewing the CCL and USML to identify those defense articles and items that should be transferred to Commerce's jurisdiction under the Export Administration Regulations ("EAR"), those that should remain subject to the International Traffic in Arms Regulations ("ITAR"), and those that require clarification or other revisions. Such a review is critical to ensure that the CCL and USML support American interests and avoid obsolete and/or counterproductive controls that harm both U.S. national security and the domestic economy.

I. SPECIFIC RECOMMENDATIONS

Maxar's comments in response to selected Items from the ANPRM are below.

A. Item 2: Further refinement or updated controls on certain enumerated technologies

With respect to star trackers controlled under ECCN 7A004, Maxar recommends that BIS clarify that all technology related to satellite star trackers controlled on the CCL is eligible for the License Exception Strategic Trade Authorization ("STA"), 15 C.F.R. § 740.20. Specifically, BIS should create new paragraph 'c' for satellite star trackers within ECCN 7A004 that is not missile technology ("MT") controlled, or should exempt the technology from Part 740 restrictions on license exceptions, making the trackers eligible for the License Exception STA. Corresponding changes would also be needed for technology controls for star trackers in ECCNs 7E001, 7E002, and 7E003.

Prior to the reforms implemented in 2014, ECCN 7A004 controlled primarily star trackers used in missiles and rockets. When export control reform efforts moved satellite star trackers falling under certain performance specifications into ECCN 7A004, the entire entry remained subject to MT controls, preventing satellite star trackers which were moved from the USML to the CCL from utilizing the License Exception STA. Per 15 C.F.R. § 740.20(b)(2)(iii), the License Exception STA may not be used for any item controlled for MT reasons. In fact, no license exception may be used if an item is controlled for MT reasons, except that items described in ECCNs 7A004 (star trackers), 7B001 (related test equipment), and 7E003 (technology related to the repair, refurbishing, or overhaul of the star tracker), among other ECCNs, "may be exported as part of a spacecraft, manned aircraft, land vehicle or marine vehicle or in quantities appropriate for replacement parts for such applications under §740.9(a)(4) (License Exception TMP for kits consisting of replacement parts), §740.10 (License Exception RPL), §740.13 (License Exception TSU), or §740.15(b) (License Exception AVS for equipment and spare parts for permanent use on a vessel, aircraft or spacecraft)." 15 C.F.R. § 740.2(a)(5)(i). The CCL should be revised to state that star trackers (7A004), related test equipment (7B001), and technology related to the repair, refurbishing, or overhaul of star trackers (7E003), are not controlled for MT reasons if exported for a satellite program and are therefore eligible for license exceptions such as the STA.[1]

Maxar believes that BIS should allow exports of star tracker technology under the STA License Exception for all EAR-controlled technology related to satellite star trackers (i.e., not those controlled under USML Category XV(e)(16)) under 15 C.F.R. § 740.2(a)(5)(i) in a manner similar to technology for other satellite components. Moreover, as noted later in these comments, the technical parameters for star trackers controlled by USML Category XV(e)(16)—angular accuracy less than or equal to 1 arcsec per star coordinate and a tracking rate equal to or greater than 3.0 deg/sec—is expected to become obsolete as commercial development of low Earth orbit ("LEO") expands with higher accuracy pointing becoming a standard commercial feature.

[1] Technologies related to the development (7E001) and production (7E002) of star trackers would remain under MT control.

B. Item 3: Appropriate controls to apply to items associated with crewed and crew-tended space platforms if moved to the CCL

Concurrent with this submission, Maxar has separately recommended to the Directorate of Defense Trade Controls ("DDTC") that it extend exceptions and special provisions provided to the International Space Station ("ISS") to the Lunar Gateway, commercial habitats attached to the ISS, and to all future crewed and crew-tended space platforms, by explicitly excluding them from USML Category XV. Specifically, Maxar believes that Lunar Gateway items should be controlled under ECCN 9A004.

Export controls have a substantial impact on all commercial space operations, regardless of platform or destination; they can also have a substantial impact on National Aeronautics and Space Administration ("NASA")-led missions done in collaboration with international partners. In particular, export control-related delays can place space station operations in jeopardy, which is one reason why USML Category XV excludes the ISS and "its specially designed (as defined in the EAR) parts and components, which are subject to the EAR" as well as "articles for the ISS that are determined to be subject to the EAR via a commodity jurisdiction determination." USML Category XV(a), Note 2 to Paragraph (a). The ISS is controlled on the CCL under ECCN 9A004.w, and parts, components, accessories, and attachments that are specially designed for the ISS are controlled under ECCN 9A004.x. Moreover, the EAR provides a license exception to the ISS, which "authorizes exports and reexports required on short notice of certain commodities subject to the EAR that are classified under ECCN 9A004 to launch sites for supply missions to the ISS." 15 C.F.R. § 740.11(e), License Exception GOV ("Governments, international organizations, international inspections under the Chemical Weapons Convention, and the International Space Station").

The ISS receives special treatment because of the unique nature and needs of crewed operations in space. Like the ISS, all human spaceflight operations involve international parties and/or technologies which make simplified and expedited export control processes vital to the success of such endeavors and the protection of lives. There is no reason that the same policy rationale should not apply equally to any crewed or crew-tended space platform. Therefore, the Department of State, the Department of Commerce, and NASA should work together to ensure that the exceptions to the USML and special provisions within the CCL provided to the ISS are expanded to explicitly include the Lunar Gateway, commercial habitats attached to the ISS, and all crewed or crew-tended space platforms, regardless of location, including LEO, cislunar, and deep space. These provisions should be made explicit within USML Category XV and ECCN 9A004.

C. Item 5: Specific defense articles which have entered into normal commercial use since the most recent revisions

Electric propulsion systems and thrusters should be moved from USML Category XV(e)(11)(iv)[2] ("plasma based propulsion systems") to the CCL under ECCN 9A515.x.[3] Specifically, hall-effect thrusters, such as the Fakel SPT-100 and Snecma PPS1350 models, have been included on a large number of commercial spacecraft in the past 10-15 years and are now a standard option offered by most U.S. and international satellite manufacturers. Maintaining these systems on the USML has no impact on the technology's availability globally and only serves to make U.S. companies less competitive in the international marketplace. Therefore, in its comments submitted to the Department of State, Maxar recommends that the electric propulsion systems and thrusters described in this paragraph be transferred from the USML to the CCL.

Moreover, bi-propellant attitude control system thrusters described in USML Category XV(e)(12)[4] should be transferred to the CCL under ECCN 9A515.x. These thrusters are used to stabilize geostationary satellites along their vertical and horizontal axes via low-power, short-duration maneuvers. Such thrusters that support basic positioning maneuvers are standard on nearly all large communications satellites produced by the U.S. and global competitors. Therefore, like plasma-based propulsion systems, maintaining these bi-propellant attitude control thrusters on the USML has little to no impact on the availability of the technology to other countries. However, the thrusters presence on the USML makes American companies less competitive in the international marketplace, damaging the domestic satellite manufacturing industrial base, and thereby harming national security interests. Therefore, in separate comments to the Department of State, Maxar recommends that bi-propellant attitude control system thrusters should be transferred from the USML to the CCL.

D. Item 6: Defense articles for which commercial use is proposed, intended, or anticipated in the next five years

The technical parameters for star trackers controlled by USML Category XV(e)(16)[5] —angular accuracy less than or equal to 1 arcsec per star coordinate and a tracking rate equal to or greater than 3.0 deg/sec—is expected to become obsolete in the next five years as the commercial development of LEO expands with higher-accuracy pointing becoming a standard commercial feature.

---

[2] "Electric (Plasma/Ion) propulsion systems that provide a thrust greater than 300 milli-Newtons and a specific impulse greater than 1,500 sec; or that operate at an input power of more than 15kW." USML Category XV(e)(11)(iv), 22 C.F.R. § 121.1.

[3] "'Parts,' 'components,' 'accessories' and 'attachments' that are 'specially designed' for defense articles controlled by USML Category XV or items controlled by 9A515" and that do not meet certain specified criteria. ECCN 9A515.x, 15 C.F.R. Part 774, Supplement 1.

[4] "Thrusters (e.g., spacecraft or rocket engines) using bi-propellants or mono-propellant that provide greater than 150 lbf (i.e.,667.23 N) vacuum thrust (MT for rocket motors or engines having a total impulse capacity equal to or greater than 8.41 × 10^5 newton seconds)." USML Category XV(e)(12), 22 C.F.R. § 121.1.

[5] "Space-qualified star tracker or star sensor with angular accuracy less than or equal to 1 arcsec (1-Sigma) per star coordinate, and a tracking rate equal to or greater than 3.0 deg/sec, and specially designed parts and components therefor (MT)." USML Category XV(e)(16), 22 C.F.R. § 121.1.

E. Item 7: Other technical issues for these items

BIS and DDTC should review the technical data and software required to construct finished satellite imagery from raw encrypted data. Such technical data and software—specifically, camera models from earth imaging satellites—are required to align pixels accurately and correct for distortion, which is the first processing step toward producing the finished satellite imagery.

BIS and DDTC have already reviewed such finished imagery and issued an advisory opinion in 2003 that this type of finished imagery is neither subject to nor controlled by the CCL or the ITAR when such items are collected from a National Oceanic and Atmospheric Administration ("NOAA")-licensed earth imaging satellite. This conclusion should be made explicit in the CCL under an appropriate ECCN.[6]

II. RECOMMENDATIONS TO STREAMLINE CONTROLS

BIS seeks public comment on "ways to thoughtfully streamline export control regulations for both the U.S. commercial space industry as well as our international partners to lower administrative burden, decrease regulatory compliance costs and increase exports thereby bolstering the U.S. space commercial sector and industrial base." 84 Fed. Reg. 8485. To that end, Maxar provides the following general comments.

A. Mandate a regular review of the CCL and the USML

The USML is a control list for military items and should not control commercial or dual-use items. The State Department, in conjunction with the Commerce and Defense Departments, should formally be required to regularly review the USML and move items from the USML to the CCL if such items are unilaterally controlled by the United States, have commercial end-uses, or are otherwise commercially available. Similarly, the Department of Commerce, and other relevant federal agencies, should regularly review the CCL to remove unilateral controls and to reduce controls on items that have become widely commercially available.

The CCL and USML reviews should be mandatory and ongoing, with a manageable portion of both lists revised annually. Maxar suggests that twenty percent of the CCL and USML be examined each year, leading to a full review and revision over the course of five-year cycles.

An excellent example of the benefits of a USML review is recent reforms to controls on remote sensing technology. Prior to January 2017, the USML controlled remote sensing technology with apertures greater than .035 meters, and the rest of the world controlled this technology only for apertures greater than .5 meters. This unilateral control prevented U.S. companies from competing for international sales of imaging satellites. In January 2017, USML Category XV(a)(7)(i) was revised to raise the aperture threshold

[6] Moreover, control for the security, processing, housing, and transmission of raw data obtained from U.S.-operated satellites is subject to the NOAA licensing regime. While a camera model software will vary from sensor-to-sensor, it does not contain sufficient information required for the manufacture, assembly, or design of a satellite. Further, each individual component of a satellite, whether subject to the jurisdiction of the ITAR or the EAR, as well as the finished satellite itself, is controlled either by subsections of USML Category XV in the ITAR, or throughout the CCL, including but not limited to Categories 6, 7, and 9.

for ITAR control from .35 to .5 meters, thus making domestic businesses more competitive, without negatively effecting U.S. national security. *See* 82 Fed. Reg. 2891 (Jan. 10, 2017).

There are many other examples where the Departments of Commerce and State could immediately align CCL and USML controls with relevant multilateral regimes rather than maintaining separate unilateral controls. Regular reviews of the CCL and USML would help to maintain alignment of the US control lists with their multilateral counterparts, ensuring that domestic controls are effective and do not unnecessarily harm the ability of U.S. companies to compete in the global marketplace.

B. Reduce the number of agencies and organizations/offices that review export licenses, advisory opinions, commodity jurisdiction, and commodity classification requests

The Commerce Department is responsible for administering and enforcing the EAR, and the State Department is responsible for administering and enforcing the ITAR. However, when a request for an export license, advisory opinion, commodity jurisdiction, or commodity classification is placed with Commerce or State, the request is staffed to multiple other agencies for review and approval, such as Defense, Homeland Security, Energy, and NASA, and within these additional agencies, multiple organizations review the request. For example, three offices within State, one within Commerce, three within Defense, and one within Energy may review a single export license. This is eight layers of review per license, including from organizations that are not directly responsible for, and do not have an expertise in, commercial space, such as Energy and Homeland Security.

The multiple layers of review results in unnecessarily long processing times. Agencies commit to 30 to 60-day processing timelines for export licenses, advisory opinions, commodity jurisdictions, and commodity classifications. However, for various reasons, requests are often processed for much longer periods, sometimes upwards of 100 to 300 days. Reasons for delay include a lack of staff at the relevant organizations/offices, unavailability of staff for professional or personal reasons, and agency discretion to implement a "hold without action" in order to extend review timelines with no explanation or notification to the company. If fewer organizations were involved in the review process, there would be less potential for delay.

Additionally, the multiple layers of review may result in the attachment of provisos and conditions to export licenses that are unnecessary or impractical because the organizations/offices reviewing the licenses do not have an expertise in commercial space. Such provisos and conditions increase regulatory burdens and do not advance U.S. national security interests.

If reducing the number of organizations and offices that review requests for export licenses, advisory opinions, commodity jurisdiction, and commodity classifications is not an option, then Maxar recommends that relevant agencies identify other ways to reduce processing times, such as immediately and fully staffing the organizations/offices involved in the reviews per the recommendation below.

C. Immediately and fully staff the relevant agencies and offices responsible for administering export controls and keep these agencies and offices staffed during federal government shutdowns

The U.S. economy and national security are best served if the organizations responsible for administering and enforcing export control regulations are responsive. Currently, the lack of staff at BIS, the DDTC, the Bureau of International Security and Non-Proliferation ("ISN"), and the Defense Technology Security Agency ("DTSA") is creating delays in processing times and hindering the ability of

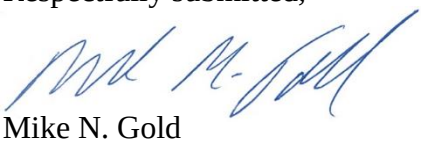
the agencies to engage in regulatory reform. Thus, we recommend immediate and full staffing of the BIS, DDTC, ISN, and DTSA.

Moreover, staffing at the BIS, DDTC, ISN, and DTSA must be maintained during federal government shutdowns. Export control functions are essential not only to the American economy but to the country's national security. In the context of human space exploration and military operations, lives are at stake. Therefore, most if not all export control officials should be considered essential personnel and must continue to support critical functions during any future federal government shutdowns.

***

Accurate, clear, and current export controls are absolutely vital to support a robust American economy as well as to maintain U.S. national security. Therefore, we applaud the attention that the National Space Council has given to export control reform, fully support the goals of Space Policy Directive 2, and greatly appreciate the Department of Commerce's work in this area.

Respectfully submitted,



Mike N. Gold
Vice President, Regulatory and Policy

UNIVERSITY OF MIAMI
COLLEGE of ENGINEERING

Department of Mechanical & Aerospace Engineering
1251 Memorial Drive
MEB Room 205
Coral Gables, Fl 33146
Phone: 305-284-2571
Fax: 305-284-2580
www.mae.miami.edu

BIS-2018-0029

Dear Assistant Secretary Ashooh,

I am writing on behalf of the University of Miami (UM). UM is committed to monitoring changes in the administration of export control laws and regulations that affect academia and the development of "specially designed" space qualified technologies. UM appreciates the opportunity to provide comments on the U.S. Department of Commerce (USDOC), Bureau of Industry and Security (BIS), Request for Public Comments Regarding Review of Commerce Control List for Items Transferred from the United States Munitions List Categories IV and XV, 84 Fed. Reg. 8485 (Mar. 08, 2019).

Mr. William J. Collins, Director of Export Compliance for the University of Miami had met with Ms. Karen H. Nies-Vogel, USDOC Director, Office of Exporter Services in San Diego, at the Association of University Export Control Officers (AUECO) Annual Conference in March 2019. She recommended that UM furnish comments pertaining to "new emerging technologies for lunar/Mars habitats, architectures and ground operations" for consideration by the USDOC for this Advanced notice of proposed rulemaking.

UM Radiation Project Overview:

UM is developing innovative technology for potential use in lunar/Mars habitats. (DARPA provided funding for computer conceptual modeling and for developing feasibility studies while NASA is supporting experimental validation of the technology.) Designs for a device that creates a protective area from harmful galactic cosmic radiation (GCR) and electrically charged particles for potential man-rated habitats are being investigated for effectiveness. The general concept is to generate a magnetic shield, like the earth's magnetosphere, by running a persistent current through loops of high temperature superconducting material. The magnetic field can stand alone or can be combined with localized magnetic fields (such as the recently discovered localized magnetospheres on Mars and the Moon.) Plasma is introduced to extend the magnetic field lines away from the superconducting magnet thereby making the system more effective.

Current approaches for protecting humans from GCR include passive shielding such as multilayer materials and water walls. Habitat designs on celestial surfaces may also include regolith and local features such as lava tubes. The technology developed at UM will not only protect humans from GCR while in transit to/from and while on the surface of the moon and Mars, but the technology will also enable spacecraft to operate in high radiation environments like the earth's Van Allen radiation belts.

Electrodynamic Dust Shield (EDS) – NASA:

During the NASA Constellation Program (Moon, Mars and Beyond) in the early part of 2004 to 2010, NASA had assembled together a combination of university researchers, government contractors and NASA engineers to investigate the feasibility of lunar surface technologies for lunar architectures and ground operations. One such technology was the Electrodynamic Dust Shield (EDS) to demonstrate "dust removal

from a view-port and from a door prior to docking procedures". The EDS technology "consisted of a series of parallel electrodes connects to a multiphase AC source that generated a traveling electrodynamic wave." "The EDS used electrostatic and dielectrophoretic forces generated by a grid of electrodes running a 2 micro A electric current to remove dust particles from surfaces." EDS systems were developed at NASA laboratories for dust mitigation of solar panels, optical systems, viewports, thermal radiators, and spacesuits for lunar and Martian exploration missions. The technologies were tested in the Desert Research and Technology Study (Desert RaTS) in Black Point Lava Flow in Arizona in 2010. *(Reference for the above summary: Calle, C.I., M.D. Hogue, A. Chen, "Integration of the Electrodynamic Dust Shield on a Lunar Habitat Demonstration Unit", ESA Annual Meeting on Electrostatics 2010, Paper D1.)*

The technology was not utilized due to the closeout of the Constellation Program in 2011. However, with the announcement of President Trump's vision to "Explore Moon to Mars Program" and increases to the 2020 budget request to put forth new technologies and systems to explore more locations on the lunar surface and sending astronauts to Mars, the EDS and GCR radiation shielding technologies could be employed. They will be "*specially designed*" for the man-rated habitats, for lunar architectures and ground operations on celestial bodies.

Combination of UM and NASA Technology: Radiation and Dust Shielding

Inspection of the radiation and dust shielding concepts indicates that the technologies are synergetic. If developed simultaneously, then mass, power and volume savings will be gained. In fact, the addition of the dust mitigation technology into the radiation shielding technology will introduce minimal marginal increases to the main design drivers of mass, power and volume.

Location for the new Technology for the radiation and dust shielding concepts:

At this time, within the U.S. Department of Commerce Export Administration Regulations (EAR) and the Commerce Control List (CCL) none of the proposed commodities and technologies are described in any Export Control Classification Numbers (ECCN's). The EAR CCL does not support any celestial surface equipment, the architectures and ground operations commodities/technologies; and there are no ECCN's for hardware, test equipment, materials, software or technology for these "space qualified" and "specially designed" items.

None of the celestial surface equipment, architectures and ground operations commodities/technologies would fit in ECCN 9X515 for the items are not identified as "spacecraft" or parts, components, accessories or attachments of that ECCN.

UM agrees that these "emerging technologies" are "space qualified" and "specially designed" items and are not military defense articles as per the ITAR. However, the celestial surface equipment, architectures and ground operations commodities/technologies may require a new classification and ECCN such as ECCN 9X250, unless the USDOC can elaborate where this commodity and technology is in the existing CCL. As the Moon, Mars and Beyond program evolves and matures and as the technologies and commodities are being developed, UM believes that we are in need of instituting "technology protection" measures within the jurisdiction of the EAR. These technologies may leapfrog out of the fundamental research environment and into a "managed controlled" environment very quickly; UM would like to remain

in compliance with USG regulations and is asking for consideration to discuss the possibilities of placing these celestial surface equipment, architectures and ground operations commodities/technologies within the EAR.

Resources:

USG:
https://www.federalregister.gov/documents/2019/03/08/2019-04268/request-for-public-comments-regarding-review-of-commerce-control-list-for-items-transferred-from

References:

https://www.researchgate.net/publication/267842567_Integration_of_the_Electrodynamic_Dust_Shield_on_a_Lunar_Habitat_Demonstration_Unit

https://spacenews.com/bridenstine-says-nothing-off-the-table-as-nasa-develops-new-lunar-plan/

https://www.nasa.gov/press-release/nasa-administrator-statement-on-nasa-s-moon-to-mars-plans-fy-2020-budget

Thank you for very much for this opportunity.

