November 5, 2023

**Responses to BIS Seeks Public Comments on Following Additional Questions**

(found in 7 topics in part D on page 73486 of October 25, 2023, Federal Register)

1Q How should development at an Infrastructure as a Service (IaaS) be accessed so as to develop large dual-use AI foundation models with capabilities such as parameter count, training compute, and/or training data? Would additional regulations be feasible?

1A To determine feasibility for additional regulations, BIS must first consider whether, and, if so, how, to revise the following existing AI regulations, based on adaptive, artificial, autofocusing, automated, automatic, automatically, autonomous, autonomously, computer-aided, cryptanalytic, cyber, dynamically, embedded, intelligence, neural, neurophysical, numerical, optical, quantum, real time, robots, self-contained, surreptitious intrusion, unmanned, or virtual reality regulatory wording, rather than on “AI,” or “Artificial Intelligence,” which terms in quotation marks do not appear in the regulations, other than in Wikipedia descriptions of the regulations:

1. 0D501 Software for development, production, operation, or maintenance of 0A501a semiautomatic firearms (automatic are USML Ia); 0A501x parts and components of 0A501a semiautomatic firearms; or 0B501e production equipment for 0A501a or x semiautomatic firearms or USML Category 1;
2. 0D521 Software provides a significant intelligence advantage to the United States;
3. 0D602 Software for 0A602x for USML Category II not elsewhere specified on USML or CCL; or 0B602b, c, or d for USML Category II;
4. 0D604 Software for 0A604x for USML Category IV not elsewhere specified on USML or CCL; or 0B604a or x for USML Category IVh28;
5. 0D614 Software for 0A614 for military training not USML Category IX; or 0B614a for 0A614 or USML Category IX;
6. 2D001a and b software, other than 2D002, for 2B007 robots to comply with national safety standards applicable to potentially explosive munitions environments, or radiation hardened, or operate at altitudes exceeding 30,000 m;
7. 2D002 software enabling electronic devices to function as a “numerical control” unit coordinating simultaneously more than 4 axes for “contouring control”;
8. 2D003 software for 2B002 that converts optical design, workpiece measurements and material removal functions into “numerical control” commands to achieve the desired workpiece form;
9. 2D201 software for “use” of 2B207 robots to comply with national safety standards for handling high explosives or control units for such robots;
10. 3A001a6 optical sighting devices (Wikipedia states these include virtual reality-enabled digital cameras (“smart scopes”) with software algorithm that produce digitally enhanced target images);
11. 3A001a9 artificial neural networks (Wikipedia states these are used for solving artificial intelligence (AI) problems);
12. 3D005 to restore operation of a microcomputer, microprocessor microcircuit, or microcomputer microcircuit within 1 ms;
13. 3D980 for 3A980 voiceprint identification and analysis; and 3A981 monitoring neurophysical responses;
14. 4D001a for 4A004b neural computer; or 4A004c optical computer;
15. 4D993 automatic generation of source code;
16. 5A991b2a Automatically predicting and selecting frequencies and “total digital transfer rates” per channel to optimize the transmission;
17. 5A002c use or perform quantum cryptography;
18. 5A004a perform cryptanalytic functions; 5A004b cyber activities;
19. 5D002a Software for development, production, or use of 5A002 or 5D002c2 (equipment for 5A003 detect surreptitious intrusion) or 5A004;
20. 6D003a1, a2, a3, a4, a5a Software for “real time processing” of acoustic data (“Real-time processing” defined as “The processing of data by a computer system providing a required level of service, as a function of available resources, within a guaranteed response time, regardless of the load of the system, when stimulated by an external event.”);
21. 6D003a5b Automatically detecting, classifying, and determining the location of divers or swimmers;
22. 7D001 Software for development or production of 7A003b Inertial measurement equipment for aircraft, land vehicles, and vessels, with an embedded ‘positional aiding reference’ and providing position after loss of all ‘positional aiding references’ for a period of up to 4 minutes;
23. 7D001 Software for development or production of 7A005b Satellite navigation system receiving equipment employ ‘adaptive antenna systems’ (dynamically generate one or more spatial nulls in an antenna array pattern by signal processing in the time domain or frequency domain);
24. 7D003a, b Software to improve 7A003;
25. 7D003e Computer-Aided-Design (CAD) for development of “active flight control systems” (Function to prevent undesirable aircraft and missile motions or structural loads by autonomously processing outputs from multiple sensors and then providing necessary preventive commands to effect automatic control);
26. 8A001b1, b3 Manned, untethered submersible vehicles designed to ‘operate autonomously’;
27. 8A001c Unmanned submersible vehicles;
28. 8A002b Systems for the automated control of the motion of submersible vehicles controlled by 8A001;
29. 8A620f1 Self-contained diving rebreathers;
30. 8A992 b Photographic still cameras having autofocusing;
31. 8D001 Software for development, production, or use of 8A (except 8A992);
32. 8D620 Software for the development, production, operation, or maintenance of 8A620;
33. 8D992 Software for development, production, or use of 8A992;
34. 9D001 Software for development of 9A012, except as controlled by USML VIIIa5, unmanned aerial vehicles (UAVs) controlled flight out of the direct natural vision of the operator, equipment to convert manned aircraft to 9A012 UAV, or engines to propel UAVs above 15,240 meters (50,000 feet); 9A101b engines for use in UAVs with a range equal to or greater than 300 km except as described in USML XIX; 9A110 composite structures for 9A012 items controlled for MT reasons; 9A120 UAVs having autonomous flight control and navigation capability, controlled flight out of the direct vision range involving a human operator, or incorporating an aerosol dispensing system; 9B002 automated data acquisition and processing equipment for gas turbine engines incorporating 9E003h or i technologies; 9B005 automated data acquisition and process equipment for wind tunnels for speeds Mach 1.2 or more or simulating Reynolds number flows exceeding 25 x 106 or simulating flow environments at speeds exceeding Mach5; 9B010 equipment for production of 9A012; 9B106 environmental chambers for UAVs; 9B115 production equipment for 9A101 or USML IVd2, d3, d4 or h17; or 9B116 production facilities for 9A012, 9A101, or USML IVd2, d3, d4 or h17;
35. 9D002 Software for production of 9A012, 9A101b, 9A110, 9A120, 9B002, 9B005, 9B106, 9B115, or 9B116, as described above for 9D001;
36. 9D003 Software incorporating 9E003h technology and used in FADEC systems for 9A101b, 9B002, 9B995, 9B106, 9B115, or 9B116, as described above for 9D001;
37. 9D004e Software for operation of 9A012;
38. 9D101 Software for use of 9B106 or 9B116, as described above for 9D001;
39. 9D104 Software for use of 9A012 MT or 9A101b as described above for 9D001;
40. 9D610a Software for development, production, operation, of maintenance of 9A610.t composite structures for UAVs, .u apparatus and devices for handling, control, activation, and non-ship-based launching of UAVs, .v radar altimeters for use in UAVs, or .w flight control systems for UAVs; or 9B610t, u, v, or w;
41. 9D619a Software for development, production, operation, of maintenance of 9A619t, u, v, or w; or
42. 9D991 Software for development or production of 9A991a2 trainer aircraft; or 9B991a automated equipment using non-mechanical methods for measuring airfoil wall thickness.