Sincerely,

V. Coverstone

Dr. Victoria Coverstone

AEROJET ROCKETDYNE

April 22, 2019

Mr. Richard E. Ashooh, Assistant Secretary for Export Administration
Bureau of Industry and Security
U.S. Department of Commerce
1401 Constitution Ave NW
Washington, DC 20230

Subject: Review of Commerce Control List for Items Transferred from USML Categories IV and XV in response to Federal Register Notice Vol. 84, No. 46, March 8, 2019

Dear Mr. Ashooh:

Aerojet Rocketdyne, Inc. (AR) appreciates the opportunity to provide comments in response to the subject Federal Register Notice related to Review of items transferred from United States Munitions List Categories IV and XV. AR supports the Bureau of Industry and Security's goals of streamlining export control regulations for the commercial space industry to secure our industrial base and reduce our export burdens. As described below, AR believes current text in Categories 9A515, 9E515, and 9A604 should be revised to reduce ambiguity, improve clarity, and thus reduce overall administrative burden.

ECCN 9A515 -- Electric (Plasma / Ion) Propulsion Systems and "specially designed" parts and components transitioned from USML Category XV(e)(11)(iv)

AR appreciates the progress regulators have made in refining USML Cat. XV(e)(11)(iv) since the initial Final Rule implemented in November 2014 by releasing certain electric propulsion systems and associated "specially designed" parts and components to ECCN 9A515, AR understands challenges this technology poses in developing clear positive control language.

State of the art commercial satellite systems available world-wide are capable of providing 20-30 kW of power and typically use electric propulsion in the 8-10 kW range. These commercial satellite systems can easily add capability up to 20kW and higher, and are limited only by cost concerns. These commercial systems are typically high mass with low power/mass ratio.

State of the art electric propulsion components, such as hall and ion thrusters and their associated power processors, are currently commercially deployed at up to 5 kW per thruster and are being developed up to 15kW per thruster for future commercial use. These thrusters have thrust capability of ~260 – 600 milli-Newtons, respectively, with specific impulse of 1,500 sec, well below any applicability to missile technology, yet these commercial designs are currently captured on the USML while operating at power levels below the 15 kW threshold of the USML due to their thrust and specific impulse output.

USML Category XV(e)(11)(iv) currently controls electric propulsion systems and specially designed parts and components of the system. Propulsion system is not a defined term; and, as such, leads to confusion as to what is positively controlled by this category since the performance (thrust and specific impulse) is controlled at the propulsion system level and not at the thruster level. Typical propulsion systems contain a propellant management sub-system (PMS) – tank, manifold, propellant control valves or orifices-, a power processing unit, and thruster(s). Propulsion systems that operate multiple plasma thrusters at the one time can readily exceed the ITAR thrust and specific impulse

threshold, while the thruster and power processor are not "specially designed" to achieve the controlled performance level.

AR, in a separate response to DDTC's request for comments, recommended that USML Category XV(e)(11)(iv) be revised to enhance clarity and usability by simply controlling plasma/ion thrusters and specially designed parts and components, including power processing units, that warrant ITAR control (i.e. thrust and specific impulse commensurate with power input levels greater than 15 kW).

AR suggests BIS create a dedicated ECCN to enumerate Plasma and Ion thrusters and "specially designed" power processors for Plasma and Ion thrusters that are released from the USML to the CCL, similar to what BIS has done for chemical spacecraft thrusters. A dedicated ECCN would alleviate the export classification challenges associated with determining whether or not a thruster and its associated power processer meets the definition of "specially designed" (i.e. peculiarly responsible for achieving or exceeding the controlled performance levels, characteristics, or functions of USML Category XV electric propulsion systems or ECCN 9A515) when a typical spacecraft electric propulsion system contains multiple plasma thrusters to achieve the controlled performance level.

ECCN 9E515 – Technology associated with ECCN 9A515.h thrusters designated Missile Technology

When DDTC revised USML Category IV to release thrusters for spacecraft, certain bipropellant rocket engines with total impulse greater than or equal to 8.41×10^5 N-sec transitions from USML Category IV(d) to newly created ECCN 9A515.h. These bipropellant rocket engines are designated as missile technology; whereas, the associated technology, ECCN 9E515.a, is not designated as missile technology.

AR respectfully requests BIS confirm technology associated with 9A515.h commodities designated as missile technology is NOT designated as missile technology or add a not to the license requirements of 9E515 to clarify that MT applies to ECCN 9E515.a technology for ECCN 9A515.h commodities controlled for MT reasons.

ECCN 9A604 – "Specially designed" parts of ECCN 9A604.x "components"

AR designs and sells thrusters for USML Category IV defense articles, and which are not captured on the USML. These thrusters contain parts and components that are "specially designed" to achieve the requirements of the USML Category IV defense article; yet, we primarily sell assembled thrusters and not the "specially designed" parts. As such, we have opted to categorize the thrusters as ECCN 9A604.x.

Unlike ECCN 9A515.x, ECCN 9A604.x does not generically control "specially designed" parts of 9A604 commodities. This presents a classification challenge. Simply following the Order of Review process leaves the classifier in a quandary about how to classify the thruster, especially when the item peculiarly responsible for the controlled performance, characteristic, or function of the Category IV defense article is a part or component of the thruster. So we choose to classify the complete thruster as ECCN 9A604.x and the "specially designed" component as ECCN 9A604.x, too.

AR recommends BIS consider adopting language similar to that of ECCN 9A515.x by controlling "specially designed" parts and components of USML Category IV and 9A604 (excluding "specially

AEROJET ROCKETDYNE

designed" parts of 9A604.e and .f), or create a new 9A604 ECCN to control thrusters "specially designed" for USML Category IV defense articles and are not controlled under USML Category IV.

Thank you for the opportunity to comment on ECCNs 9x515 and 9A604. If you have questions regarding these comments, please feel free to contact the undersigned at stacy.christofferson@rocket.com or via telephone at 425-869-4515.

Sincerely,

Stacy S. Christofferson

Stacy S. Christofferson
Export Empowered Official, International Trade Compliance

Response to
Requests for Comments by
Department of Commerce

In response to Public Notices published by the Department of Commerce (DoC) in the Federal Register on March 8, 2019, regarding the review of items in the United States Munition List (USML), Categories IV and XV, The Johns Hopkins University Applied Physics Laboratory (JHU/APL) has examined the questions articulated in these notices and would like to submit the following answers for consideration. JHU/APL is providing answers DoC questions 2, 3, 5, and 7. Question are italicized and followed by the JHU/APL responses.

DoC Question 2. *The USG is considering further refinement or updated controls on the various technologies listed below. Are there additional specific space-related technologies not described in the list which warrant further review by State or Commerce given their current or anticipated near term commercial applications?*

- *Satellite thrusters (bi-propellant, electric, and liquid apogee engines);*
- *Gyroscopes;*
- *Inertial navigation systems;*
- *Large aperture earth observation cameras;*
- *Spacecraft antenna systems and adaptive Global Navigation Satellite System (GNSS) antennas;*
- *Suborbital systems with propulsion systems currently controlled under USML;*
- *Kapton tape;*
- *Star trackers; and*
- *Astrocompasses.*

Response

a. Additional space-related technologies that warrant review by DoS or DoC include:
   - Sun sensors
   - Inertial measurement units
   - Reaction wheels
   - Solar arrays and panels
   - Deep space communications antennas
b. It would be beneficial to have a category that provides control guidance for science instruments such as
   - Mass spectrometers (particles, plasmas)
   - Spectral – visible/infrared/ultraviolet/multispectral sensors
   - Magnetometers
c. Advanced quadcopters can be used as an alternative to traditional planetary rovers for exploratory activities. Review of some functions of quadcopters may be warranted, including their software for flight reconnaissance, planning, and new landing site selection.
d. Various properties of satellite thrusters will guide the considerations for updating EAR controls on this technology. Figures of Merit related to the following properties will be

essential: specific impulse, thrust level, in-flight reliability record, longevity, and robustness to environmental and operational changes.

DoC Question 5. *Are there specific defense articles which have entered into normal commercial use since the most recent revisions? If so, please provide sufficient detail in describing and identifying the article to support your claim. Commenters may include documentation to support this claim, e.g., product information demonstrating what is currently in the market (web pages describing products and product brochures), or scientific and industry articles, in particular those also describing trends in commercial products, that resulted from new technologies or manufacturing methods.*

Response

CubeSats of 6U size or smaller have become widely available as commercial off-the-shelf (COTS) systems because of several factors.

a. *Advances in satellite technology* have provided many improvements including lighter structural elements, capable miniaturized components, and low power electronics. As a result, CubeSats can now support numerous applications including science studies, telecommunication, remote sensing, defense, and more.
b. *Standardization of CubeSat architectures* has enabled small companies to enter the market as some of the previously demanding technical obstacles have been mitigated or removed. Standardization also has lowered the cost of initial investments required for entering the market.
c. *NewSpace and big data* increased the market interest in CubeSats considerably. New opportunities have motivated commercial investments for global interconnectivity and for innovative big data solutions in Earth observation and other space-based applications.
d. *Increase in number of countries* interested in developing a domestic capability has enhanced the demand for CubeSat network development or for low-cost, space-based services.

A recent report published by BIS Research states that the global CubeSat market generated more than $140 million in 2017, and it is expected to exceed $350 million by 2023. The global market has plans for launching more than 3,600 CubeSats (nano, micro, and pico) in the next 10 years. Key suppliers of CubeSats include Airbus S.A.S., The Boeing Company, Ball Corporation, Clyde Space Ltd., GomSpace A/S, Israel Aerospace Industries Ltd., Lockheed Martin Corporation, NanoAvionika, LLC, Northrop Grumman Corporation, OHB SE, QinetiQ Group Plc, Space Systems Loral (SSL), LLC, and Tyvak Nano-Satellite Systems, Inc.

The COTS availability of 6U or smaller CubeSats warrants further review of this technology for less stringent licensing requirements.

DoC Question 7. *Are there other technical issues for these items which BIS should address, e.g., the addition of technical notes or defined terms used in the control parameters to make the controls easier to understand and apply consistently?*

Response

a. The control of optical systems and radar in earth-based versus space-based Situational Awareness applications needs clarification to ensure precise understanding and consistent implementation.
b. Hardware purchased from a foreign vendor often needs to be sent back to the vendor for various reasons, including repair, maintenance, calibration, or exchange. In the case of hardware that originated abroad, a less stringent licensing requirement is warranted, especially if the U.S. user can document the fact that the hardware does not bear any indication of what it was used for or the data that it produced during use by the U.S. individual.

DoC Question 3. *NASA continues to pursue development of the future Lunar Gateway, which may be described in USML Category XV(a). If moved to the CCL, what would be the appropriate controls to apply to items associated with the Lunar Gateway, e.g., ECCNs 9A515 or 9A004*?

Response

a. The national interest in space activity in Earth's Cis-Lunar space is turning toward participation by the private or commercial sector. Planning trajectories in this domain involve three-body calculations of a sort different from the two-body codes employed previously in Deep Space exploration. The basis of three-body trajectory planning is use of mathematics from the domain of basic or fundamental research. Verified codes that employ this mathematics may need to be reviewed to determine if they are appropriate items for inclusion in either ITAR or EAR control.
b. The use of unmanned probes for Lunar Gateway applications warrants review to determine if ITAR or EAR control should be applied to this technology.

April 22, 2019

Mr. Richard E. Ashooh
Assistant Secretary for Export Administration
Bureau of Industry and Security
U.S. Department of Commerce
Via: *www.regulations.gov*

Subject: Raytheon Company Comments on Review of CCL for Items Transferred from USML Categories IV and XV
Docket ID: BIS-2018-0029
Ref: 84 Fed. Reg. 8486

On March 8, 2019, the U.S. Department of Commerce, Bureau of Industry and Security (BIS) requested comments from the public to "inform its review of the controls implemented in recent revisions to Categories IV and XV of the U.S. Munitions List (USML) and the related transfer of items to the […] Commerce Control List (CCL)." Specifically, BIS requested comment on ways to "thoughtfully streamline export control regulations for these categories for the benefit of U.S. industry as well as our international partners [….] thus bolstering the U.S. space commercial sector and industrial base." To this end, BIS posed eight specific questions for consideration. Raytheon Company ("Raytheon") offers the below response to questions (4) and (5).

I. 4. Are there technologies controlled in the USML for either Category IV and XV, which are not currently described or not described with sufficient clarity which the commenter believes should be controlled under the EAR?

Raytheon believes the aperture criterion of .50m in Category XV(e)(2)(ii) may be too strict and recommends BIS consider increasing the reference aperture size (e.g., to 1.1m). This change is recommended because non-U.S. built commercial imaging satellites are already using apertures larger than 0.5m and the adverse effect on U.S. industry's competitiveness in the international market should be considered when evaluating tight controls on performance parameters. As an alternative, Raytheon notes that – while aperture size remains relevant as part of an overall risk calculus – other performance parameters may be equally significant in distinguishing military and intelligence applications. As such, pairing aperture size with other performance parameters could potentially accomplish the same national security objectives.

II. 5. Are there specific defense articles which have entered into normal commercial use since the most recent revisions?

Non-U.S. aerospace entities currently develop and operate a variety of high-resolution space imaging systems, including the China High-resolution Earth Observation System (or "CHEOS"). The availability and commercial use of such systems suggests that controls related to space imaging should be carefully assessed to ensure they continue to distinguish between military and commercial applications.

*****

Raytheon appreciates BIS's willingness to solicit feedback on forward-looking topics of this nature.

The Boeing Company
929 Long Bridge Drive
MC 7949-5929
Arlington, VA 22202-4208

April 22, 2019

Regulatory Policy Division
Bureau of Industry and Security
U.S. Department of Commerce, Room 2099B
14th Street and Pennsylvania Avenue NW
Washington, DC 20230

Subject: Request for Public Comments Regarding Review of Commerce Control List for Items Transferred from United States Munitions List Categories IV and XV, BIS-2018-0029

Reference: Federal Register / Vol. 84, No. 46 / Friday, March 8, 2019 / Proposed Rules

Via http::://www.regulations.gov

Dear Sir/Madame:

The Boeing Company ("Boeing") appreciates the opportunity to provide comments in response to the Advanced Notice of Proposed Rulemaking on Commerce Control List ("CCL") items transferred from United States Munitions List ("USML") Categories IV and XV, consistent with the objectives in the Space Policy Directive-2. We support the Department's initiative to ensure clear descriptions of controlled items and streamlined licensing in these areas, and appreciate the interest in feedback on technological developments that might warrant the transition of certain items from the USML to the CCL.

As a satellite and spacecraft manufacturer, and prime contractor to the National Aeronautics and Space Administration ("NASA"), Boeing operates daily under the controls in USML Categories IV and XV, and the related Export Control Classification Numbers ("ECCNs"). In general, we see developments in the commercial communications satellite sector rapidly evolving into areas described on the USML. In space exploration, our comments focus on the need for greater clarity around controlled items and technologies and consideration of future NASA and commercial space exploration activities. Adjustments to controls in these areas will enable Boeing and others in U.S. industry to better perform globally, enhancing U.S. economic competitiveness without detriment to other national security considerations. We reproduce and address below the specific questions posed by the Department.

1. **For technologies controlled under ECCN 9A515—examples include habitats, planetary rovers, and planetary systems such as communications and power—what factors or specific technologies should be considered for movement to a different ECCN or paragraph under ECCN 9A515 with less stringent licensing requirements?**

Boeing recommends that non-critical, low-level items related to spacecraft such as ISS and other future stations be moved from 9A004.x and 9A515.x to 9A004.y , as follows:

*y. Items that would otherwise be within the scope of ECCN 9A004.v or .x but that have been identified in an interagency-cleared commodity classification (CCATS) pursuant to § 748.3(e) as warranting control in 9A004.y.**, or items not elsewhere enumerated on the CCL but specially designed for a commodity subject to control in ECCN 9A004, 9A515 or for a defense article enumerated in USML Category XV, as follows:***

...

y.1 Crew life support equipment, including devices for atmosphere management, water management, waste management, and food management;

y.2 Environmental monitoring equipment to measure pressure, moisture, particles, microbes, chemicals, and sound;

y.3 Crew health equipment, health monitoring devices, exercise equipment, medical diagnostic equipment, and food storage;

y.4 Radiation monitoring and protection devices; and

y.5 Fire safety devices for detection, protection, suppression, and cleanup.

2. **The USG is considering further refinement or updated controls on the various technologies listed below. Are there additional specific space-related technologies not described in the list which warrant further review by State or Commerce given their current or anticipated near term commercial applications?**
   a. **Satellite thrusters (bi-propellant, electric, and liquid apogee engines);**
   b. **gyroscopes;**
   c. **inertial navigation systems;**
   d. **large aperture earth observation**
   e. **cameras;**
   f. **spacecraft antenna systems and adaptive Global Navigation Satellite System (GNSS) antennas;**
   g. **suborbital systems with propulsion systems currently controlled under USML;**
   h. **kapton tape;**
   i. **star trackers; and**
   j. **astrocompasses**.

Boeing concurs that each of the items on this list should be reviewed for refined or updated controls. We elaborate regarding several of the items in subsequent responses below. Boeing also recommends the addition of the following items to this list:

- Launch vehicle dispensers used for the launch of multiple satellites

- Satellite-to-satellite interstage adapters

3. **NASA continues to pursue development of the future Lunar Gateway, which may be described in USML Category XV(a). If moved to the CCL, what would be the appropriate controls to apply to items associated with the Lunar Gateway, e.g., ECCNs 9A515 or 9A004?**

   Boeing strongly recommends that the Lunar Gateway and future NASA-sponsored space stations be controlled on the CCL. Given NASA's civil and scientific missions, it is unlikely that a NASA-sponsored space station would provide a critical military or intelligence advantage such that it warrants control under the International Traffic in Arms Regulations, per 22 CFR §120.3(b).

   The only commercial space station currently enumerated on the CCL is the International Space Station. To prevent multiple classification changes during the development, manufacturing, and production stages of new stations such as Lunar Gateway, existing ECCNs on the CCL should be modified to prevent items related to these platforms from being captured in the catch-all ECCN 9A515.x. Boeing recommends that ECCN 9A004.w and 9A004.x be modified to include other commercial space stations, as follows:

   w. The International Space Station being developed, launched, and operated under the supervision of the U.S. National Aeronautics and Space Administration and ***other NASA-sponsored space stations****.*
   x. "Parts," "components," "accessories" and "attachments" that are "specially designed" for the International Space Station ***and other NASA-sponsored space stations****."*

4. **Are there technologies controlled in the USML for either Category IV and XV, which are not currently described or not described with sufficient clarity which the commenter believes should be controlled under the EAR? While this notice discusses specific items based on initial communications with industry, the list is not exhaustive and commenters are encouraged to provide additional examples within both USML categories.**

   Boeing has several recommendations for clarification of controls in Categories IV and XV to better delineate militarily critical items versus commercial commodities and technologies, as follows:

   A. **Separation mechanisms and interstages:** USML Category IV(h)(11) controls "Separation mechanisms, staging mechanisms, and interstages useable for articles enumerated in paragraph (a) of this category, and specially designed parts and

components therefor." This control catches at least two items commonly used to facilitate launches of multiple commercial communications satellites at once: satellite dispensers and satellite-to-satellite interstage adapters.

1. Satellite dispensers: Boeing controls satellite dispensers as separation mechanisms under ITAR Category IV(h)(11). Because these items are in regular use for launching multiple commercial communications satellites at one time, we believe they should be enumerated in ECCN 9A604, since they are essentially an accessory that is bolted onto the launch vehicle to secure a satellite during launch.

2. Satellite-to-satellite interstage adapters: Boeing also controls these items in IV(h)(11) as "interstages." These items facilitate the stacking of satellites in a single launch vehicle but do not interface directly with the launch vehicle. We believe these adapters or interstages and their respective interfaces between the stacked satellites should be controlled under ECCN 9A515.x. Boeing designs and builds these items for various commercial satellite programs, and we believe they warrant Commerce control because they are not part of the launch vehicle and are designed around the interfaces of the satellites. These items are not peculiarly responsible for any ITAR-controlled capabilities.

We recommend the addition of a note to this subparagraph, as follows:

(11) Separation mechanisms, staging mechanisms, and interstages useable for articles enumerated in paragraph (a) of this category, and specially designed parts and components therefor (MT for those separation mechanisms, staging mechanisms, and interstages usable in systems enumerated in paragraph (a)(1) of this category);
Note: This subparagraph does not control satellite launch dispensers and satellite-to-satellite interstages, which are subject to the EAR.

B. **Antennas:** We recommend certain revisions to control language in Category XV to more clearly control only items used in defense-related applications and to release to the CCL items used in communications satellite applications. ITAR Category XV(e)(1) currently controls antenna systems with specified features, with few enumerated technical parameters.

As written, XV(e)(1)(ii) catches certain antennas used widely on communications satellites, because of the use of the term "scanning." Antennas used on communications satellites employ electronic scanning, but only for purposes of repositioning or "steering" the antenna coverage to establish or retain a communications link, and not for detecting objects or performing remote sensing. Repositioning a communications satellite antenna for coverage is done either with a steering mechanism (similar to ground tracking antennas) or by electronically steering

a fixed phased array (similar to modern Wi-Fi and 5G cellular antennas). This action–electronic steering–would seem to be caught in XV(e)(1)(ii) as "active electronic scanning" when in reality the signal is being electronically steered to provide communications in a certain geographic area.

Regarding XV(e)(1)(iii), the capability of adaptive beam forming is inherent in any phased array antenna with externally controlled beam forming algorithms, widely used in communications satellite applications.

We recommend adding the following note:

Note to (e)(1)(ii) & (iii): These controls apply to antennas used for radar or remote sensing applications and not for communications satellite applications.

C. **NASA Docking System**: The Note to Category XV(a)(12) states that spacecraft that dock exclusively via the NASA Docking System (NDS) are controlled by ECCN 9A515.a.4. Certain visiting vehicles such as Japan Aerospace Exploration Agency (JAXA)'s H-II Transfer Vehicle ("HTV") are caught by XV(a)(12) because they do not dock using NDS. Because vehicles such as HTV are not released by the Note to XV(a)(12), U.S. contractors are required to obtain State Department authorization for exchanges with these International Space Station ("ISS") partners. We see no national security risk from revising the note to include other docking systems. We recommend that the NDS be defined and controlled, along with its specially designed parts and components, in ECCN 9A515.x, and that the Note to XV(a)(12) be modified, as follows:

*"[S]pacecraft that dock exclusively using the **International** Docking System Standard, including the NDS, are controlled by 9A515.a.4."*

D. **Data related to items integrated into CCL items:** Note 1 to XV(f) is helpful to the satellite industry, as it excludes from ITAR control certain data related to CCL-controlled satellites. By adding the terms "spacecraft" and "end-user," this note will allow OEMs in other space-related sectors, including commercial and NASA-funded space programs, to pursue EAR authorization to share data with foreign partners. Our recommendation is as follows:

*Note 1 to paragraph (f): The technical data control of this paragraph does not apply to certain technical data directly related to articles described in paragraphs (c) or (e) of this category when such articles are integrated into and included as an integral part of a satellite **or spacecraft** subject to the EAR. For controls in these circumstances, see ECCN 9E515. This only applies to that level of technical data (including marketing data) necessary and reasonable for a purchaser **or end-user** to have assurance that a U.S. built item intended to operate in space has been designed, manufactured, and tested in conformance with specified contract requirements (e.g., operational performance, reliability, lifetime, product quality, or delivery expectations) as well as data necessary for normal orbit satellite operations, to*

evaluate in-orbit anomalies, and to operate and maintain associated ground station equipment (except encryption hardware).

5. **Are there specific defense articles which have entered into normal commercial use since the most recent revisions? If so, please provide sufficient detail in describing and identifying the article to support your claim. Commenters may include documentation to support this claim, e.g., product information demonstrating what is currently in the market (web pages describing products and product brochures), or scientific and industry articles, in particular those also describing trends in commercial products, that resulted from new technologies or manufacturing methods.**

Electric propulsion systems and star trackers are in normal commercial use in communications satellite programs.

A. Electric propulsion systems described in Category XV(e)(11)(iv) are in widespread use on commercial communications satellites. Boeing recommends that these types of thrusters transition to EAR control due to widespread use on commercial communications satellites and foreign availability from companies such as Safran in France and Fakel in Russia[1]. Our recommended revision to the control language is as follows:

"[E]lectric (plasma/ion) propulsion systems that provide a thrust greater than ~~*300*~~ ***450*** *milli-Newtons and a specific impulse greater than 1,500 sec; or that operate at* an input power of more than 15kW."

B. Category XV(e)(16) controls star trackers that are commonly used on commercial communications satellites. Boeing recommends that star trackers specially designed for spacecraft be transitioned from ITAR to EAR control. U.S. industry is not on the leading edge of this technology, and there is ample availability of this technology abroad. For example, we are aware that Germany's Jena Optronik is currently developing a star tracker for commercial communications satellites that will likely exceed the capabilities enumerated in XV(e)(16).

Alternatively, if star trackers that are specially designed for spacecraft are to remain on the USML, we recommend a clarification note to the control text. As written, it is unclear whether an item is controlled in this paragraph if it meets **one** of these thresholds–specified angular accuracy or tracking rate–during normal operation, or if

[1]See "Jorge J. Delgado, Ronald L. Corey, Vjacheslav M Murashko, Alexander I. Koryakin, and Sergei Y. Pridanikov, 'Qualification of the SPT-140 for use on Western Spacecraft' (paper presented at AIAA Propulsion and Energy Forum, Cleveland, OH, July 28-30, 2014).

it must meet both parameters **at the same time** during normal operation. Star trackers used on commercial communication satellites generally meet these two criteria, but do not meet both at the same time during normal operation. Our recommendation is as follows:

*"Space-qualified star tracker or star sensor with **capability to achieve simultaneously an** angular accuracy less than or equal to 1 arcsec (1-Sigma) per star coordinate, and a tracking rate equal to or greater than 3.0 deg/sec, and specially designed parts and components therefor (MT)"*

6. **Are there defense articles for which commercial use is proposed, intended, or anticipated in the next five years? If so, provide sufficient detail in describing and identifying the article to support your claim. Commenters may include documentation to support this claim, e.g., product development or marketing information describing what products will soon to be in the market (web pages describing products under development, press releases related to products under development) or scientific and industry articles, in particular those describing new products that may soon enter the market place as a result of new technologies or manufacturing methods.**

The items we described above in our responses to questions No. 4 and 5 will continue to evolve commercially further into thresholds described on the USML. For this reason, it is crucial to revise the technical control thresholds now to allow for commercial technological growth in the coming years.

7. **Are there other technical issues for these items which BIS should address, e.g., the addition of technical notes or defined terms used in the control parameters to make the controls easier to understand and apply consistently?**

We recommend clarification of the items intended for control in 9A004.a, since USML Category IV(a)(5) appears to catch any space launch vehicle not controlled in Category IV(a)(1) through (a)(4). We also recommend clarification regarding controls applicable to the items identified in 9A004.b through 9A004.f. It is easy to overlook the unusual License Requirements Note in 9A004 pointing to control of these items in a different ECCN, 9A515. We suggest clearer control of these items either in 9A004 or in 9A515.

8. **What are the cost savings to private entities by shifting control of additional specific commercial items from the USML to the CCL? To the extent possible, please quantify the current cost of compliance with USML control of an item and any cost savings if a particular change was implemented. Cost savings could include time saved in terms of regulatory uncertainty over whether certain items are regulated as on the USML or the CCL. This reduced uncertainty, under the "bright line" approach of the USML to CCL review process, would allow both BIS and industry**

to avoid spending hours and resources on case by case determinations for certain items. As much as possible, please quantify time saved, reduction in compliance costs, and reduction in paperwork.

In general, compliance with EAR controls requires fewer company resources—less time and personnel devoted to drafting and submitting licenses and complying with administrative obligations, to name just a few requirements--than compliance with Department of State ITAR controls, given the greater flexibility of licensing and exporting under the EAR versus the ITAR. The greater availability of license exceptions, the shorter timeframes for obtaining licenses when required, and more current and nuanced definitions of terms in the EAR, all allow for more streamlined but still compliant exporting of controlled commodities, technologies and software.

We hope that these comments and questions will prove helpful in your review of these controls and requirements. Please do not hesitate to contact me at 703-465-3312 or at arthur.shulman@boeing.com with any questions.

Sincerely,

Arthur Shulman
Director, Global Trade Controls

Uploaded via http://www.regulations.gov

Subject: Comment on Advanced Notice of Proposed Rulemaking Regarding Review of Commerce Control List for Items Transferred From United States Munitions List Categories IV and XV

Reference: 84 FR 8485 (March 8, 2019); RIN 0694-AH66; Docket No. 181010936-8936-01;

The Satellite Industry Association ("SIA")[1] hereby comments in response to the above-referenced Advanced Notice of Proposed Rulemaking, which seeks comments to assist the Bureau of Industry and Standards in reviewing controls of items transferred from USML Categories IV and XV.[2] SIA is a U.S.-based trade association providing representation of the leading satellite operators, service providers, manufacturers, launch services providers, remote sensing operators, and ground equipment suppliers. SIA is the unified voice of the U.S. satellite industry on policy, regulatory, and legislative issues affecting the satellite business.

To the Bureau of Industry and Security (BIS), thank you for inviting the public's comments on the advance notice of proposed rulemaking (ANPRM) for reviewing controls of items transferred from USML Categories IV and XV, and in particular space technologies. Eight questions were addressed in the ANPRM, which SIA has commented on below.

[1]SIA Executive Members include: AT&T Services, Inc.; The Boeing Company; EchoStar Corporation; Intelsat S.A.; Iridium Communications Inc.; Kratos Defense & Security Solutions; Ligado Networks; Lockheed Martin Corporation; OneWeb; SES Americom, Inc.; Space Exploration Technologies Corp.; Spire Global Inc.; and Viasat, Inc. SIA Associate Members include: ABS US Corp.; Airbus Defense and Space, Inc.; Analytical Graphics, Inc.; Artel, LLC; Blue Origin; DataPath Inc.; Eutelsat America Corp.; ExoAnalytic Solutions; Globecomm; Globalstar, Inc.; Glowlink Communications Technology, Inc.; HawkEye 360; Hughes; Inmarsat, Inc.; Kymeta Corporation; Leonardo DRS; Panasonic Avionics Corporation; Peraton; Planet; SSL; Telesat Canada; Ultisat, Inc.; and XTAR, LLC.

[2]*See Review of Commerce Control List for Items Transferred From United States Munitions List Categories IV and XV*, Advanced Notice of Proposed Rulemaking, Docket No. 181010936-8936-01 (rel., Mar. 08, 2019) ("Advanced Notice of Proposed Rulemaking").

SIA members build, launch and operate spacecraft for commercial and government sectors, including hundreds of satellites ranging from telecommunications to imagery to ship tracking to weather. These satellites, their ground elements, and data provide essential support to many sectors including in the US military, public safety, aviation, media, retail, shipping, agriculture, weather, natural resource, and banking. Our industry has had a significant experience with export control regulations and their impacts on industries which are growing and changing. The breadth of experience which informs out comments herein.

1. **For technologies controlled under ECCN 9A515 – examples include habitats, planetary rovers, and planetary systems such as communications and power – what factors or specific technologies should be considered for movement to a different ECCN or paragraph under ECCN 9A515 with less stringent licensing restrictions?**
    a. No examples provided
2. **The USG is considering further refinement or updated controls on the various technologies listed [in the Federal Register Notice]. Are there additional specific space-related technologies not described in the list which warrant further review by State or Commerce given their current or anticipated near term commercial applications?**
    a. No examples provided
3. **NASA continues to pursue development of the future Lunar Gateway, which may be described in USML Category XV(a). If moved to the CCL, what would be the appropriate controls to apply to items associated with the Lunar Gateway, e.g., ECCNs 9A515 or 9A004?**
    a. SIA recommends that the control status of the future Lunar Gateway mirror the controls on the JWST and ISS, under CCL ECCN 9A004.
    b. SIA further recommends that in furtherance of its recommendation above to question 5 of the associated USML review[3], that there be a unique ECCN for civil programs, such as the Lunar Gateway rather than individual ECCNs for each program designated this way.
4. **Are there technologies controlled in the USML for either Category IV and XV, which are not currently described with sufficient clarity which the commenter believes should be controlled under the EAR?**
    a. **Servicing and Refueling Satellites -** SIA recommends the USML define "servicing" as "to repair, provide maintenance, to augment, or enhance capabilities" in order

[3] a. Referenced text: **Civil Program Controls** - In order to address the challenges associated with early program classifications under the USML which are later reclassified under the CCL, SIA recommends the creation of an additional entry under ECCN 9A004 for civil programs designated by an interagency review as well as a new classification under USML Category XV for NASA programs missing this designation. DDTC and BIS can publicly provide a list of all programs classified this way on their website, and later update the CCL when reasonable without creating ambiguity in control status.

to differentiate articles and commodities that are designed to add value to the spacecraft (repair, maintenance, augmentation, etc.) from those with other purposes such as extending life, refueling or docking for resupply to the ISS which should be controlled under CCL ECCN 9A515.a.4.

i. Additionally, SIA recommends expanding the scope of CCL ECCN 9A515.a.4 to include spacecraft specially designed for life extension or refueling of a spacecraft that do not otherwise provide additional capabilities that would be captured under USML's definition of "servicing."

ii. Note to USML Category XV(a)(12) states that "spacecraft that dock exclusively via the NASA Docking System (NDS)" are not controlled under the USML and are classified as 9A515.a.4. SIA suggests that in order to avoid misclassifying future space station resupply docking mechanisms under the USML, the Department considers designating all spacecraft that dock with any space station such as the Lunar Gateway under 9A515.a.4.

iii. Lastly, SIA suggests the Department consider removing the worldwide licensing requirement for spacecraft controlled under 9A515.a.4 that are designed for resupply of the ISS or another US space station such as the Lunar Gateway be controlled similarly to category 9A515.a.5.

5. **Are there specific defense articles which have entered into normal commercial use since the most recent revisions? If so, please provide sufficient detail in describing and identifying the article to support your claim. Commenters may include documentation to support this claim, e.g., product information demonstrating what is currently in the market (web pages describing products and product brochures), or scientific and industry articles, in particular those also describing trends in commercial products, that resulted from new technologies or manufacturing methods.**

a. **Electric Propulsion** - SIA recommends electric propulsion systems and thrusters (including gridded ion, Hall effect, resistojet, and ArcJet thrusters) be move from current USML XV(e)(11)(iv) ("Plasma based propulsion systems") to CCL ECCN 9A515.x or to the reserved ECCN of 9A515.h.

i. Electric propulsion systems and thrusters such as gridded ion thrusters (such as L3's XIPS), ArcJet thrusters, resistojet, and Hall-effect thrusters (such as the Fakel SPT-100 and Snecma PPS1350 models) have been included on a large number of commercial spacecraft in the past 10 to 15 years and are now a standard option offered by most U.S and international satellite manufacturers.

ii. Electric propulsion systems are known for their high specific impulse but are equally notable for their low thrust.

1. For example, using xenon as the propellant, operating voltage in the range of 300-1200 V enables specific impulse in the range of 1500-3600 seconds.

iii. However, electric propulsion thrust is highly constrained by thruster power, which is ultimately constrained by available satellite power (i.e.

the total amount of power generated by the solar panels of the spacecraft that is not required to operate the primary payload and/or other major sub-systems).

1. For example, the 1.35-kW SPT-100 at 300 V only produces 0.083 N of thrust,[4] the 4.5-kW XIPS produces a peak thrust of 0.18 N,[5] and the 4.50-kW SPT-140 at 300 V produces 0.25 N of thrust.[6] In comparison, a Moog-ISP 5-lbf thruster using NTO/MMH produces 22 N (or 88X the thrust of an SPT-140). [7]

iv. Generating thrust levels that would be useful for purely military, rather than dual-use, applications requires significant increases in satellite power, well beyond the current state of the art.

1. A significant benefit of electric propulsion units is their small size, often less than 1U, such as Enpulsion's line of nanothrusters.[8] Given the ongoing discussions around effective management of on-orbit debris, in addition to limited military utility, the USG should encourage adoption of electric propulsion technologies by reducing barriers to use.

b. **Star Trackers -** SIA recommends removing star trackers currently controlled under USML Category XV(e)(16) due to their entry into common commercial use

i. The technical parameters for star trackers controlled by USML XV(e)(16) – angular accuracy less than or equal to 1 arcsec per star coordinate and a tracking rate equal to or greater than 3.0 deg/sec – are likely to become obsolete in the next few years as commercial development of Low Earth Orbit expands dramatically and higher-accuracy pointing becomes a more standard commercial requirement and feature;

ii. Prior to export control reforms implemented in 2014, CCL ECCN 7A004 controlled primarily star trackers used in missiles and rockets. Afterwards, though the same category now controlled satellite star trackers, it remained subject to MT controls (and NS and AT), with the result that the satellite start trackers remained ineligible for License Exception STA while entire satellites themselves became STA eligible (9A515.a.5);

---

[4] Delgado, J.J., Baldwin, J.A., and Corey, R.L., "Space Systems Loral Electric Propulsion Subsystem: 10 Years of On-Orbit Operation", 2015, SSL, 22 April 2019 http://erps.spacegrant.org/uploads/images/2015Presentations/IEPC-2015-04_ISTS-2015-b-04.pdf

[5]Tighe, W., Chien, K.R., and Spears, R., "XIPS Ion Thrusters for Small Satellite Applications", L-3 Communications Electron Technologies, Inc., 22 April 2019 https://digitalcommons.usu.edu/cgi/viewcontent.cgi?article=1459&context=smallsat

[6]Pollard and Beiting, "Ion Energy, Ion Velocity, and Thrust Vector Measurements for the SPT-140 Hall Thruster", 2000, 3rd Spacecraft Propulsion Conference,22 April 2019, http://adsabs.harvard.edu/full/2000ESASP.465..789P

[7]"Monopropellant Thrusters", MOOG, 22 April 2019 https://www.moog.com/content/dam/moog/literature/Space_Defense/Spacecraft/Monopropellant_Thrusters_Rev_0613.pdf

[8]Enpulsion, 22 April 2019, https://www.enpulsion.com/

iii. SIA therefore recommends that star trackers be removed from the USML and transferred to the CCL under 7A004 or 9A515 because these items are designed for space application and not for weapons of mass destruction.

iv. SIA further recommends the creation of a new ECCN subcategory 7A004.c or 9A515.i to control all star trackers specially designed for satellites controlled under 9A004 or 9A515 that is eligible for license exception STA.

1. If controlled under ECCN 7A004.c, SIA recommends revising associated ECCNs 7B001, 7E001, etc

c. **Aperture Size –** Revise USML Category XV(a)(7)(i) technical parameters to be 1.0m clear aperture size to reflect improvements of commercially available satellite imagery.

i. Over the past 5 years, there has been a drastic increase in commercially available satellite aperture size as satellite technology has evolved.

1. DigitalGlobe WorldView-3 – Aperture Size 1.1m[9]
2. Airbus Pleiades – Aperture Size 65cm[10]
3. Airbus Pleiades NEO (Launch planned in 2020) – Resolution will surpass Pleiades with a likely larger aperture[11]
4. JAXA ALOS-3 (Launch planned in 2020) – Aperture size 90x60cm[12]

ii. TripleSat constellation (Launched 2015) – Aperture size 42cm[13] Though the above satellites were developed with governments' involvement, the imagery has become wide commercially available and competes with the US commercial remote sensing industry

iii. CCL ECCN 9A515.a.1 should subsequently be revised to read "Have electro-optical remote sensing capabilities and having a clear aperture greater than 0.65 meters, but less than or equal to 1.0 meters" to reflect this change.

d. **Standard Separation/Integration Technologies** SIA recommends that USML Category IV(h)(11) be revised to include "specially designed" in its description to account for standard launch integration technologies that are usable with a wide variety of payloads and launch vehicles. In particular, SIA recommends that the Department should define two new terms and revise USML Category IV(h)(11) to classify them under CCL 9A515.x:

i. Standard Spacecraft/LV Adapter – "Separation mechanisms that are usable with a variety of Spacecraft and SLVs"

---

[9] "WorldView-3", eoPortal, 22 April 2019, https://directory.eoportal.org/web/eoportal/satellite-missions/v-w-x-y-z/worldview-3

[10] "Pleiades", eoPortal, 22 April 2019, https://earth.esa.int/web/eoportal/satellite-missions/p/pleiades

[11] "Pleiades Neo", Airbus Defense and Space Intelligence, 22 April 2019, https://www.intelligence-airbusds.com/files/pmedia/public/r51130_9_leaflet-pleiadesneov2.pdf

[12] ALOS-3, eoPortal, 22 April 2019, https://directory.eoportal.org/web/eoportal/satellite-missions/a/alos-3

[13] "TripleSat Satellite Sensor", Satellite Imaging Corporation, 22 April 2019, https://www.satimagingcorp.com/satellite-sensors/triplesat-satellite/

1. Example: Motorized Light Band[14]

ii. Deployer – "Commodities used to contain a spacecraft for integration to launch vehicle without requiring direct integration between the Spacecraft and SLV"
    1. Example: Isispace Quadpack[15]

iii. Interstage Adapter – Satellite-to-satellite interstage adapters facilitate the stacking of satellites in a single launch vehicle but do not interface directly with the launch vehicle. These adapters, or "interstages," and their respective interfaces between the stacked satellites should be controlled under ECCN 9A515.x. They are not part of the launch vehicle and are designed around the interfaces of the satellites. These items are not peculiarly responsible for any ITAR-controlled capabilities.

iv. While physical launch integration and payload-specific integration articles and technical data are understood to be a defense services, the introduction of USML controlled technical data in the form of a standard interface's documentation poses a significant challenge for otherwise fully EAR controlled satellite projects.

6. **Are there defense articles for which commercial use is proposed, intended, or anticipated in the next five years? If so, provide sufficient detail in describing the article to support your claim. Commenters may include documentation to support this claim, e.g., product development or marketing information describing what products will soon to be in the market (web pages describing products under development, press releases related to products under development) or scientific and industry articles, in particular those describing new products that may soon enter the market place as a result of new technologies or manufacturing methods.**
    a. No examples provided
7. **Are there other technical issues for these items which BIS should address, e.g., the addition of technical notes or defined terms used in the control parameters to make the control easier to understand and apply consistently?**
    a. **Anomaly Responses**
        i. 9E515 includes repair (including on-orbit anomaly resolution and analysis beyond established procedures).[16]
        ii. This has led to confusion regarding the status of operations in response to an anomaly or repeated anomalies, including operations that a satellite operator might internally develop.

---

[14] "2000785G MkII MLB User Manual", Planetary Systems Corporation, 22 April 2019, https://www.planetarysystemscorp.com/wp-content/uploads/2018/07/2000785G-MkII-MLB-User-Manual.pdf

[15] "QuadPack Cubesat Deployer", Innovative Solutions in Space, 22 April 2019 https://www.isispace.nl/product/quadpack-cubesat-deployer/

[16] See 79 FR 27417 ("the control of repair technology includes on-orbit anomaly resolution and analysis, beyond established procedures. However, standard post-launch operations (*e.g.,* orbit-raising), orbit maintenance and other movement of the spacecraft on-orbit do not fall within the controlled technology.").

iii. There is no reason to treat such operations differently: commanding is commanding, even in response to an anomaly. Once a satellite is launched there is very little that can be changed, so operations in response to an anomaly have the same limited options of commands as during standard operations (turn units on/off, point in a different direction, adjust power, etc.). Changing the order and timing of commands in order to respond to an anomaly does not warrant control, since the options for commanding do not change.

iv. BIS should limit such repair technology to things like "investigations into" anomalies, and exclude specific operations in response to them.

b. **Baseband Units (BBUs) –** Add a note to 9A515.b and 9A515.x, clarifying that BBUs that do not perform TT&C are not controlled under ECCN 9A515.

i. BBUs that do not fully perform TT&C are in some cases being viewed as 9A515.b or 9A515.x TT&C ground system equipment or components when they perform merely physical layer type operations with no knowledge of spacecraft content:

ii. For example they are not generating and/or building the content of the spacecraft bus control or monitoring functions, unlike for example, the software system and databases at the control system, nor decommutating the telemetry 1s and 0s and assembling them into engineering data.

iii. Currently, a wide array of non-sensitive devices can demodulate a telemetry carrier and modulate a command one. There are digital spectrum analyzers to demodulate and synthesizers to handle just about any signal type; these are subject to anti-terrorism-controls only.[17]

iv. Accordingly, BBUs with similar limited functionality should not be controlled by 9A515.b or 9A515.x

c. **9A004.b-.f Controls –** Add a clarification or short guide via a website FAQ clarifying these are classified under 9A515.

i. It is easy to misclassify 9A515 items as 9A004.b through .f , even with the License Requirement Note in 9A004 pointing to 9A515. Specifically, ECCN 9A004.e. refers to "On-board systems or equipment, specially designed for 'spacecraft'…." which leads some to classify "specially designed" spacecraft equipment under 9A004.e instead of applying the 9A515 classification. A clarification via a website FAQ would be helpful for the satellite community.

d. **9A004.a Space Launch Vehicles Note** – Add a note that indicate that this category covers SLVs not described in Category IV of the USML.

[17] For example, the following 3A991 or 3D991 Keysight products can perform the same functions as the BBU: Keysight MXG RF Generators FM/PM Modulators; Keysight MSA Signal Analyzers (FM/PM demodulators, signal processing); and Keysight 89601A Vector Signal Analysis software used with the above.

e. **Space Vehicles –** SIA requests a definition of a "Space Vehicle" to define the difference between a "Space Launch Vehicle," a "Spacecraft," and a "Space Vehicle."
f. **Telemetry for Launch Vehicles** – SIA requests a note identical in nature to Note 3 to USML Category XV(f) and Note 2 to EAR Category 9E be added to USML Category IV and EAR Category 9E.
g. **9A515.y –** Please provide a note to clarify the scope of ECCN 9A515.y
    i. Currently, 9A515.y components are added as a result of an interagency review (CCATS), though only the requesting company has access to the CCATS documentation. For example, 9A515.y.1 – Discrete electronic components not specified in 9A515.e could apply to any transistor, diode, inductor, etc. As the leading paragraph does not include "specially designed," 9A515.y would ostensibly capture any and all discrete electronic devices. As a result, SIA requests amplification of the technical parameters in the entries under 9A515.y or access to CCATS documentation.
    ii. SIA further requests clarification on the scope of ECCN 9A515.y. In particular, it asks the Department to address whether the exact items classified as 9A515.y as a result of a CCATS are controlled under the ECCN or if the entry applies to those types of items described in the entry under 9A515.y.

8. What are the cost savings to private entities by shifting control of additional specific commercial items from the USML to the CCL?

b. SIA recommends State revise USML XV(f) and 22 CFR 124.15 to align the ITAR with standardization and growth in the small satellite industry by revising the controls such that launch integration campaigns for a non-USML satellite where US-persons are not involved in launch vehicle integration activities, and the satellite is integrated to the launch vehicle using a standard deployer or separation mechanism are not subject to DTSA monitoring conditions given DTSA's review and approval of shipping and security controls.
    i. The introduction of standard form factors (e.g. CubeSats) and associated deployers have in many cases completely shielded the spacecraft from launch integration activities. In most such instances, there is no technical exchange of any kind between the satellite owner/manufacturer and the launch provider, and the launch provider has no physical, nor electrical, access to the satellite itself at any time during the integration process and throughout the launch activity. In addition, no US persons are present during deployer integration to the launch vehicle.
    ii. Current and future small launch vehicles offer increasing flexibility in launch scheduling and herald an increasing volume of launches, especially for standard form-factor satellites (e.g. CubeSats).
    iii. Providing a notification-based process or revising the scope of the DTSA monitoring requirement to focus on foreign launches of USML controlled

spacecraft or an otherwise USML controlled defense services such as integration activities or integration related technical data rather than foreign launches of fully containerized EAR-controlled satellites where no US persons are present for integration will enable the current and increasing volume of the commercial satellite industry, while serving as a resource and cost-saving measure for both DTSA/DDTC and commercial companies and enabling the former to focus on higher priority and higher security-risk activities.

iv. DTSA monitoring requirements can add months in campaign timelines that would otherwise be weeks, and tens of thousands of dollars in costs to the satellite operator.

Respectfully submitted,

/s/ Tom Stroup

Tom Stroup
President
Satellite Industry Association
1200 18th Street N.W., Suite 1001
Washington, D.C. 20036
(202) 503-1560

April 22, 2019

UNIVERSITIES SPACE RESEARCH ASSOCIATION

7178 Columbia Gateway Drive • Columbia, MD 21046
410-730-2656 • 410-730-3496 (fax) • www.usra.edu

April 22, 2019

Directorate of Defense Trade Controls
Office of Defense Trade Controls Policy
U.S. Department of State Washington, DC 20522

Via email to: DDTCPublicComments@state.gov

Re: USML Categories IV and XV

Reference: 84 FR 8486 (March 8, 2019); RIN 1400-AE73; Docket No. DOS-2018-0048;

The Universities Space Research Association (USRA) is pleased to provide comments in response to the above referenced Advanced Notice of Proposed Rulemaking, which seeks comments to assist the Directorate of Defense Trade Controls in reviewing USML Categories IV and XV.

USRA very much appreciates the opportunity to provide comments to the Department of State on the proposed rule. The U.S. university community recognizes and supports the need for export controls to protect our national security. U.S. universities also welcome these efforts by the Department of State to bring about careful consideration of what space-related technology must be controlled. This will help restore to U.S. universities the ability to teach our students space technology, and to conduct research in space, in a way that will enable the U.S. to remain a leader in the future.

ITAR affects university research and education, because "deemed exports" can restrict communication in the classroom and in the university research environment. This has caused students and able young faculty members to avoid space-related fields, where the uncertainties and burdens of ITAR compliance and the ITAR approval process have been acute. Professors of major research universities have reported "dumbing down" the curriculum so that the risk of being accused of transferring export controlled information is reduced.

Our comments are in order to the questions listed in the federal register. Questions for which we have no comment have been omitted

Question #2: Are there specific defense articles described in the referenced categories that have entered into normal commercial use since the most recent revision of that category? If so, please include documentation to support this claim.

a. **Star Trackers -** USRA recommends removing star trackers currently controlled

under USML Category XV(e)(16) due to their entry into common commercial use.

b. **Aperture Size** – Revise USML Category XV(a)(7)(i) technical parameters to be 1.0m clear aperture size to reflect improvements of commercially available satellite imagery.

Question #4: Are there other technical issues for these categories which the Department should address?

a. **Space Vehicles** – USRA requests a definition of a "Space Vehicle" to define the difference between a "Space Launch Vehicle," a "Spacecraft," and a "Space Vehicle."
b. **Thermal Batteries** – USRA requests removing thermal batteries from USML Category XIII(h)(3)

Question #5: The export control system uses the size of space-based optical telescopes as the technical parameter differentiating between items controlled by the Department of Commerce in Commerce Control List (CCL) Export Control Classification Number (ECCN) 9A515.a.1and by the Department of State in USML Category XV(a)(7) and XV(e)(2). This is based on physics, and specifically the fact that larger optical telescopes generally can generate higher-resolution images than smaller ones. NASA tends to use larger optical telescopes for astrophysics missions because the celestial bodies these missions observe are many light years away, and smaller optical capabilities cannot physically meet the relevant science requirements. At the same time, because NASA missions are designed and calibrated to observe distant celestial objects, they are physically incapable of observing the Earth, which is so bright relative to distant objects that NASA's telescopes would suffer permanent physical damage if pointed at Earth. Essentially, NASA astrophysics missions form a class of spacecraft which meet the technical definition for national security-sensitive spacecraft regulated by the Department of State, but are incapable of observing the Earth.

In the past, this issue has been addressed by creating separate regulatory categories for specific missions. For example, the James Webb Space Telescope, NASA's next flagship astrophysics mission, was the subject of specific regulatory activity (*see,* 82 FR 2875 and 2889, Jan. 10, 2017) to ensure that it is controlled by the Department of Commerce under ECCN 9A004 even though it otherwise meets the control text of USML Category XV. However, since it would be impractical to issue an updated regulation every time NASA initiates a new astrophysics mission, the Department is seeking comments from the public on a way to provide technical differentiation within U.S. export control regulations between the space-based optical telescopes for astrophysics missions and those used for Earth observation.

a. **Civil Program Controls** - In order to address the difficulties associated with early program classifications under the USML which are later reclassified under the CCL, USRA recommends

the creation of an additional entry under ECCN 9A004 for civil programs designated by an interagency review as well as a new classification under USML Category XV for NASA programs missing this designation. DDTC and BIS can publicly provide a list of all programs classified this way on their website, and later update the CCL.

USRA is a nonprofit consortium of 110 universities offering advanced degrees in space- and aeronautics-related disciplines. USRA was established in 1969 by the National Academy of Sciences at the request of the National Aeronautics and Space Administration.

Sincerely,

Eric Hammond
Director, Government Relations
USRA

Subject: Comments regarding review of the United States Munitions List Categories IV and XV and review of the Commerce Control List for Items Transferred From United States Munitions List Categories IV and XV.

Reference: 22 CFR 121 & 15 CFR 774

Dear Mr. Jeffrey Leitz and the Bureau of Industry and Security,

The Commercial Spaceflight Federation ("CSF") appreciates the opportunity to provide its comments in response to the request for comments regarding review of the United States Munitions List Categories IV and XV and review of the Commerce Control List for Items Transferred From United States Munitions List Categories IV and XV.

I. COMMERCIAL SPACEFLIGHT FEDERATION

The Commercial Spaceflight Federation is the leading voice for the commercial spaceflight industry. Founded in 2006, CSF and its 80+ members are laying the foundation for a sustainable space economy and democratizing access to space for scientists, students, civilians, and businesses. CSF members are responsible for the creation of thousands of high-tech jobs driven by billions of dollars in investment. Through the promotion of technology innovation, CSF is guiding the expansion of Earth's economic sphere, bolstering U.S. leadership in aerospace, and inspiring America's next generation of engineers and explorers.

CSF believes that we are in a new, exciting era of commercial space operations, and that export control reform can enhance the nation's strong space industrial base - a critical priority for both our national security and economic competitiveness - and ensure that the United States remains the preeminent leader in space. While national security is of the utmost importance, overly restrictive regulations will result in decreased innovation and entrepreneurship, which would be especially harmful to the currently burgeoning industry of commercial space. Properly balanced export control regulations will catalyze the American commercial space sector's continued innovation, growth, and leadership in the global space industry. CSF is committed to supporting an export control regime that protects and strengthens our national security while increasing U.S. competitiveness abroad.

II. BACKGROUND

The U.S. Department of State Directorate of Defense Trade Controls ("DDTC") maintains the United States Munitions List ("USML") including Categories IV and XV. The Bureau of Industry and Security (BIS), Department of Commerce, maintains the Commerce Control List ("CCL") under the Export Administration Regulations (EAR). To ensure controls align with the national security and foreign policy objectives of the U.S. Government, the USML and the CCL

must be regularly reviewed and updated to account for technological developments, issues related to the practical application of these controls, and changes in the military and commercial applications of items covered by the USML or by the corresponding "600 series" and 9x515 ECCNs on the CCL consistent with the objectives in Space Policy Directive-2 (available at *https://www.whitehouse.gov/presidential-actions/space-policy-directive-2-streamlining-regulations-commercial-use-space/*), this Advanced Notice of Proposed Rulemaking (ANPRM), seeks public comments to inform a review of those items on the CCL implemented in connection with the recent removal of articles from Categories IV (79 FR 34, January 2, 2014) and XV (82 FR 2889, January 10, 2017) of the USML and the placement of those items on the CCL. BIS seeks to ensure the CCL includes clear descriptions, captures items in normal commercial use, takes into account technological developments, and implements the national security and foreign policy objectives of the United States properly.

In particular, BIS seeks comment on ways to thoughtfully streamline export control regulations for both the U.S. commercial space industry as well as our international partners to lower administrative burden, decrease regulatory compliance costs as well as increase exports thereby bolstering the U.S. space commercial sector and industrial base.

In regards to the Commerce Control List for Items Transferred From United States Munitions List Categories IV and XV (DDTC NPRM), one advantage of revising the USML into a more positive list is its controls can be tailored to satisfy the national security and foreign policy objectives of the U.S. government by maintaining control over those articles that provide a critical military or intelligence advantage, or otherwise warrant control under the Start Printed Page 8487 International Traffic in Arms Regulations (ITAR), without inadvertently controlling items in normal commercial use. This approach, therefore, requires that the list be regularly revised and updated to account for technological developments, practical application issues identified by exporters and re-exporters, and changes in the military and commercial applications of items affected by the list.

III. COMMENT ONE (BIS NPRM)- Adjustments to Technologies Controlled Under ECCN 9A515

Based on comment topic suggestion one (BIS NPRM); *for technologies controlled under ECCN 9A515.*

The Commercial Spaceflight Federation suggests, that an overwhelming majority of spacecraft parts and components are captured under 9A515.x, requiring a license or license exception to export to all countries other than Canada. CSF recommends that the Department of Commerce evaluate and assess ECCN 9A515.y and expand the list of parts and components that do not pose a threat to National Security and Regional Stability. Such examples include; environmental

control and life support systems, commercial spacecraft passenger seats and parts and components thereof, spacecraft internal and external lighting, humidity and CO2 removal systems, thermal control, spacecraft tires, wheels breaks and landing gear, and electrical power distribution and control units. 9A515.y items should also include those to outfit a habitat (e.g. crew lavatories, exercise equipment, plant and vegetable growth systems).

IV. COMMENT TWO (BIS NPRM)- Further Refinement or Updated Controls on Various Technologies

CSF would like to suggest an addition to comment topic suggestion two, (BIS NPRM);

The USG is considering further refinement or updated controls on the various technologies listed below.

- Satellite thrusters (bi-propellant, electric, and liquid apogee engines)
- Gyroscopes
- Inertial navigation systems
- Large aperture earth observation cameras
- Spacecraft antenna systems and adaptive Global Navigation Satellite System (GNSS) antennas
- Suborbital systems with propulsion systems currently controlled under USML
- Kapton tape
- Star trackers
- Astrocompasses.

CSF would like to suggest the addition of

- Docking systems other than the NASA Docking Systems
- Altitude determination and control systems that provide a spacecraft's geolocation accuracy with respect to spacecraft that are not Earth orbiting. For example, cislunar orbit.

V. COMMENT THREE (BIS NPRM) and COMMENT EIGHT (DDTC NPRM)- Recategorization of Lunar Gateway

CSF would like to comment on topic suggestion three, (BIS NPRM) and topic suggestion eight (DDTC NPRM);
NASA continues to pursue development of the future Lunar Gateway, which may be described in USML Category XV(a).

CSF suggests that Lunar Gateway should be appropriately listed under ECCN 9A004, with a new subparagraph listed similar to how the James Webb Space Telescope and the International Space Station and all parts and components specially designed therefore are explicitly enumerated.

VI. COMMENT FOUR (BIS NPRM) - Further Clarity on Technologies Controlled in the USML for Either Category IV and XV

CSF would like to suggest review on comment topic suggestion four (BIS NPRM):

Are there technologies controlled in the USML for either Category IV and XV, which are not currently described or not described with sufficient clarity which the commenter believes should be controlled under the EAR?

1. CategoryIV(h)(11): Separation mechanisms, staging mechanisms, and interstages useable for articles enumerated in paragraph (a) of this category, and specially designed parts and components therefor (MT for those separation mechanisms, staging mechanisms, and interstages usable in systems enumerated in paragraph (a)(1) of this category);

   The use of the term "useable" inadvertently captures separation mechanisms that are not intended nor are they specially designed for use with articles enumerated in IV(a). Small diameter separation mechanisms, for example, those with a bolt diameter less than .75 inches, specially designed to deploy on-orbit solar panels, instrument covers, or utilized for cargo resupply should be controlled on the CCL under ECCN 9A515.x or specifically enumerated under a new subparagraph within ECCN 9A515. CSF recommends that USML Category IV(h)(11) be revised to read as follows: "Separation mechanisms, staging mechanisms, and interstages specially designed for articles enumerated in paragraph (a) of this category, and specially designed parts and components therefore…"

2. Category XV(a)(2): Autonomously detect and track moving ground, airborne, missile, or space objects other than celestial bodies, in real-time using imaging, infrared, radar, or laser systems;

   CSF recommends striking "space objects" so that spacecraft that "Autonomously detect and track" space objects will be captured in EAR ECCN 9A515. Future commercial space exploration will need to do real-time imaging of space objects using imaging, IR, radar, or laser to perform rendezvous and proximity operations and/or berthing/docking maneuvers with other spacecraft. Commercial applications are satellite servicing (e.g.

refueling), recovering decommissioned space objects to deorbit them, active collision avoidance, tracking to maintain optical cross links, and for satellite-based autonomous navigation.

3. Category XV(a)(4): (a)(4) 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 or functions of other items in paragraph (a);

   CSF recommends striking "constellation". In the case where there is a use case for using constellations of space vehicles for a commercial communications platform, these constellations can be captured in EAR ECCN 9A515 or 9A004. There's also a potential use case for using a constellation of commercial space vehicles in cislunar space to support in-space navigation above the GPS constellation.

4. Category XV(a)(7)(i) and (7)(ii) : (a)(7)(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 and having a clear aperture greater than 0.50m; and (a)(7)(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;

   CSF recommends re-writing this regulation to use The National Imagery Interpretability Rating Scale (NIIRS), since that's specifically tailored for image quality on the ground. If (i) and (ii) are re-written as NIIRS, the parameters would be irrelevant, as clear aperture, GSD, and $\Delta\lambda$ are inputs into a NIIRS calculation. Also, GSD calculations assume an altitude, but that is not necessarily set by a spacecraft's design, so it's not clear how to judge whether a given spacecraft complies with this.

5. Category XV(a)(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;

   CSF recommends putting space vehicles or vehicles that have capability to land on celestial bodies into EAR ECCN 9A004 as landers might have some radar-based landing systems, so applications beyond Earth orbit should be excluded.

6. Category XV(a)(10): Autonomously perform collision avoidance;

CSF recommends to have technical note to exempt into EAR 9A515 for commercial platforms. This may become critical for operating in space once the large communication satellite constellations are deployed. Especially for low-thrust vehicles that may be spiraling through altitudes where these constellations operate.

7. Update Category XV(a)(12): Are specially designed to provide inspection or surveillance of another spacecraft, or service another spacecraft via grappling or docking;

   CSF recommends to have technical note to exempt spacecraft into EAR 9A515 for commercial platforms. This is an explicit commercial business case. Inspecting spacecraft that are non-operational, or space situational awareness data, e.g. to help people identify their spacecraft.

   Note to paragraph (a)(12): This paragraph does not control spacecraft that dock exclusively via the NASA Docking System (NDS), which are controlled by ECCN 9A515.a.4.

   CSF recommends to remove docking and have any docking capability go into the EAR ECCN 9A515.a.4 so it is not limited only to the NASA Docking System (NDS).

VII. COMMENT SIX (BIS NPRM)- Defense Articles in the Next Five Years

In relation to suggested comment six (BIS NPRM):

Are there defense articles for which commercial use is proposed, intended, or anticipated in the next five years?

CSF recommends several specific changes.

a. CSF recommends an amendment to the CCL to create a specific entry in ECCN 9A004 conforming to the Wassenaar Arrangement's newly added 9.A.4.g, "Aircraft specially designed or modified to be air-launch platforms for space launch vehicles." Reference: Wassenaar Arrangement, Rev. Dec. 2018, Pg. 157.
b. In relation to Separation Mechanisms;
   i. Currently, USML Category IV(h)(11) controls separation mechanisms useable for defense articles enumerated in USML Category IV(a), and specially designed parts and components of such separation mechanisms. Industry has been told on multiple occasions by DDTC that separation systems specially designed to separate spacecraft from a payload adapters ("Spacecraft Separation Mechanisms"), if used in USML Category IV(a) rockets, are controlled under

USML Category IV(h)(11). No spacecraft can reach its orbit unless it is launched on a USML Category IV(a) rocket, which means that under DDTC's current interpretation, all Spacecraft Separation Mechanisms, even if specially designed for small satellites, are caught under USML Category IV(h)(11). This has been an issue for industry in light of the rapid commercialization of Spacecraft Separation Mechanisms.

ii. In addition, the USML Category IV(h)(11) control is inconsistent with other-assembly level controls in USML Category IV. For example, all other USML IV(h) paragraphs clearly state that the controls apply to rockets or missiles or if not, technology at issue in the USML IV(h) subparagraph is specially designed for rockets or missiles (e.g., kinetic kill vehicles in USML Category IV(h)(3)). Where there could be confusion about the controls that apply to spacecraft, there are notes to clarify, such as Note to USML Category IV(h)(17) or IV(d)(2).

iii. Spacecraft Separation Mechanisms differ significantly from mechanisms that separate the stages of a rocket ("Stage Separation Mechanisms"). CSF recommend the following:

1. Stage Separation Mechanisms remain in USML Category IV(h)(11); and
2. Spacecraft Separation Mechanisms are moved to a new subparagraph is USML XV(e) and the subparagraph only controls Spacecraft Separation Mechanisms specially designed for USML Category XV(a).

iv. We recognize that the Missile Technology Control Regime (MTCR) controls "[s]taging mechanisms, separation mechanisms, and interstages therefor, usable in the systems specified in 1.A". Thus, if it is not possible to immediately amend USML Category IV(h)(11) to exclude Spacecraft Separation Mechanisms, CSF recommend a clarifying note to USML Category IV(h)(11), or process (different from the CJ process) by which companies can request that standard, commercial Spacecraft Separation Systems be removed from ITAR-control.[1]

c. CSF recommends that commercial suborbital "crewed" space vehicles for the sole purpose of space tourism using Category IV propulsion to achieve suborbital flight, be categorized under the jurisdiction in EAR ECCN 9A004 or provided an Exemption in a technical note of the ITAR to be categorized in the EAR. For example, the same ITAR-related limitations for the complete suborbital vehicle would still be applicable like the JWST in 9A004.v such that:

i. v. "Parts," "components," "accessories" and "attachments" that are "specially designed" for the James Webb Space Telescope and that are not:

ii. v.1. Enumerated or controlled in the USML;

[1] Companies have tried previously to use the CJ process to remove Spacecraft Separation Systems from control, but these efforts have failed.

iii. v.2. Microelectronic circuits;

iv. v.3. Described in ECCNs 7A004 or 7A104; or

v. v.4. Described in an ECCN containing "space-qualified" as a control criterion (See ECCN 9A515.x.4).

Note: Further rationale for the above amendment; Launch vehicles for crewed suborbital commercial flights ("space tourism") have limited capability and are specially designed to achieve a limited apogee and flight duration. While the vehicle hardware and systems may be modified to achieve and/or exceed Missile Technology Control Regime thresholds for complete "unmanned" rocket systems, the MTCR Category I, Item I.A.1, does not specifically call out for "Crewed" complete aerial vehicle systems that can achieve a "range" of 300 km and carry a "payload" of 500kg. Therefore, it stands to reason that a launch vehicle, specially designed for commercial suborbital flight with humans on board as the "payload", and not being able to achieve a 300 km "range" should be controlled by EAR ECCN 9A004.

d. CSF recommends that Celestial Landers (non-rovers), spacecraft or space vehicles that are non-Earth pointing or non-Earth imaging spacecraft, or any other vehicle landing on any celestial body other than Earth, be categorized under the jurisdiction in EAR ECCN 9A515 and/or provided an Exemption in a technical note of the ITAR to be categorized in the EAR 9A515 since the end-use/application of the vehicle in space cannot be ultimately used against the United States and its activities with known foreign government partners pose a low-risk to the national security of the United States. The same restrictions applicable in Category 9A515 would apply.

Note: Further rationale for the above amendment; DDTC/MTEC are rightfully concerned about earth-pointing (earth imaging) spacecraft where technologies that exist in Category XV(a) can be used against the U.S. and/or our allies in times of war. However, if the technology is to be used on a spacecraft, space vehicle or celestial lander whose sole purpose is to orbit and/or land on another celestial body (e.g., Moon, Mars) other than maneuvering within an earth-facing orbital plane, then these space vehicles should be captured under the jurisdiction of the EAR since the end-use end-application technology of the vehicle in space cannot be ultimately used against the United States and its activities pose a low-risk to the national security of the United States. The end-user foreign entities involved in this mission can be put on a pre-approved list by the DDTC/MTEC to exempt this commercial space endeavor to the EAR. Reaching, colonizing and populating outer space is a massive endeavor that will require significant international partnerships. Conducting a sizable international collaborative effort such as this is an administrative nightmare under a Technical Assistance Agreement. EAR control or an ITAR exemption is badly needed to allow the United States to lead and participate in space colonization.

VIII. COMMENT SEVEN (BIS NPRM) and COMMENT FOUR (DDTC NPRM)- Other Technical Issues and the Addition of Technical Notes

Based on topic suggestion seven (BIS NPRM) and topic suggestion four (DDTC NPRM);

Are there other technical issues for these categories which these departments should address? CSF has several suggested additions and technical notes.

Suggestions are as follows;

a. A technical amendment to the USML in the form of a Note to Category XV(f) to make clear that the act of carrying a foreign payload (including payloads for foreign governments) for scientific or commercial research aboard a space launch vehicle, spaceplane or spacecraft is not a defense service.
b. A technical amendment to the USML in the form of a Note to Category XV(f) to make clear that foreign space flight participant activities related to scientific or commercial research or foreign payload management or observation are not a defense service.
c. Technical amendment to the USML in the form of a Note to Category XV(b) that superficial access to training simulators, including those used for spacecraft, during the course of a facility tour is not controlled.
d. Technical amendment to the USML in the form of a Note to Category XV(f) that information regarding general foreign spaceport requirements related to hangar size and building requirements, apron and runway width and length, ground support equipment, vehicle processing and fueling, nitrous oxide storage and loading, chemical handling and storage, and other basic facility-related information is not subject to the ITAR or the EAR.
e. An amendment to the CCL to unilaterally clarify the scope of the new entry in ECCN 9A004 so that such air-launch platforms also include those for space vehicles, spaceplanes, spacecraft, etc.
f. CSF suggests further clarification on the term "space-based logistics". The term captures cargo resupply missions to the ISS, but what else? Is it just for logistics to and from LEO only? What about cislunar?
g. CSF suggests further clarification on the term "servicing" of another spacecraft. Is this only refuel, repair?
    i. CSF suggests the definition: "Servicing" means, spacecraft capable of autonomously performing any of the following activities for another spacecraft: attitude control, longitudinal relocation, orbit raising, inclination reduction, propellant augmentation, inspection and repair, replacement or enhancement of parts and systems, incorporation of auxiliary propulsion, navigation, power,

payloads, and other functions to enhance the performance or extend a spacecraft's life, and assembly of spacecraft structures.

h. A technical amendment to the USML that that clarifies that mission specific analyses - such as loads associated with a payload - generated by the dynamics of rocket during flight should not be subject to ITAR. For example: Under current ITAR rules if a loads analysis shows that solar array mounts on a spacecraft are failing, a TAA is required before the situation can be resolved from a system level. But the fact of the matter is that this type of issue and any other mission specific work will occur regardless of whether the launch happens on a US or foreign vehicle.

i. Technical amendment to the USML in the form of a Note to Category IV and/or XV that makes clear that crewed spaceplanes, space vehicles, spacecraft, etc. are not subject to MT control because, e.g., they are crewed ("manned") vehicles.

j. Technical amendment to the USML in the form of a Note to Category IV and/or XV that aircraft specifically designed or modified to be air-launch platforms for space launch vehicles, spaceplanes, or spacecraft, are not subject to the ITAR and, do not fall within the definition of "mobile launcher mechanisms" in Category IV with respect to the launch of space launch vehicles

k. Update USML Category XV and EAR Category 9X to include "celestial lander" in its definition of Spacecraft.

   i. Current definition of ITAR Category XV(a) - "Spacecraft, including satellites and space vehicles, whether designated developmental, experimental, research, or scientific, or having a commercial, civil, or military end-use, that:"

   ii. Current definition of EAR ECCN 9A515.a - "Spacecraft," including satellites, and space vehicles, whether designated developmental, experimental, research or scientific, not…"

l. Define the meaning of the words "apparatus" and "devices" as used in ITAR category IV(c) to clarify exactly what is intended for control, and what is not intended for control. The note to this subcategory provides clarification as to some of the controlled items, like transporters and cranes, but does not, for example, address parts and components of transporters and cranes.

m. Add a technical note to ITAR category IV(h)(14) indicating that this control applies to only the primary thrust-generating propulsion systems for articles enumerated in paragraphs (a) and (d) of this category, and not auxiliary systems, such as reaction control system thrusters or propellant settling thrusters.

n. Request clarification for USML ITAR Category IV(b)(1) and (b)(2) that Fixed launch sites and mobile launcher mechanism, "parts and components" not specifically enumerated in this category, are not controlled for the following subparagraphs

   i. Fixed launch sites and mobile launcher mechanisms for any system enumerated in paragraphs (a)(1) and (a)(2) of this category (MT) or

   ii. Fixed launch sites and mobile launcher mechanisms for any system enumerated in paragraphs (a)(3) through (a)(5) of this category
   iii. Commercially available structural materials (e.g., steel, aluminum, forgings, castings and other unfinished products) for masts and towers and its associated parts and components may be captured under Category IV(b) without additional clarification for release. Further clarification from DDTC is required to understand what are the specific concerns related to 'launch sites' (e.g.,vehicle hold down mechanisms, vehicle load bearing structures, certain electro-mechanical interfaces directly attached to the vehicle on the pad) but more so, clarify what should not be controlled for launch sites. Further specificity is required as to not capture those low-risk parts and structural elements down to their forgings and castings of a launch site that are not directly connected to relevant controlled articles tied to the LV.

o. Request to remove "other liquid propellants" from USML Category IV(c), Note 1 to paragraph (c) with respect to, liquid propellant tanks specially designed for the storage or handling of the propellants controlled in USML Category V, CCL ECCNs 1C001, 1C111 and 1C608, or other liquid propellants used in the systems enumerated in paragraphs (a)(1), (a)(2), or (a)(5).
   i. Certain "other" LV propellants (e.g., Liquid Oxygen, Hydrogen, Liquified Natural Gas, are commercially available for industrial use but can also be utilized as rocket fuels and oxidizers. DDTC should remove the "other liquid propellants" catchall from Category (IV)(c) so only positively enumerated propellants are deemed controlled, in line with prior reform efforts.

CSF sincerely appreciates the work of the Administration to remove unnecessary regulatory burdens associated with the critically important controls on the export of military, dual-use, and other items warranting control. We are willing to work with the Administration in this highly complex and technical area to refine, support, and implement these and other export control reform suggestions.

Please do not hesitate to contact me at jane@commercialspaceflight.org or (469) 879 - 9503.

Thank you for your time and consideration,

Jane Kinney
Director of Business Operations
Commercial Spaceflight Federation

On behalf of the Aerospace Industries Association (AIA) and our member companies, we appreciate the opportunity to provide comments in response to the Advance Notice of Proposed Rulemaking (ANPRM) regarding review of the Commerce Control List for Items Transferred from United States Munitions List Categories IV and XV. We support the effort the Administration is undertaking to draw upon all available government, industry, and academic resources to update the export control regulations as necessary to encourage the growing commercialization of space. We believe that this effort can reinforce U.S. technological innovation and leadership in the commercial space sector while safeguarding national security interests.

Below selected questions are responses from a number of AIA member companies. We do not have industry consensus on each of the following responses, but wanted to send these responses from our member companies. We appreciate this opportunity to response, but respectfully request additional time for open discussions with the government before regulations related to these Categories are finalized. We support the regular and mandatory reviews of the USML and CCL with industry feedback on necessary changes given the ever-changing aspects of this technology. Thank you again for the opportunity to provide comments in response to the ANPRM. We look forward to collaboration on these regulations.

Response from Company A:

Request for Public Comments Regarding Review of the Commerce Control List for Items Transferred from United States Munitions List Categories IV and XV

AGENCY:

Bureau of Industry and Security, Commerce

1. For technologies controlled under ECCN 9A515—examples include habitats, planetary rovers, and planetary systems such as communications and power—what factors or specific technologies should be considered for movement to a different ECCN or paragraph under ECCN 9A515 with less stringent licensing requirements

    - An overwhelming majority of spacecraft parts and components are captured under 9A515.x, requiring a license or license exception to export to all countries other than Canada. It is recommended the Department of Commerce to evaluate and assess ECCN 9A515.y and expand the list of parts and components that do not pose a threat to National Security and Regional Stability. Such examples include; environmental control and life support systems, spacecraft internal and external lighting, humidity and CO2 removal systems, thermal control, spacecraft tires, wheels breaks and landing gear, and electrical power distribution and control units. 9A515.y items should also include those to outfit a habitat (e.g. crew lavatories, exercise equipment, plant and vegetable/vegetation growth systems).

2. The USG is considering further refinement or updated controls on the various technologies listed below. Are there additional specific space-related technologies not described in the list which warrant further review by State or Commerce given their current or anticipated near term commercial applications?
    - Satellite thrusters (bi-propellant, electric, and liquid apogee engines);
    - gyroscopes;
    - inertial navigation systems;
    - large aperture earth observation cameras;
    - spacecraft antenna systems and adaptive Global Navigation Satellite System (GNSS) antennas
    - suborbital systems with propulsion systems currently controlled under USML
    - kapton tape;
    - star trackers; and
    - astrocompasses
    - Docking systems other than the NASA Docking System
    - Altitude determination and control systems that provide a spacecraft's geolocation accuracy with respect to spacecraft that are not earth orbiting. For example, cislunar orbit.

3. NASA continues to pursue development of the future Lunar Gateway, which may be described in USML Category XV(a). If moved to the CCL, what would be the appropriate controls to apply to items associated with the Lunar Gateway, *e.g.,* ECCNs 9A515 or 9A004?

    - The Lunar Gateway should be appropriately listed under ECCN 9A004, with a new subparagraph listed similar to how the James Webb Space Telescope and the International Space Station and all parts and components specially designed therefore are explicitly enumerated.

4. Are there technologies controlled in the USML for either Category IV and XV, which are not currently described or not described with sufficient clarity which the commenter believes should be controlled under the EAR? While this notice discusses specific items based on initial communications with industry, the list is not exhaustive and commenters are encouraged to provide additional examples within both USML categories.

    AIA members submitted the following regarding technologies that should be controlled under the EAR:

    - USML IV(h)(11) controls separation mechanisms, staging mechanisms, and interstages "useable" for articles enumerated in IV(a). The use of the term "useable" inadvertently captures separation mechanisms that are not intended nor

are they specially designed for use with articles enumerated in IV(a). Small diameter separation mechanisms, for example, those with a bolt diameter less than .75 inches, specially designed to deploy on-orbit solar panels, instrument covers, or utilized for cargo resupply should be controlled on the CCL under ECCN 9A515.x or specifically enumerated under a new subparagraph within ECCN 9A515.

- USML Category IV(h)(11) should be revised to read as follows: "Separation mechanisms, staging mechanisms, and interstages specially designed for articles enumerated in paragraph (a) of this category, and specially designed parts and components therefor…"

The following amendments were also offered in response to Question 4 from the DDTC NPRM:

- Technical amendment to the USML in the form of a Note to Category IV and/or XV that aircraft specifically designed or modified to be air-launch platforms for space launch vehicles, spaceplanes, or spacecraft, are not subject to the ITAR, and, do not fall within the definition of "mobile launcher mechanisms" in Category IV with respect to the launch of space launch vehicles.

- Technical amendment to the USML in the form of a Note to Category IV and XV that differentiates between "space launch vehicles" and "space vehicles" by the performance capability of carrying human passengers in a pressurized cabin in outer space after shutdown of any integrated propulsion.

- Technical amendment to the USML in the form of a Note to Category XV(a)(11) to make clear that propulsion systems incorporated into such items are controlled under XV(e).

- Technical amendment to the USML in the form of a Note to Category XV(f) to make clear that the act of carrying a foreign payload for scientific or commercial research aboard a space launch vehicle, spaceplane or spacecraft is not a defense service.

- Technical amendment to the USML in the form of a Note to Category XV(f) that foreign space flight participant activities related to scientific or commercial research or foreign payload management or observation are not subject to the ITAR or the EAR.

- Amendment to the CCL to unilaterally clarify the scope of the new entry in ECCN 9A004 so that such air-launch platforms also include those for space vehicles, spaceplanes, spacecraft, etc.

- Technical amendment to the USML in the form of a Note to Category IV and/or XV that crewed spaceplanes, space vehicles, spacecraft, etc. are not subject to MT control because, e.g., they are crewed ("manned") vehicles.

- Technical amendment to the USML in the form of a Note to Category XV(b) that superficial access to training simulators, including those used for spacecraft, during the course of a facility tour is not controlled.

- Technical amendment to the USML in the form of a Note to Category XV(f) that information regarding general foreign spaceport requirements related to hangar size and building requirements, apron and runway width and length, ground support equipment, vehicle processing and fueling, nitrous oxide storage and loading, chemical handling and storage, and other basic facility-related information is not subject to the ITAR or the EAR.

5. Are there specific defense articles which have entered into normal commercial use since the most recent revisions? If so, please provide sufficient detail in describing and identifying the article to support your claim. Commenters may include documentation to support this claim, *e.g.,* product information demonstrating what is currently in the market (web pages describing products and product brochures), or scientific and industry articles, in particular those also describing trends in commercial products, that resulted from new technologies or manufacturing methods.

6. Are there defense articles for which commercial use is proposed, intended, or anticipated in the next five years? If so, provide sufficient detail in describing and identifying the article to support your claim. Commenters may include documentation to support this claim, *e.g.,* product development or marketing information describing what products will soon to be in the market (web pages describing products under development, press releases related to products under development) or scientific and industry articles, in particular those describing new products that may soon enter the market place as a result of new technologies or manufacturing methods.

    - The following response also addresses Question 3 from the DDTC NPRM: An amendment is needed to the CCL to create a specific entry in ECCN 9A004 to conform to the Wassenaar Arrangement's newly added 9.A.4.g, "Aircraft specially designed or modified to be air-launch platforms for space launch vehicles." Reference: Wassenaar Arrangement, Rev. Dec. 2018, Pg. 157.

7. Are there other technical issues for these items which BIS should address, *e.g.,* the addition of technical notes or defined terms used in the control parameters to make the controls easier to understand and apply consistently?

- The industry would appreciate and benefit from a clarification of the term “space-based logistics”. The term captures cargo resupply missions to the ISS, but it is unclear beyond that application. What else would apply (i.e. Is it just for logistics to and from LEO only? What about cislunar?)

- Industry would also benefit from clarification of the term “servicing” of another spacecraft. Does this only include refuel, and/or repair?

8. What are the cost savings to private entities by shifting control of additional specific commercial items from the USML to the CCL? To the extent possible, please quantify the current cost of compliance with USML control of an item and any cost savings if a particular change was implemented. Cost savings could include time saved in terms of regulatory uncertainty over whether certain items are regulated as on the USML or the CCL. This reduced uncertainty, under the “bright line” approach of the USML to CCL review process, would allow both BIS and industry to avoid spending hours and resources on case by case determinations for certain items. As much as possible, please quantify time saved, reduction in compliance costs, and reduction in paperwork.

Request for Comments Regarding Review of the United States Munitions List Categories IV and XV

Department of State

1. Are there emerging or new technologies that warrant control in one of the referenced categories, but which are not currently described or not described with sufficient clarity?

2. Are there specific defense articles described in the referenced categories that have entered into normal commercial use since the most recent revision of that category? If so, please include documentation to support this claim

3. Are there defense articles described in the referenced categories for which commercial use is proposed, intended, or anticipated in the next five years? If so, please provide any documentation.

    - The following response also addresses Question 6 from the BIS NPRM: An amendment is needed to the CCL to create a specific entry in ECCN 9A004 to conform to the Wassenaar Arrangement's newly added 9.A.4.g, "Aircraft specially designed or modified to be air-launch platforms for space launch vehicles." Reference: Wassenaar Arrangement, Rev. Dec. 2018, Pg. 157.

4. Are there other technical issues for these categories which the Department should address?

    The following amendments were also offered in response to Question 4 & 7 from the BIS NPRM:

    - Technical amendment to the USML in the form of a Note to Category IV and/or XV that aircraft specifically designed or modified to be air-launch platforms for space launch vehicles, spaceplanes, or spacecraft, are not subject to the ITAR, and, do not fall within the definition of "mobile launcher mechanisms" in Category IV with respect to the launch of space launch vehicles

    - Technical amendment to the USML in the form of a Note to Category IV and XV that differentiates between "space launch vehicles" and "space vehicles" by the performance capability of carrying human passengers in a pressurized cabin in outer space after shutdown of any integrated propulsion.

    - Technical amendment to the USML in the form of a Note to Category XV(a)(11) to make clear that propulsion systems incorporated into such items are controlled under XV(e).

    - Technical amendment to the USML in the form of a Note to Category XV(f) to make clear that the act of carrying a foreign payload for scientific or commercial

research aboard a space launch vehicle, spaceplane or spacecraft is not a defense service.

- Technical amendment to the USML in the form of a Note to Category XV(f) that foreign space flight participant activities related to scientific or commercial research or foreign payload management or observation are not subject to the ITAR or the EAR.

- Amendment to the CCL to unilaterally clarify the scope of the new entry in ECCN 9A004 so that such air-launch platforms also include those for space vehicles, spaceplanes, spacecraft, etc.

- Technical amendment to the USML in the form of a Note to Category IV and/or XV that crewed spaceplanes, space vehicles, spacecraft, etc. are not subject to MT control because, e.g., they are crewed ("manned") vehicles.

- Technical amendment to the USML in the form of a Note to Category XV(b) that superficial access to training simulators, including those used for spacecraft, during the course of a facility tour is not controlled.

- Technical amendment to the USML in the form of a Note to Category XV(f) that information regarding general foreign spaceport requirements related to hangar size and building requirements, apron and runway width and length, ground support equipment, vehicle processing and fueling, nitrous oxide storage and loading, chemical handling and storage, and other basic facility-related information is not subject to the ITAR or the EAR.

5. The export control system uses the size of space-based optical telescopes as the technical parameter differentiating between items controlled by the Department of Commerce in Commerce Control List (CCL) Export Control Classification Number (ECCN) 9A515.a.1and by the Department of State in USML Category XV(a)(7) and XV(e)(2). This is based on physics, and specifically the fact that larger optical telescopes generally can generate higher-resolution images than smaller ones. NASA tends to use larger optical telescopes for astrophysics missions because the celestial bodies these missions observe are many light years away, and smaller optical capabilities cannot physically meet the relevant science requirements. At the same time, because NASA missions are designed and calibrated to observe distant celestial objects, they are physically incapable of observing the Earth, which is so bright relative to distant objects that NASA's telescopes would suffer permanent physical damage if pointed at Earth. Essentially, NASA astrophysics missions form a class of spacecraft which meet the

technical definition for national security-sensitive spacecraft regulated by the Department of State, but are incapable of observing the Earth.

- In the past, this issue has been addressed by creating separate regulatory categories for specific missions. For example, the James Webb Space Telescope, NASA's next flagship astrophysics mission, was the subject of specific regulatory activity (*see,* 82 FR 2875 and 2889, Jan. 10, 2017) to ensure that it is controlled by the Department of Commerce under ECCN 9A004 even though it otherwise meets the control text of USML Category XV. However, since it would be impractical to issue an updated regulation every time NASA initiates a new astrophysics mission, the Department is seeking comments from the public on a way to provide technical differentiation within U.S. export control regulations between the space-based optical telescopes for astrophysics missions and those used for Earth observation.

6. The control in USML Category XV(a)(7) and XV(e)(2) is based, in part, on the size of the clear aperture of the telescope's optics. However, not all space-based telescopes use a disc-shaped viewer and thus it is not always possible to definitively determine the size of the "clear aperture" of a specific space-based electro-optical/infrared (E.O./IR) remote sensing system for the purpose of the regulations. Are there suggested revisions that would clarify the scope of Categories XV(a)(7) and XV(e)(2), such as a definition of "clear aperture"?

7. Many spacecraft are designed to provide supplies to the International Space Station and other future space stations. This activity is commonly referred to as "servicing" the space stations, which is an activity that can lead to USML control under Category XV(a)(12). Are there suggested revisions that would clarify the scope of this paragraph, such as a definition of "servicing"?

    - Yes, a definition of servicing is highly recommended. Current interpretation of servicing is mainly refuel and repair, whereas cargo resupply to the ISS and potentially other space stations would fall under "space-based logistics" under the CCL.

8. NASA continues to pursue development of the future Lunar Gateway, which may be described in Category XV(a). Are there any public comments regarding the potential control status of the future Lunar Gateway?

    - Lunar Gateway should be appropriately listed under ECCN 9A004, with a new subparagraph listed similar to how the James Webb Space Telescope and the International Space Station and all parts and components specially designed therefore are explicitly enumerated.

9. What are the cost savings to private entities from shifting control of a suggested specific item from USML to the CCL? To the extent possible, please quantify the current cost of compliance with USML control of an item and any cost savings if a particular change was implemented. Cost savings could include time saved in terms of regulatory uncertainty over whether a certain item is regulated as on the USML or the CCL. This reduced uncertainty, under the “bright line” approach described in the Administration's Export Reform Initiative, would allow both State and industry to avoid spending hours and resources on case by case determinations for certain items. As much as possible, please quantify time saved, reduction in compliance costs, and reduction in paperwork for a particular change

Response from Company B:

<u>Department of Commerce</u>

1. For technologies controlled under ECCN 9A515—examples include habitats, planetary rovers, and planetary systems such as communications and power—what factors or specific technologies should be considered for movement to a different ECCN or paragraph under ECCN 9A515 with less stringent licensing requirements

    - An overwhelming majority of spacecraft parts and components are captured under 9A515.x, requiring a license or license exception to export to all countries other than Canada. It is recommended the Department of Commerce to evaluate and assess ECCN 9A515.y and expand the list of parts and components that do not pose a threat to National Security and Regional Stability. Such examples include; environmental control and life support systems, spacecraft internal and external lighting, humidity and CO2 removal systems, thermal control, spacecraft tires, wheels breaks and landing gear, and electrical power distribution and control units. 9A515.y items should also include those to outfit a habitat (e.g. crew lavatories, exercise equipment, plant and veggie growth systems).

2. The USG is considering further refinement or updated controls on the various technologies listed below. Are there additional specific space-related technologies not described in the list which warrant further review by State or Commerce given their current or anticipated near term commercial applications?
    - Satellite thrusters (bi-propellant, electric, and liquid apogee engines);
    - gyroscopes;
    - inertial navigation systems;
    - large aperture earth observation cameras;
    - spacecraft antenna systems and adaptive Global Navigation Satellite System (GNSS) antennas
    - suborbital systems with propulsion systems currently controlled under USML
    - kapton tape;

- star trackers; and
- astrocompasses
- docking systems other than the NASA Docking System
- Altitude determination and control systems that provide a spacecraft's geolocation accuracy with respect to spacecraft that are not earth orbiting. For example, cislunar orbit.

3. NASA continues to pursue development of the future Lunar Gateway, which may be described in USML Category XV(a). If moved to the CCL, what would be the appropriate controls to apply to items associated with the Lunar Gateway, *e.g.,* ECCNs 9A515 or 9A004?

    - Lunar Gateway should be appropriately listed under ECCN 9A004, with a new subparagraph listed similar to how the James Webb Space Telescope and the International Space Station and all parts and components specially designed therefore are explicitly enumerated.

4. Are there technologies controlled in the USML for either Category IV and XV, which are not currently described or not described with sufficient clarity which the commenter believes should be controlled under the EAR? While this notice discusses specific items based on initial communications with industry, the list is not exhaustive and commenters are encouraged to provide additional examples within both USML categories

    - USML IV(h)(11) controls separation mechanisms, staging mechanisms, and interstages "useable" for articles enumerated in IV(a). The use of the term "useable" inadvertently captures separation mechanisms that are not intended nor are they specially designed for use with articles enumerated in IV(a). Small diameter separation mechanisms, for example, those with a bolt diameter less than .75 inches, specially designed to deploy on-orbit solar panels, instrument covers, or utilized for cargo resupply should be controlled on the CCL under ECCN 9A515.x or specifically enumerated under a new subparagraph within ECCN 9A515.

    - It is recommended that USML Category IV(h)(11) be revised to read as follows: "Separation mechanisms, staging mechanisms, and interstages specially designed for articles enumerated in paragraph (a) of this category, and specially designed parts and components therefor…"

5. Are there specific defense articles which have entered into normal commercial use since the most recent revisions? If so, please provide sufficient detail in describing and identifying the article to support your claim. Commenters may include documentation to

support this claim, *e.g.,* product information demonstrating what is currently in the market (web pages describing products and product brochures), or scientific and industry articles, in particular those also describing trends in commercial products, that resulted from new technologies or manufacturing methods.

6. Are there defense articles for which commercial use is proposed, intended, or anticipated in the next five years? If so, provide sufficient detail in describing and identifying the article to support your claim. Commenters may include documentation to support this claim, *e.g.,* product development or marketing information describing what products will soon to be in the market (web pages describing products under development, press releases related to products under development) or scientific and industry articles, in particular those describing new products that may soon enter the market place as a result of new technologies or manufacturing methods.

7. Are there other technical issues for these items which BIS should address, *e.g.,* the addition of technical notes or defined terms used in the control parameters to make the controls easier to understand and apply consistently?

    - Clarification on the term “space-based logistics”. The term captures cargo resupply missions to the ISS, but what else? Is it just for logistics to and from LEO only? What about cislunar?
    - Clarification on the term “servicing” of another spacecraft. Is this only refuel, repair?

8. What are the cost savings to private entities by shifting control of additional specific commercial items from the USML to the CCL? To the extent possible, please quantify the current cost of compliance with USML control of an item and any cost savings if a particular change was implemented. Cost savings could include time saved in terms of regulatory uncertainty over whether certain items are regulated as on the USML or the CCL. This reduced uncertainty, under the “bright line” approach of the USML to CCL review process, would allow both BIS and industry to avoid spending hours and resources on case by case determinations for certain items. As much as possible, please quantify time saved, reduction in compliance costs, and reduction in paperwork.

Request for Comments Regarding Review of the United States Munitions List Categories IV and XV

AGENCY:

Department of State

1. Are there emerging or new technologies that warrant control in one of the referenced categories, but which are not currently described or not described with sufficient clarity?
2. Are there specific defense articles described in the referenced categories that have entered into normal commercial use since the most recent revision of that category? If so, please include documentation to support this claim

3. Are there defense articles described in the referenced categories for which commercial use is proposed, intended, or anticipated in the next five years? If so, please provide any documentation.

4. Are there other technical issues for these categories which the Department should address?

5. The export control system uses the size of space-based optical telescopes as the technical parameter differentiating between items controlled by the Department of Commerce in Commerce Control List (CCL) Export Control Classification Number (ECCN) 9A515.a.1and by the Department of State in USML Category XV(a)(7) and XV(e)(2). This is based on physics, and specifically the fact that larger optical telescopes generally can generate higher-resolution images than smaller ones. NASA tends to use larger optical telescopes for astrophysics missions because the celestial bodies these missions observe are many light years away, and smaller optical capabilities cannot physically meet the relevant science requirements. At the same time, because NASA missions are designed and calibrated to observe distant celestial objects, they are physically incapable of observing the Earth, which is so bright relative to distant objects that NASA's telescopes would suffer permanent physical damage if pointed at Earth. Essentially, NASA astrophysics missions form a class of spacecraft which meet the technical definition for national security-sensitive spacecraft regulated by the Department of State, but are incapable of observing the Earth.

    - In the past, this issue has been addressed by creating separate regulatory categories for specific missions. For example, the James Webb Space Telescope, NASA's next flagship astrophysics mission, was the subject of specific regulatory activity (*see,* 82 FR 2875 and 2889, Jan. 10, 2017) to ensure that it is controlled by the Department of Commerce under ECCN 9A004 even though it otherwise meets the control text of USML Category XV. However, since it would be impractical to issue an updated regulation every time NASA initiates a new astrophysics mission, the Department is seeking comments from the public on a way to provide technical

differentiation within U.S. export control regulations between the space-based optical telescopes for astrophysics missions and those used for Earth observation.

6. The control in USML Category XV(a)(7) and XV(e)(2) is based, in part, on the size of the clear aperture of the telescope's optics. However, not all space-based telescopes use a disc-shaped viewer and thus it is not always possible to definitively determine the size of the “clear aperture” of a specific space-based electro-optical/infrared (E.O./IR) remote sensing system for the purpose of the regulations. Are there suggested revisions that would clarify the scope of Categories XV(a)(7) and XV(e)(2), such as a definition of “clear aperture”?

7. Many spacecraft are designed to provide supplies to the International Space Station and other future space stations. This activity is commonly referred to as “servicing” the space stations, which is an activity that can lead to USML control under Category XV(a)(12). Are there suggested revisions that would clarify the scope of this paragraph, such as a definition of “servicing”?

    - Yes, a definition of servicing is highly recommended. Current interpretation of servicing is mainly refuel and repair, whereas cargo resupply to the ISS and potentially other space stations would fall under “space-based logistics” under the CCL.

8. NASA continues to pursue development of the future Lunar Gateway, which may be described in Category XV(a). Are there any public comments regarding the potential control status of the future Lunar Gateway?

    - Lunar Gateway should be appropriately listed under ECCN 9A004, with a new subparagraph listed similar to how the James Webb Space Telescope and the International Space Station and all parts and components specially designed therefore are explicitly enumerated.

9. What are the cost savings to private entities from shifting control of a suggested specific item from USML to the CCL? To the extent possible, please quantify the current cost of compliance with USML control of an item and any cost savings if a particular change was implemented. Cost savings could include time saved in terms of regulatory uncertainty over whether a certain item is regulated as on the USML or the CCL. This reduced uncertainty, under the “bright line” approach described in the Administration's Export Reform Initiative, would allow both State and industry to avoid spending hours and resources on case by case determinations for certain items. As much as possible, please quantify time saved, reduction in compliance costs, and reduction in paperwork for a particular change

The following responses are from Member Company C:

Request for Public Comments Regarding Review of the Commerce Control List for Items Transferred from United States Munitions List Categories IV and XV

AGENCY:

Bureau of Industry and Security, Commerce

1. For technologies controlled under ECCN 9A515—examples include habitats, planetary rovers, and planetary systems such as communications and power—what factors or specific technologies should be considered for movement to a different ECCN or paragraph under ECCN 9A515 with less stringent licensing requirements.

    - Given ever evolving commercial and civil space technologies, recommend BIS consider adding new subcategories under 9A to address rovers, robotic space equipment, habitats and commercial crew vehicles. In addition, a distinction should be made between items designed to operate/function in outer space vs. hardware that is "specially designed" for a satellite or spacecraft. Such items should not fall under 9A515.

    - Consideration for new subcategories should include reviews for items such as: environmental control and life support systems, spacecraft internal and external lighting, humidity and CO2 removal systems, thermal control, space vehicle tires, wheel brakes and landing gear, and electrical power distribution and control units.

2. The USG is considering further refinement or updated controls on the various technologies listed below. Are there additional specific space-related technologies not described in the list which warrant further review by State or Commerce given their current or anticipated near term commercial applications?

- Comments with specific rationale were previously provided by industry for these items in the Fall of 2015. We respectfully request that the Department continue to review and consider the comments previously provided.

3. NASA continues to pursue development of the future Lunar Gateway, which may be described in USML Category XV(a). If moved to the CCL, what would be the appropriate controls to apply to items associated with the Lunar Gateway, *e.g.,* ECCNs 9A515 or 9A004?

4. Are there technologies controlled in the USML for either Category IV and XV, which are not currently described or not described with sufficient clarity which the commenter believes should be controlled under the EAR? While this notice discusses specific items based on initial communications with industry, the list is not exhaustive and commenters are encouraged to provide additional examples within both USML categories.

   AIA members submitted the following regarding technologies that should be controlled under the EAR:

   - USML IV(h)(11) controls separation mechanisms, staging mechanisms, and interstages "useable" for articles enumerated in IV(a).
     A Note to IV(h)(11) should be added to clarify that spacecraft to launch vehicle separation mechanisms, associated payload adapters, satellite launch dispensers, and satellite-to-satellite interstages are controlled under 9A515.x as they are specifically designed for a spacecraft.

   - Technical amendment to the USML in the form of a Note to Category IV and XV Request definition of a "Space Vehicle" in both the ITAR and EAR to better define the differences between a "Space Launch Vehicle", "Spacecraft" and "Space Vehicle". Request a new category be created for space planes / space vehicles which carry passengers in a pressurized cabin in outer space.

   - Recommend a clear distinction be made between propulsion systems specially designed for a satellite or spacecraft and systems specially designed for a launch vehicle or missile. We recommend moving spacecraft thrusters from XV(e)(12) and electric propulsion from XV(e)(11)(iv) to the jurisdiction of the US Department of Commerce under 9A515.h.

5. Are there specific defense articles which have entered into normal commercial use since the most recent revisions? If so, please provide sufficient detail in describing and identifying the article to support your claim. Commenters may include documentation to support this claim, *e.g.,* product information demonstrating what is currently in the market (web pages describing products and product brochures), or scientific and industry articles, in particular those also describing trends in commercial products, that resulted from new technologies or manufacturing methods.

6. Are there defense articles for which commercial use is proposed, intended, or anticipated in the next five years? If so, provide sufficient detail in describing and identifying the article to support your claim. Commenters may include documentation to support this claim, *e.g.,* product development or marketing information describing what products will

soon to be in the market (web pages describing products under development, press releases related to products under development) or scientific and industry articles, in particular those describing new products that may soon enter the market place as a result of new technologies or manufacturing methods.

7. Are there other technical issues for these items which BIS should address, *e.g.,* the addition of technical notes or defined terms used in the control parameters to make the controls easier to understand and apply consistently?

    - Request that the Department include an identical note in USML Cat IV and EAR Category 9E as in Note 3 to USML Cat XV paragraph (f) and Note 2 to EAR Category 9E to specifically state that Space Launch Vehicle housekeeping / telemetry data is also not controlled.

    - Request that the Department allow technology related to star trackers controlled in ECCN 7A004 (7E001 and 7E002) to be added to the list of ECCNs in 740.2(a)(5)(i) that are subject to MT controls but are nevertheless eligible for certain License Exceptions, similar to ECCNs 7E003 and 7E101.

    - In addition, a definition of "service" would be helpful to distinguish between servicing spacecraft that augment or enhance the existing capabilities of an on-orbit spacecraft, which may merit a higher level of control as compared to a servicing spacecraft that repairs or provides maintenance and life extension services without enhancing existing on-orbit spacecraft capabilities. Clarification is also needed to highlight that providing supplies or cargo does not meet the definition of "servicing".

8. What are the cost savings to private entities by shifting control of additional specific commercial items from the USML to the CCL? To the extent possible, please quantify the current cost of compliance with USML control of an item and any cost savings if a particular change was implemented. Cost savings could include time saved in terms of regulatory uncertainty over whether certain items are regulated as on the USML or the CCL. This reduced uncertainty, under the "bright line" approach of the USML to CCL review process, would allow both BIS and industry to avoid spending hours and resources on case by case determinations for certain items. As much as possible, please quantify time saved, reduction in compliance costs, and reduction in paperwork.

Request for Comments Regarding Review of the United States Munitions List Categories IV and XV

AGENCY:

Department of State.

1. Are there emerging or new technologies that warrant control in one of the referenced categories, but which are not currently described or not described with sufficient clarity?

2. Are there specific defense articles described in the referenced categories that have entered into normal commercial use since the most recent revision of that category? If so, please include documentation to support this claim

3. Are there defense articles described in the referenced categories for which commercial use is proposed, intended, or anticipated in the next five years? If so, please provide any documentation.

4. Are there other technical issues for these categories which the Department should address?

    - Technical amendment to the USML in the form of a Note to Category IV and XV Request definition of a “Space Vehicle” in both the ITAR and EAR to better define the differences between a “Space Launch Vehicle”, “Spacecraft” and “Space Vehicle”. Request a new category be created for space planes / space vehicles which carry passengers in a pressurized cabin in outer space

5. The export control system uses the size of space-based optical telescopes as the technical parameter differentiating between items controlled by the Department of Commerce in Commerce Control List (CCL) Export Control Classification Number (ECCN) 9A515.a.1and by the Department of State in USML Category XV(a)(7) and XV(e)(2). This is based on physics, and specifically the fact that larger optical telescopes generally can generate higher-resolution images than smaller ones. NASA tends to use larger optical telescopes for astrophysics missions because the celestial bodies these missions observe are many light years away, and smaller optical capabilities cannot physically meet the relevant science requirements. At the same time, because NASA missions are designed and calibrated to observe distant celestial objects, they are physically incapable of observing the Earth, which is so bright relative to distant objects that NASA's telescopes would suffer permanent physical damage if pointed at Earth. Essentially, NASA astrophysics missions form a class of spacecraft which meet the technical definition for national security-sensitive spacecraft regulated by the Department of State, but are incapable of observing the Earth.

6. The control in USML Category XV(a)(7) and XV(e)(2) is based, in part, on the size of the clear aperture of the telescope's optics. However, not all space-based telescopes use a disc-shaped viewer and thus it is not always possible to definitively determine the size of the “clear aperture” of a specific space-based electro-optical/infrared (E.O./IR) remote sensing system for the purpose of the regulations. Are there suggested revisions that would clarify the scope of Categories XV(a)(7) and XV(e)(2), such as a definition of “clear aperture”?

7. Many spacecraft are designed to provide supplies to the International Space Station and other future space stations. This activity is commonly referred to as “servicing” the space stations, which is an activity that can lead to USML control under Category XV(a)(12). Are there suggested revisions that would clarify the scope of this paragraph, such as a definition of “servicing”?

    - Yes, a definition of servicing is highly recommended. Current interpretation of servicing is mainly refuel and repair, whereas cargo resupply to the ISS and potentially other space stations would fall under “space-based logistics” under the CCL.
    - USML Category XV (a)12 covers spacecraft that “Are specifically designed to provide inspection or surveillance of another spacecraft, or service another spacecraft via grappling or docking.”
    - Recommend that the Department remove this paragraph. All “servicing” spacecraft, regardless of a grappling or docking feature, should be controlled under the jurisdiction of the US Department of Commerce under 9A515.a.4.
    - In addition, recommend that the Department add the definition of “service” to distinguish between servicing spacecraft that augment or enhance the existing capabilities of an on-orbit spacecraft, which may merit a higher level of control as compared to a servicing spacecraft that repairs or provides maintenance and life extension services without enhancing existing on-orbit spacecraft capabilities. Clarification is also needed to highlight that providing supplies or cargo does not meet the definition of “servicing”.

8. NASA continues to pursue development of the future Lunar Gateway, which may be described in Category XV(a). Are there any public comments regarding the potential control status of the future Lunar Gateway?

9. What are the cost savings to private entities from shifting control of a suggested specific item from USML to the CCL? To the extent possible, please quantify the current cost of

compliance with USML control of an item and any cost savings if a particular change was implemented. Cost savings could include time saved in terms of regulatory uncertainty over whether a certain item is regulated as on the USML or the CCL. This reduced uncertainty, under the “bright line” approach described in the Administration's Export Reform Initiative, would allow both State and industry to avoid spending hours and resources on case by case determinations for certain items. As much as possible, please quantify time saved, reduction in compliance costs, and reduction in paperwork for a particular change.

Virgin Orbit, LLC
4022 E Conant Street
Long Beach, CA 90808
Ph: +1 562 384 4400

April 22, 2019

Submitted via www.regulations.gov

Subject: **Comments to Advanced Notices of Proposed Rulemaking (ANPRM) on USML Categories IV and XV and Related Items Transferred to the CCL**

Reference: **Federal Register Vol. 84 No. 46, Friday, March 8, 2019, pages 8485-8487**

ID Numbers: **BIS-2018-0029 / RIN 0694–AH66**
DOS-2018-0048 / RIN 1400–AE73

The Department of State and the Department of Commerce published Advanced Notices of Proposed Rulemaking (ANPRMs) in the Federal Register, Vol. 84, No. 46, on March 8, 2019 seeking public comments regarding review of U.S. Munitions List (USML) Categories IV and XV and the Commerce Control List (CCL) for items transferred from those USML categories.

The ANPRMs are seeking comments on ways to "streamline export control regulations for both the U.S. commercial space industry and [its] international partners to lower administrative burden, decrease regulatory compliance costs as well as increase exports thereby bolstering the U.S. space commercial sector and industrial base."

Virgin Orbit (www.virginorbit.com) is a sister company to Virgin Galactic and The Spaceship Company Orbit within Sir Richard Branson's Virgin Group of companies. We have expertise in the design, development, manufacture, and operation of a commercial, small satellite launch vehicle called LauncherOne which is launched from a modified Being 747-400 aircraft. Virgin Orbit offers a highly flexible horizontal air-launch service which can provide for delivery to any orbit or inclination; responsive and resilient launch services; schedule flexibility; high flight cadence; and, launch from any spaceport. Our corporate headquarters and state-of-the-art manufacturing facilities are located in in Long Beach, California, and our test site is located at Mojave Air and Space Port in Mojave, California.

Virgin Orbit, LLC
4022 E Conant Street
Long Beach, CA 90808
Ph: +1 562 384 4400

In tandem with our sister companies, Virgin Orbit continues to engage with current and potential international partners in ways that require or could require exports of its technology and other items. However, Virgin Orbit and its sister companies often encounter questions and uncertainty from current and potential international partners related to U.S. export controls, which oftentimes delay or preclude certain opportunities. Virgin Orbit, therefore, respectfully submits the following comments to the ANPRMs, which could reduce regulatory uncertainty and facilitate its business with international partners if addressed:

I. Implementation of Wassenaar Arrangement Controls on Air-Launch Platforms

The Wassenaar Arrangement does not account for the unilateral controls the United States maintains through USML Category XV. In implementing the new Wassenaar entry for air-launch platforms, DDTC and BIS should ensure that U.S. companies with aircraft specially designed or modified to be air-launch platforms for USML Category XV items also receive the benefit of the new Wassenaar entry.

a. Proposed Change to CCL: Amendment to the CCL to create a specific entry in ECCN 9A004 conforming to the Wassenaar Arrangement's newly added 9.A.4.g, "Aircraft specially designed or modified to be air-launch platforms for space launch vehicles." (Reference: Wassenaar Arrangement, Rev. Dec. 2018, Pg. 157.) In implementing this update, BIS should clarify the scope of the new entry in ECCN 9A004 consistent with the United States' unilateral controls on spacecraft and space vehicles, so that it includes aircraft specially designed or modified to be air-launch platforms for "spacecraft" and "space vehicles," too -- not just "space launch vehicles."

b. Proposed Change to USML: Technical amendment to the USML in the form of notes to Categories IV and XV that aircraft specially designed or modified to be air-launch platforms for space launch vehicles, spacecraft, or space vehicles are not subject to the ITAR, but rather subject to the EAR and controlled under the new entry in ECCN 9A004.

II. Clarification of "Mobile Launcher Mechanisms"

If DDTC amends the ITAR or otherwise confirms that air-launch platforms such as those discussed above are not subject to the ITAR, we ask DDTC to confirm that any mechanisms that would be used to hold and drop a space launch vehicle, spacecraft, or space vehicle from such vehicles are not within the scope of USML

Virgin Orbit, LLC
4022 E Conant Street
Long Beach, CA 90808
Ph: +1 562 384 4400

Category IV(b) as a "mobile launcher mechanism." The basis for our request is that the scope of this entry is limited to such articles "for" a system in USML IV(a)(1) or IV(a)(2). If the vehicle containing such a mechanism is controlled under USML Category XV or is subject to the EAR (e.g., in a new 9A004 entry), then the mechanism would not be, we submit, covered by USML IV(b).

a. Proposed Change to USML: Add a Note 4 to paragraph (b) in Category IV, which says, "This paragraph does not control mechanisms attached to aircraft subject to the CCL, which are specially designed or modified to be air-launch platforms for space launch vehicles, spacecraft, or space vehicles."

b. In the alternative, we ask DDTC to create a note to USML IV(b) that tracks the policy and content of the Note 2 to paragraph (e) of USML Category XV. That note states that articles that, as stand-alone items, are subject to the ITAR under Category XV(e) are not subject to the ITAR when integrated into and included as an integral part of the item subject to the EAR. This note, thus, prevents the possibility that an ITAR-controlled component will "taint" the jurisdiction of an otherwise EAR-controlled item. The policy justification for our request here is identical to the policy justification for Note 2. Thus, a suggested note to USML Category IV(b) would be:

"A launcher mechanism described in this paragraph is subject to the EAR when, prior to export, reexport, retransfer, or temporary import, it is integrated into and included as an integral part of an item subject to the EAR. Such articles do not become subject to the EAR until integrated into the item subject to the EAR. Export, reexport, retransfer, or temporary import of, and technical data and defense services directly related to defense articles intended to be integrated remain subject to the ITAR."

III. Application of MTCR Exclusion for Manned Aircraft

The MTCR categorically excludes manned aircraft from control under the regime. Therefore, manned aircraft -- even those that are specially designed or modified to be air-launch platforms for space launch vehicles, spacecraft, or space vehicles -- should not be subject to MT control. Moreover, by extension, manned spacecraft or space vehicles should not be subject to MT control.

a. Proposed Change to USML: Technical amendment to the USML in the form of a Note to Category XV that manned spacecraft or space vehicles are not subject to MT control because they are manned vehicles.

Virgin Orbit, LLC
4022 E Conant Street
Long Beach, CA 90808
Ph: +1 562 384 4400

b. Proposed Change to CCL: Technical amendment to the CCL in the form of a Note to the new 9A004 entry for air-launch platforms, confirming that such aircraft -- including the spacecraft or space vehicles they carry -- are not subject to MT control.

IV. Clarification of Controls Applicable to Spaceports

The definition of "technical data" in USML Category XV(f) includes information required for the design, development, production, manufacture, assembly, operation, repair, testing, maintenance or modification of the items in Category XV(a) through (e). The scope of this definition can be read broadly to capture information relevant to commercial spaceports that serve as facilities for Category XV(a) space vehicles, including information which is similar to facilities requirements for airports and civil aviation operations.

a. Proposed Change to USML: Technical amendment to the USML in the form of a Note to Category XV(f) that basic facility-related information for spaceports is not subject to the ITAR or the EAR. Such information should include information such as hangar size and building requirements, apron and runway specifications, general requirements for ground support equipment, vehicle processing and fueling, nitrous oxide storage and loading, chemical handling and storage, air traffic management operations, and similar activities common to civil aviation operations.

Should the agencies have any questions relative to this submission, they may contact the undersigned via email at neil.ray@virginorbit.com or via telephone at (562) 708-5297.

Yours Sincerely,

Neil Ray

Neil Ray
Compliance Counsel

SPACEX

April 22, 2019

Uploaded via http://www.regulations.gov

Subject: Comment on Advanced Notice of Proposed Rulemaking Regarding Review of Commerce Control List for Items Transferred from the United States Munitions List Categories IV and XV

Reference: 84 FR 8485 (March 8, 2019); RIN 0694-AH66; Docket No. 181010936-8936-01;

Space Exploration Technologies Corp. ("SpaceX") submits the following comments in response to the Commerce Department's Advance Notice of Proposed Rulemaking ("ANPRM") regarding the review of controls for items transferred from the United States Munitions List ("USML") Categories IV and XV. SpaceX appreciates the opportunity to provide its comments in response to the ANPRM. SpaceX appreciates and supports the initiative by the Bureau of Industry and Security ("BIS"), Directorate of Defense Trade Controls ("DDTC"), and the Administration to consider ways to streamline export control regulations for US commercial space industry to lower administrative burden, decrease regulatory compliance costs, and increase exports thereby bolstering the US space commercial sector and industrial base.

In support of our comments, we reference spacex.com/mars.

1. Clarification of Vehicle Definitions

Issue: The International Traffic in Arms Regulations ("ITAR") United States Munitions List ("USML") and Export Administration Regulations ("EAR") Commerce Control List ("CCL") do not currently account for vehicles that have both spacecraft and launch capabilities.

Background: In the next five years, SpaceX intends to commercialize Starship[1], its two-stage fully reusable heavy lift launcher system. Both the first and second stages will incorporate multiple Raptor engines.[2]

The second stage will have the capability to carry satellites and other similar payloads, to support on-orbit servicing and return of large payloads to Earth, to carry people and cargo, and to perform point-to-point travel on Earth in under an hour.

[1] https://www.spacex.com/mars. The term "Starship" refers to the integrated two-stage system, and the second stage of the system.
[2] Raptor is a USML Category IV(d)(2) engine.

1155 F Street, NW Suite 475 Washington, DC 20004
phone 202.649.2700 fax 202.649.2701
spacex.com

The first Starship test vehicle (a "hopper") in South Texas completed a successful tethered hop in April. SpaceX is constructing additional hoppers, and is planning more hops in 2019.

Comment: Define "rocket" and "SLV" in USML Category IV and "spacecraft" in USML Category XV, and redefine or add these terms in Section 774 of the EAR, consistent with the USML.

DDTC should define the terms "rocket" and "space launch vehicle" (SLV) in USML Category IV(a). Items that are not rockets or SLVs based on the industry understanding of these terms are capable of delivering "at least 500-kg payload to a range of at least 300 km". DDTC should clarify, for example, whether the incorporation of a USML Category IV(d) propulsion system is the trigger for USML Category IV(a) control. DDTC should avoid relying on definitions that ultimately refer back to USML Category IV(a)(1) articles, because it is unclear what these are. For example, the definition of a rocket or SLV should not rely on the incorporation of a USML Category IV(h)(1) guidance system because the description of a "guidance system" in USML Category IV(h)(1) is one that is specially designed for a USML Category IV(a)(1) article.

DDTC should also define the term "spacecraft" in USML Category XV(a). The definition should differentiate a "spacecraft" from a "rocket", "SLV", and "individual rocket stages". An item that a company uses as a spacecraft may also be capable of delivering "at least 500-kg payload to a range of at least 300 km," or may also serve as the second stage of a rocket or SLV. DDTC's definition should go further than the definition of the term "spacecraft" in the EAR, which is limited to satellites and space probes and does not recognize other types of spacecraft, including those that carry cargo and people.

BIS and DDTC should collaborate on the definition of the term "spacecraft", and BIS should then revise the definition of "spacecraft" in Section 774 of the EAR. BIS should add DDTC's definitions of "rocket" and "space launch vehicle" to Section 774 of the EAR.

Definitions or clarifications that contemplate Starship and other commercial space vehicles identified in response to the ANPRM would be most useful.

2. License Exemption for Launch, Landing and Related Activities that Occur in the Ocean

Issue: The ITAR and EAR do not clearly identify where in the ocean the United States begins and ends, making it difficult to determine what constitutes an "export" when a US person taking items into the ocean for launching or landing a rocket or spacecraft. In addition, if a US person owns and remains in possession and control of such items when taking them from US soil into the ocean, the current regulations still appear to require a license, even if there is no foreign person involvement.

Background: SpaceX is also designing Starship to carry cargo and people from one point on Earth to another (also known as "point-to-point travel").[3] SpaceX is evaluating performing point-to-point travel using launch and landing platforms in the ocean, as illustrated in the video linked in footnote three. In order to launch and land Starship in the ocean, in various circumstances,

[3] https://www.youtube.com/watch?v=zqE-ultsWt0

SpaceX will be required to take Starship, a USML item, from US soil out in to various points in the ocean.

Comment: Exempt exports related to ocean launch and landing activities from licensing requirements.

Assuming that a US person's taking of a defense article from US soil to US contiguous waters, the US Exclusive Economic Zone ("EEZ"), international waters, a foreign country's EEZ, or a foreign country's contiguous waters is as an "export," SpaceX requests that DDTC consider adding an exemption to the ITAR for such activities.

Specifically, SpaceX suggests adding an exemption to the ITAR to allow US persons that are registered with DDTC to ship from the United States into the ocean, without a license or other authorization, any defense articles, including software, required for launching or recovering a rocket or spacecraft, including testing and all pre-launch and post-launch activities, provided that such defense articles: (i) do not enter the "territorial waters" of a foreign country[4]; and (ii) are returned to US soil after launch or recovery activities are complete, or are otherwise rendered unusable.

A license, agreement, or other authorization would still be required for other controlled activities, such as (i) releasing or otherwise transferring technical data to a foreign person; (ii) transferring registration, control, or ownership of a defense article; (iii) performing defense services on behalf of, or for the benefit of any foreign person; or (iv) entering the territorial waters of a foreign country, or calling port in a foreign country.

We request that BIS add a parallel license exception in the EAR.

3. Space-Qualified Vibration Suppression Systems

Issue: USML Category XV(e)(5) controls "space-qualified active vibration suppression systems, including active isolation and active dampening systems, and associated control electronics specially designed therefor," but does not provide a definition of "vibration suppression system" or operational parameters for systems covered by the ITAR.

Comment: Clarify what is covered by "space-qualified active vibration suppression systems" in Category XV(e)(5).

We ask DDTC to use control parameters to define "active vibration suppression system", or in the alternative, define active vibration system to clarify the reason active vibration suppression systems warrant USML control. In addition, we request that DDTC take the following into consideration:

- What is the difference between an active vibration suppression system and an image stabilization system?

[4] Although the ITAR does not define the term, the term "territorial seas" is defined in other settings as the 12 nautical miles from a country's coast. *See* >https://nauticalcharts.noaa.gov/data/us-maritime-limits-and-boundaries.html<. We recommend that the agencies specify this definition in the new rule.

- If a commercial active vibration system, or one with similar capabilities, became space-qualified, it should not be ITAR-controlled. For example, commercial satellites may require a level of vibration suppression that would not be sufficient for sensitive systems used by the military, and should not be captured by USML Category XV(e)(5).

4. Landing Legs for Rockets

Issue: Landing leg assemblies for rockets are currently controlled as rocket components even if they are passive on assent. This level of control is not necessary for these systems and their parts, components, attachments, and accessories.

Comment: Move landing leg assemblies and parts, components, attachments, and accessories thereof to ECCN 9A604.y

The landing leg assembly used on SpaceX's Falcon rockets, and parts, components, attachments, and accessories of the assembly, are classified Export Control Classification Number ("ECCN") 9A604.x as commodities "specially designed" for USML Category IV and ECCN 9A604.x items. We propose moving landing leg assemblies and parts, components, attachments, and accessories thereof to ECCN 9A604.y. During launch and ascent the landing leg assembly and parts, components, attachments, and accessories are passive. They are also not required for the delivery of a payload, and do not enhance the capability of the rocket to deliver a payload to orbit.

5. Shipments, Transfers, and Releases Outside the Earth's Atmosphere

Issue: The ITAR and EAR are not clear regarding whether shipments, transfers, or releases that occur outside the Earth's atmosphere are export controlled. Given the unprecedented nature of planned space exploration activities and the difficult and dangerous issues that may arise, the agencies should clarify that transfers occurring entirely outside the earth's atmosphere are not export controlled.

Background – Starship Commercial Missions

On September 17, 2018, SpaceX announced Yusaku Maezawa, a Japanese citizen, will be the company's first private customer to fly on Starship around the Moon. In the next few years, SpaceX intends to contract with additional private customers who are interested in flying to space.

SpaceX is also targeting Starship missions to Mars in the next few years carrying cargo and then people, some of which may include foreign persons. These initial missions will serve as the beginnings of the first Mars base, from which we can build a thriving city and eventually a self-sustaining civilization on Mars. To build a Mars base and self-sustaining civilization, people on these missions will participate in activities that could involve transfers or ITAR or EAR-controlled technical data/technology or defense services, such as: setting up a production propellant plant and producing propellant; developing and building launch and landing sites; and inspecting and potentially repairing Starship.

In addition, people who are a part of these missions must train for these activities on Earth prior to departure. Training for, and participating in, these types of activities for missions to Mars will result in the transfer or release of technology/technical data, including software, that likely falls outside of Note 2 to Paragraph (f) of USML Category XV or Note 2 to ECCN 9E515. Given the scale of these activities, if applied to transfers occurring outside the earth's atmosphere, the current licensing structure would be burdensome and prevent people on missions from accessing information that is potentially critical to resolving difficult or dangers issues.

Comment: Exempt releases or transfers of technology/technical data and defense services that occur entirely outside the atmosphere from licensing requirements

Assuming the technology/technical data released during the activities described above falls outside of Note 2 to Paragraph (f) of USML Category XV or Note 2 to ECCN 9E515, it is not clear from the regulations whether transfers or releases that occur entirely outside Earth's atmosphere are "exports" or "reexports" and whether licensing is required for such transfers or releases. For example:

- If a foreign person receives technical data from a US person onboard a spacecraft to perform a repair on a component of the life support system on Starship during the flight to Mars, is this an export and does SpaceX require export authorization prior to this person performing the repair?
- If a US person and foreign person repair Starships engines on Mars and the US person releases technical data to the foreign person during the repairs is this a defense service that requires a Technical Assistance Agreement?

As noted above, people on these missions to Mars will need training on Earth in order to participate in the activities during flight and on Mars, and export authorization would be required for any releases or transfers of controlled technical data/technology that occur during these on-Earth trainings, consistent with current licensing regimes. These export authorizations will allow DDTC and BIS to vet the people who are participating in missions to Mars, and authorize many if not all of the same types of information sharing that will occur outside the Earth's atmosphere. For this reason, we respectfully submit that export authorization for activities that occur outside Earth's atmosphere would be unnecessary.

The absence of an exemption for transfers or releases that occur entirely outside the atmosphere would create significant challenges for Mars missions. For example:

- People on missions to Mars need to have immediate access to technology/technical data that is required to complete a successful mission. Enumerating a predictive list of this technology/technical data is challenging because this type of mission is unprecedented.
- Limiting access to an enumerated list could be unsafe if an unpredicted issue arises. In this situation, mission participants need the ability to perform any actions and access any technology/technical data required to solve issue.
- Export authorizations come with administrative requirements that would be challenging to fulfill during a mission to Mars. For example, the export regulations all have a recordkeeping requirement and some export authorizations include provisos requiring the applicant additionally retain a library of released technology/technical data. Given the

nature and duration of a Mars mission, there will be a potentially large number of releases and the nature of the releases will be primarily informal (e.g., conversations). In addition, missions to Mars will be heavily survival-focused, and any additional administrative burdens could create difficult and dangerous situations.

We propose adding a note to the definitions of "export" and "reexport" in the ITAR and EAR clarifying that these terms do not include shipments, transfers, or releases that occur entirely outside Earth's atmosphere, except for transferring registration, control, or ownership of a satellite.

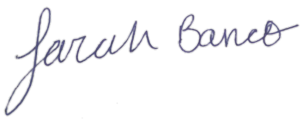
Alternatively, we propose: (1) adding a section to the ITAR defining "activities that are not exports or reexports", similar to Section 734.18 of the EAR, and including in the new section a statement confirming that shipments, transfers, or releases that occur entirely outside the atmosphere are not exports or reexports, except transferring registration, control, or ownership of a satellite; and (2) revising Section 734.18 of the EAR to state the same.

Alternatively, we propose adding a license exemption to the ITAR and a license exception to the EAR requiring no licenses for shipments, transfers, or releases that occur entirely outside Earth's atmosphere, except for transferring registration, control, or ownership of a satellite.

We recognize that implementing this comment may be challenging if shipments, transfers, or releases involving arms embargoed countries. If this is the case, then we recommend implementing this comment with respect to all other countries, at least initially, and then later, if possible, expanding it to include arms embargoed countries.

* * *

Respectfully submitted,



Sarah Banco

Counsel, Export Compliance Officer

SpaceX

202-649-2700

Honeywell
101 Constitution Avenue, N.W.
Suite 500 West
Washington, DC 20001
202-662-2614

April 22, 2019

To: BIS c/o www.regulations.gov
Fr: Michael Slonim, Senior Manager, International Trade Compliance
Re: BIS-2018-0029 (Proposed Rules)

Q1. *Technologies under 9A515 can be evaluated by vehicle/habitat use to determine an appropriate ECCN. An example of this approach for next human space vehicles follows:*

Human Support Technology (EAR99)

- *Life support by providing atmosphere, water and temperature controlled environment for supporting life*
- *Crew / vehicle interfaces including visual, audio technology to communicate to the crew and crew inputs through physical or logical technology*
- *Medical technology used on space vehicles*
- *Crew support technologies such as hygiene items, clothing, sleep accommodations, exercise equipment, etc.*

Commercial Activity (EAR99 or the same ECCN as earth categories)

- *Mineral extraction technology*
- *Resource processing technology (e.g. converting water to hydrogen and oxygen)*
- *Power generation for local use or transmission for use*
- *Space tourism transportation technologies (Transit Vehicles, Rovers)*

Scientific Activity (EAR99)

- *Geology*
- *Astronomy (Non Earth Observation)*

Other Activities (Retain the 9A515) — We think that specific defense related technologies that could be militarized need to retain more stringent control. These include:

- *Precision location determination sensors*
- *Propulsion for re-entry*
- *Vehicle re-entry thermal protection*
- *Security for Communications*
- *High power energy and associated technologies*

Q2. *In the ECR transition of certain inertial products from USML to CCL, there was an unintended roll-back wherein the licensing burden increased under BIS. Specifically, under the former USML classification, temporary imports for overhaul, service and repair (and the subsequent exports of repaired hardware) were allowable under ITAR license exemption 22 CFR 123.4(a)(1). Under ECR, these shifted to 7A003, e.g., IMUs and 7A001, e.g., Accelerometers. The h/w under these ECCNs are "MT" controlled and do not qualify for the comparable BIS license exception "RPL". Therefore, repairs of this hardware now require a hardware license for the export of completed service/repairs. It would be helpful if RPL was allowable for these MT-controlled goods.*

Honeywell
101 Constitution Avenue, N.W.
Suite 500 West
Washington, DC 20001
202-662-2650

Q3. *The lunar gateway should be moved to the CCL and controlled as ISS has controlled. There is no technical reason for listing on the USML given ISS is similar (identical) technology and is on the CCL. Accordingly, 9A004 is the logical choice given applicability to both the International Space Station and Lunar Gateway. This approach should also be extended to lunar surface based vehicles.*

Q4. No comment

Q5. *Time Triggered Ethernet (TTE) is used on Orion CM/SM and Ariane 6 but should be considered a commercial item under EAR99. TTE is now a commercial item used in aerospace, wind farms and autos. See: https://www.tttech.com/product-filter/time-triggered-ethernet-ttethernet/*

Q6-Q8. No comment

Before the
DEPARTMENT OF COMMERCE
Washington, D.C. 20230

In the Matter of	**)**	
	)	
Request for Public Comments Regarding Review of Commerce Control List for Items Transferred From United States Munitions List Categories IV and XV	**)**	**BIS-2018-0029**

COMMENTS OF THE CONSORTIUM FOR THE EXECUTION OF RENDEZVOUS AND SERVICING OPERATIONS

I. INTRODUCTION AND SUMMARY.

The Consortium for Execution of Rendezvous and Servicing Operations ("CONFERS") is an industry-led initiative that advocates globally for commercial On-Orbit Servicing (OOS) as an integral part of a robust space economy. As an essential underpinning of that advocacy, CONFERS. aims to leverage best practices from government and industry to research, develop, and publish non-binding, consensus-derived principles, practices, and technical and operations standards for OOS and Rendezvous and Proximity Operations (RPO). These standards would provide the foundation for a new commercial repertoire of robust space-based capabilities and a future in-space economy.

CONFERS has been developed by a team of private sector organizations with initial funding from the Defense Advanced Research Projects Agency (DARPA). Advanced Technology International (ATI) is providing overall program management. Technical expertise and project execution support is being provided by the Secure World Foundation (SWF), the University of Southern California's Space Engineering Research Center (SERC), and the Space Infrastructure Foundation (SIF).

To fulfill its mission, CONFERS is recruiting a broad array of members from satellite equipment manufacturers, satellite operators, service providers, developers of RPO simulation, planning and safety tools, and insurers; interacting with standards development organizations; and engaging other stakeholders from industry, academia, and governments. CONFERS currently has 25 industry members from the United States and abroad. The process is fully collaborative and includes dedicated outreach activities to the global commercial satellite and space community.

We appreciate the efforts of the Department of Commerce, working in concert with other federal departments and agencies, to review the controls implemented in United States Munitions List (USML) Categories IV and XV and the related transfer of items to the Department of Commerce's Commerce Control List (CCL).[1] As ours is a nascent industry with significant future economic and national security potential for the United States, we are keenly aware of the potential harm that burdensome export control regulations could pose to the success of OOS and RPO services but also of the need to protect critical technologies as a national security measure.

II. Need for Periodic Reviews of the USML

The commercial space industry is undergoing a period of drastic change. Spin-in technologies from other domains, significant increases in private sector funding, and increased government leveraging of commercial capabilities and services are driving the space industry to rapidly innovate and explore new capabilities and markets.

The rapid innovation and change in the space industry are particularly evident in the commercial satellite servicing sector. Dozens of U.S. and foreign companies are current investing in developing the technologies for on-orbit inspection, docking, berthing, relocation, refueling, life extension, repair, upgrade, deorbit, refueling, and assembly of satellites and other space objects. Some of our members have already signed agreements with other commercial or governmental entities to provide such services and plan to do initial demonstrations as early as 2020.

The ever-changing nature of space technology means that the categorization of technologies enshrined in the USML and CCL must also constantly evolve. Therefore, the Department of Commerce, in conjunction with other federal departments and agencies, must execute regular and mandatory reviews involving industry feedback on necessary changes to both lists. The Department of Commerce should liaise with industry to determine the appropriate time interval between reviews.

[1] "Request for Public Comments Regarding Review of Commerce Control List for Items Transferred From United States Munitions List Categories IV and XV", *Federal Register*, 8 March 2019, https://www.federalregister.gov/documents/2019/03/08/2019-04268/request-for-public-comments-regarding-review-of-commerce-control-list-for-items-transferred-from

III. Categorization and Controls of Satellite-Servicing Related Technologies

CONFERS members believe that some or all of the technologies, services, and information related to commercial satellite servicing should be transitioned from the USML to the CCL. However, not all member organizations have had the opportunity to produce a detailed response on this topic before the ANPRM deadline. Therefore, CONFERS hopes that the Department of Commerce and other relevant departments and agencies will engage in an ongoing dialogue with CONFERS to discuss necessary changes to ensure this critical industry flourishes.

Respectfully submitted,

/*signed*/

Brian Weeden, Ph.D.
CONFERS Executive Director
315 Sigma Drive
Summerville, SC 29486

April 20, 2019

Lockheed Martin Corporation
2121 Crystal Drive Suite 100 Arlington, VA 22202

Mark Webber
Director, International Trade & Export Policy

April 22, 2019

Mr. Dennis Krepp
Director, Sensors & Aviation Division
Office of National Security and Technology Transfer Controls
Bureau of Industry and Security
U.S. Department of Commerce
Washington, D.C.

ATTN: Request for Public Comments Regarding Review of Commerce Control List or Items Transferred from USML Categories IV & XV (BIS-2018-0029)

Lockheed Martin Corporation (Lockheed Martin) is pleased to submit the following comments in response to the March 8, 2019 advanced notice of proposed rulemaking (ANPRM) regarding the review of Commerce Control List (CCL) items transferred from Category IV (Launch Vehicles, Guided Missiles, Ballistic Missiles, Rockets, Torpedoes, Bombs, and Mines) and XV (Spacecraft and Related Articles) of the U.S. Munitions List (USML).

Lockheed Martin appreciates the effort by the Department to support ongoing efforts by the National Space Council to reform and streamline U.S. export controls on space-related items, consistent with the objectives laid out in Space Policy Directive-2. Lockheed Martin supports the objective of SPD-2 to ensure Federal regulations "promote economic growth; minimize uncertainty for taxpayers, investors, and private industry; protect national security, public-safety, and foreign policy interests; and encourage American leadership in space commerce."

Export controls have played an important historical role in shaping the U.S. space industry. As a general matter, the Department should coordinate with the Department of State to ensure only the most sensitive space-related items are controlled on the USML. Previous efforts to remove space-related items from the USML to the CCL have had a positive benefit for commercial and civil space opportunities, helping to make US companies more competitive, reduce costs, and facilitate international cooperation. However, as noted below, there are additional items that, when intended for use in commercial/civil applications, should be removed from the USML.

In addition, Lockheed Martin would recommend the Department, working with the National Space Council and other elements of the U.S government, consider whether there are procedural reforms that could have a material effect on how commercial space operations are approved for export and international cooperation. This ANPRM focuses in large part on revisions to the export control

lists as a mechanism for streamlining export licensing. This is a valuable exercise that we strongly support. It is also imperative that the Department consider whether existing licensing mechanisms could be used to limit the licensing requirement for transactional applications, for example, when supporting a U.S. government program. As noted below, many of the recommended control list changes focus on support for cooperative activities with NASA. The Department should consider whether CCL items could be subject to more expansive license exceptions for civil and commercial space applications. Reforming how the Department licenses civil and commercial space exports is just as important as reforming what the Department licenses.

Finally, we applaud the Department's continuing efforts to periodically review the U.S. export control lists to ensure that controls are clear, do not inadvertently control items in normal commercial use, account for technological developments, and properly implement the national security and foreign policy objectives of the United States. As modernization changes the availability and utility of space technologies, we would encourage these reviews to continue.

In particular, the Department has requested specific comments on a number of questions. The following comments provide answers to some of the questions included in the ANPRM:

3. NASA continues to pursue development of the future Lunar Gateway, which may be described in USML Category XV(a). If moved to the CCL, what would be the appropriate controls to apply to items associated with the Lunar Gateway, e.g., ECCNs 9A515 or 9A004?

- Given the peaceful scientific focus of the program, the Lunar Gateway would be most appropriately controlled under ECCN 9A004 along with the James Webb Space Telescope (JWST) and the International Space Station (ISS).

4. Are there technologies controlled in the USML for either Category IV and XV, which are not currently described or not described with sufficient clarity which the commenter believes should be controlled under the EAR? While this notice discusses specific items based on initial communications with industry, the list is not exhaustive and commenters are encouraged to provide additional examples within both USML categories.

The following USML-controlled technologies do not provide a critical military or intelligence advantage and thus should not be included on the USML:

- Tanks used to transport, store and handle liquid propellants shipped to launch sites for purposes of tanking satellites prior to launch.

  Category IV(c) controls "Apparatus and devices specially designed for the handling, control, activation, monitoring, detection, protection, discharge, or detonation of the articles enumerated in paragraphs (a) and (b) of this category (MT for those systems enumerated in paragraphs (a)(1), (a)(2), and (b)(1) of this category)." This broad control captures tanks used to support commercial satellite launches. This is a good example of how ITAR controls can greatly complicate support for commercial operations. As noted above, where possible, the Department should seek to enable Commerce authorization for all activities supporting

commercial satellite launch. These items should be controlled on the CCL under Export Control Classification Number (ECCN) 9A515.y rather than USML IV(c).

- Human exploration, commercial crew/cargo or space tourism spacecraft that are being developed, launched, and operated under the supervision of the U.S. National Aeronautics and Space Administration (NASA).

  Category XV(a)(2) controls spacecraft that can "Autonomously detect and track moving ground, airborne, missile, or space objects other than celestial bodies, in real-time using imaging, infrared, radar, or laser systems." Civil and commercial spacecraft that utilize these technologies in support of NASA programs should not be subject to ITAR control. For example, these technologies are necessary for the docking and transfer of crew and cargo at the International Space Station (ISS) and other space facilities envisioned by NASA and commercial business pursuits. These items should be controlled under ECCN 9A004 rather than USML XV(a)(2).

- Spacecraft that are being developed, launched, and operated under the supervision of the U.S. National Aeronautics and Space Administration (NASA) or that dock exclusively via docking systems that use the International Docking Standard.

  These items should be controlled under ECCN 9A004 rather than USML XV(a)(12). The note to paragraph (a)(12): "This paragraph does not control spacecraft that dock exclusively via the NASA Docking System (NDS), which are controlled by ECCN 9A515.a.4" is somewhat limiting, as there are other docking systems that are likely to be used for international programs. For example, there is a high probability that the International Berthing and Docking Mechanism (IBDM) will be used on Orion for the Lunar Gateway missions. This complicates the future jurisdiction and classification of the Orion spacecraft requiring dual licensing depending upon the docking adapter being used. The control text should release from the ITAR all docking systems intended for human exploration/ habitation.

- Systems used in space telecommunication.

  Category XV(e) controls "Spacecraft parts, components, accessories, attachments, equipment, or systems," including antennae systems in paragraph (e)(1). However, Lockheed Martin does not consider these items to be uniquely military items, especially when used in human space exploration or commercial telecommunications systems. These items should be controlled under ECCN 9A515.x rather than USML XV(e)(1).

- Elements or systems used in human space exploration systems.

  Paragraph (e)(20) controls "Equipment modules, stages, or compartments that incorporate propulsion systems described in paragraph (e) of this category or Category IV(d)(1)-(6) of this section, and can be separated or jettisoned from another spacecraft." These technologies are an important component of human space exploration systems. Accordingly, these items should be controlled under ECCN 9A004 rather than XV(e)(20).

In addition to the James Webb Space Telescope (JWST) and the ISS, 9A004 should include the following human space exploration systems and elements:

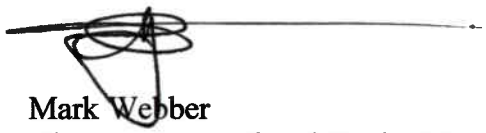
- The Multi-Purpose Crew Vehicle (MPCV, a.k.a. Orion) being developed, launched, and operated under the supervision of the U.S. National Aeronautics and Space Administration (NASA). [Includes the Orion Crew Module (CM), European Service Module (ESM), Crew Module Adaptor (CMA) and Spacecraft Adaptor (SA). Excludes the Launch Abort System (LAS) and the Space Launch System (SLS).]
- The Lunar Gateway elements being developed, launched, and operated under the supervision of the U.S. National Aeronautics and Space Administration (NASA). [Includes the Lunar Power and Propulsion Element (PPE), Utilization and Habitation elements, docking ports/systems, logistics modules/systems, Crew and science airlocks, propellant storage, lunar telecommunication systems, robotic manipulator arm including robotic interfaces, rendezvous sensor packages, human and robotic lunar landers, lunar surface habitation and utilization modules/systems, human and robotic lunar rover systems, in-situ resource development systems and sample return systems. Excludes nuclear power systems.]

- The Human Mars Exploration elements being developed, launched, and operated under the supervision of NASA. [Includes the Mars power and propulsion elements, utilization and habitation elements, docking ports/systems, logistics modules/systems, crew and science airlocks, propellant storage, Mars telecommunication systems, robotic manipulator arm including robotic interfaces, rendezvous sensor packages, human and robotic Mars landers, Mars surface habitation and utilization modules/systems, human and robotic Mars rover systems, in-situ resource development systems and sample return systems. Excludes nuclear power systems.]

- "Parts," "components," "accessories" and "attachments" that are "specially designed" for the Human Exploration systems (including MPCV, Lunar Gateway and Mars Exploration elements) and that are not:
    - Enumerated or controlled in the USML;
    - Microelectronic circuits;
    - Described in ECCNs 7A004 or 7A104; or
    - Described in an ECCN containing "space-qualified" as a control criterion (See ECCN 9A515.x.4).
    - [Note: This includes environmental control and life support systems (ECLSS), avionics and control systems, radiation mitigation and monitoring, fire safety systems, autonomous capabilities, utilization, and crew health capabilities, science experiments (both internal and external) to include cubesat deployer used in concert with a science airlock.]

Thank you for the opportunity to provide comments in response to APRM regarding items on the CCL transferred from USML Categories IV & XV. If you have any questions related to these comments or would like additional information related to the issues discussed above, please contact Mark Webber, Director, International Trade & Export Policy at 703-413-5951 or Mark.J.Webber@lmco.com.

For Lockheed Martin Corporation,



Mark Webber
Director, International Trade & Export Policy

cc: DDTCPublicComments@state.gov
Directorate Defense Trade Controls, U.S. Department of State

Communications & Power Industries

April 22, 2019

U.S. Department of Commerce
Bureau of Industry and Security
Washington, D.C. 20037

Subject: Request for Comments Regarding Review of Commerce Control List of Items Transferred from USML Munitions List IV and XV
Ref: BIS-2018-0029

Dear Sir/Madame:

Communications & Power Industries LLC ("CPI") wishes to submit the following recommendation for revisions to 9A515.

Overview of CPI

CPI is a global manufacturer of electronic components and subsystems focused primarily on communications and defense markets. CPI develops, manufactures and globally distributes innovative and reliable technology solutions used in the generation, amplification, transmission and reception of microwave signals for commercial and military applications. CPI serves customers in the communications, defense, medical, industrial and scientific markets. The subsystems and components manufactured by CPI include Vacuum Electron Devices (VEDs), solid state and VED-based high-power amplifiers, receiver protectors, transmitters, transceivers, integrated microwave assemblies, antenna systems and radomes.

9A515.x Specially Designed Parts, Component, Accessories, and Attachments

1) CPI recommends adding 9A515.i (.i is currently reserved) as follows:
i. Terrestrial equipment specially designed for "spacecraft," as follows:
i.1. Telemetry and telecommand equipment "specially designed" for any of the following data processing functions:
i.1.a. Telemetry data processing of frame synchronization and error corrections, for monitoring of operational status (also known as health and safe status) of the "spacecraft bus;" *or*
i.1.b. Command data processing for formatting command data being sent to the "spacecraft" to control the "spacecraft bus;"
i.2. Simulators "specially designed" for 'verification of operational procedures' of "spacecraft."
***Technical Note**: For the purposes of 9A515.i.2, 'verification of operational procedures' is any of the following:*
1. Command sequence confirmation;
2. Operational training;
3. Operational rehearsals; or
4. Operational analysis.

Justification: The aforementioned items are positively described and controlled under 9A004 when used with the James Webb Space Telescope. The same equipment, however, when "specially designed" for use in or with a 9A515.b ground control system and simulator are not positively

described in 9A515, rather they are caught under the catch-all category of 9A515.x. Irrespective of the type of spacecraft or ground station for which telemetry and telecommand equipment and simulators are specially designed, these items are licensed as 9A515.x. CPI believes that adding telemetry and telecommand equipment and simulators as a 9A515 paragraph, i.e. 9A515.i, instead of capturing the items in a catch-all category furthers the objective of creating a positive control list which will result in more consistent control and licensing of these items.

2) Exclude from 9A515.x ground station antenna systems that do not incorporate telemetry and telecommand equipment and simulators described in the proposed 9A515.i or 9A004.f.

Justification: An antenna system is captured as a "specially designed" component based on its use in or with a 9A515.b ground station or simulator and its unique configuration[1] even if the antenna system does not perform all three functions required for the Telemetry, Tracking, and Control (TT&C)[2] of a "spacecraft." This designation over-controls an antenna system that, despite its unique configuration, is no different than a ground station communications antenna system.

An antenna system that lacks all three functions of TT&C, specifically if it lacks the ability to generate and process telemetry and command data, has the same functions as a ground station communications antenna system. An antenna system, irrespective of the type of ground station that it is configured for use in or with, will:

- Transmit data generated by the satellite operator and receive data from the satellite to be processed by other ground station equipment; and
- Track and point the antenna at a satellite.

The ability of the antenna system to transmit and receive data of any type is a function of the RF/microwave equipment utilized by the system, e.g. solid state amplifiers and Travelling Wave Tube Amplifiers, which are excluded from control under 9A515.x.5 and 9A515.x.6, respectively. It should be noted, that the Note 2 to CCL 9, Group E, states that USML XV(f) and 9E001, 9E002, and 9E515,do control data that is transmitted to or from a satellite or spacecraft when limited to "housekeeping data." This includes "spacecraft" orientation or position information such as state vector or ephemeris information. This note is significant: if the act of transmitting and receiving the data is not controlled under the ITAR or 9E515, it follows that the components to transmit and receive the data should not be controlled under 9A515.x. The antenna system is merely the conduit for sending transmitting to and receiving any data from a satellite.

9A515 does not control specific methodologies or technologies, e.g. location tracking, step-tracking, mono-pulse tracking, conical scanning tracking, etc., to track and point the antenna dish at the satellite. Moreover, the antenna system cannot track and point the antenna at the satellite without the satellite operator providing the expected location of the satellite in space relative to the predefined satellite orbit, e.g. geostationary (GEO), medium Earth orbit (MEO), and low Earth orbit (LEO), to the antenna system. The antenna system that only tracks and points should not be controlled under 9A515 when the tracking and pointing technologies are not controlled.

CPI believes an antenna system should only be controlled under 9A515.x when it incorporates telemetry and telecommand equipment currently described in 9A004.f, the equipment which is required to execute all three functions of telemetry, tracking, and control.

---

[1] An antenna system's unique configuration is generalized as the antenna size, the type of reflector, the type of antenna feed and its location relative to the reflector, method of tracking and pointing the antenna (e.g. conical scanning, step tracking, mono-pulse tracking, ephemeris location, etc.), the type of pedestal movement, and radio-frequency (RF) performance.

[2] Telemetry, Tracking, and Control is one of three criteria for control under 9A515.b

There is historical precedent for controlling ground station antenna systems at a lower level when they lack all three functions of telemetry, tracking, and control. The following table, based on DDTC commodity jurisdictions, are examples of ground station antenna systems with a lesser control.

Description	Final Determination Date	Final Determination	Manufacturer	Model Name
Series of receive-only, telemetry tracking	2011-09-01	ECCN 5A991.g	Telemetry Antenna Company	Telemetry Antenna System M/N PD500 Seri
Ground VSAT antenna consisting of pedestal	2014-05-27	EAR99	Harris Corporation (Government Communication	Seeker 1.3M Common Antenna Platform
7.3 m IOT antenna	2012-07-03	ECCN 5A991.h	ViaSat, Inc.	7.3 m In Orbit Test (IOT) Ka Band Antenn

Excluding antenna systems that lack telemetry and telecommand capabilities through the creation of the proposed 9A515.i paragraph will create a bright line for determining when an antenna system is a "specially designed" component of a 9A515.b ground station and when it is not. It further simplifies the classification of an antenna system by asking one question. Does the antenna system incorporate telemetry and telecommand equipment described in 9A515.i? If yes, then antenna systems is caught under 9A515.x. If no, it is not captured under 9A515.x. In contrast, the current regulatory language, requires any antenna system, regardless of capability, that is *used in or with* a TT&C ground station or simulator to be captured as a "specially designed" component and evaluated against the "specially designed" "releases." To evaluate the eligibility of the antenna system under one or more of the six releases, one must gather information about the design intent of the antenna system and its components, the current use and future use of the antenna system, and identify and track modifications to the antenna system and its components that make it suitable for use in the TT&C ground station.

Thank you for considering our comments and recommendations.

Respectfully submitted,

Creighton K Chin

Digitally signed by Creighton K Chin
DN: c=US, o=COMMUNICATIONS AND POWER INDUSTRIES LLC, ou=COMMUNICATIONS AND POWER INDUSTRIES LLC, cn=Creighton K Chin, 0.9.2342.19200300.100.1.1=A01097C0000013D045ED79E0000063E
Date: 2019.04.22 22:34:03 -07'00'

Creighton Chin
Director of Export Compliance
Communications & Power Industries LLC