2Q How should technical solutions be developed to constrain a 3A090 item being used to train large dual-use AI foundation models while allowing AI training at a small or medium scale, *e.g*., limit a product that contains a set of ICs including 3A090 AI accelerators, CPUs, and network interface cards – which could form a high-bandwidth domain including up to *e.g*., 256 AI accelerators, from communicating outside the product or set beyond 1 GB/s in at least one of the input or output direction? Should each device provide a cryptographic signature to other devices in the set and then have a tamperproof device that would hold the private keys for the cryptographic signatures?

2A Existing accelerometer regulations: 3D001 for 3A090, 3D101 for 3A101b, and 7D001 for 7A001, include no verbiage indicating relevance to AI. However, the Category 3 or 7 entries listed in 1A above could be modified to include AI accelerators.

3Q How should semiconductor fabrication facility compliance regulations be modified to help assist recognition of “direct products”?

New red flag 19 will assist. To be most effective, this needs to identify criteria that:

1. Are already “knowable” or easily determined by the semiconductor fabrication facilities; and
2. Should be highly indicative of an IC that will meet FDP scope under 734.9h1iB*2* and h1iiB2.

What refinements to those criteria or alternative criteria would better achieve those two objectives?

3A Effective November 17, 2023, the two citations for FDP scope are identical, as follows:

An integrated circuit, computer, “electronic assembly,” or “component” specified in ECCN 3A001.z, 4A003.z, 4A004.z, 4A005.z, 5A002.z, 5A004.z, or 5A992.z.

The z paragraphs read:

3A001.z Any commodity described in 3A001 that meets or exceeds the performance parameters in 3A090.

4A003.z Commodities specified in 4A003 that also meet or exceed the performance parameters in 4A090.

4A004.z Commodities that are described in 4A004 that also meet or exceed the performance parameters in 4A090.

4A005.z Commodities that are specified in 4A005 that also meet or exceed the performance parameters in 4A090.

5A002.z. Other commodities, as follows:

z.1 Commodities that are described in 5A002.a and that also meet or exceed the performance parameters in 3A090 or 4A090.

z.2 Commodities that are described in 5A002.b and that also meet or exceed the performance parameters in 3A090 or 4A090.

z.3 Commodities that are described in 5A002.c and that also meet or exceed the performance parameters in 3A090 or 4A090.

z.4 Commodities that are described in 5A002.d and that also meet or exceed the performance parameters in 3A090 or 4A090.

z.5 Commodities that are described in 5A002.e and that also meet or exceed the performance parameters in 3A090 or 4A090.

5A004.z. Other commodities, as follows:

z.1 Commodities that are described in 5A004.a and that also meet or exceed the performance parameters in 3A090 or 4A090.

z.2 Commodities that are described in 5A004.b and that also meet or exceed the performance parameters in 3A090 or 4A090.

5A992.z Commodities that are described in 5A992.c that also meet or exceed the performance parameters in 4A090.

These z paragraphs fail to meet the two criteria in 3Q, for the following reasons:

1. The word “described” includes descriptions of what does not require a license; whereas FDP applies to “specified” items requiring a license (“controlled” would be even better than “specified” to indicate a license requirement unequivocally).
2. 3A001.a.3, a.10.c, a.11.b, a.12, a.13, and a.14.a.3 and a.4 may, or may not, meet or exceed 3A090 parameters; it would be wise to clarify that 3A090 TTP and DP do not modify these seven 3A001 sub-items (see Category 3 introduction Notes 1 and 2).
3. 4A003.b APP-based license requirements differ in many respects from 4A090 TPP and DP. Different exporters and different BIS administrators would have great difficulty in agreeing on exactly what portions of 4A003.b meet or exceed 4A090, and, therefore, require licenses for export to different countries.
4. New License Exceptions and No License Required because of inapplicability of 3A090 or 4A090 to specified destinations are modified by “parameters” which affect what is not controlled if met or exceeded, rather what is controlled.
5. Category 4 introduction Notes 1 to 4 resolve overlaps between 4A004/4A005 vs. 4A003 and between 5A002/5A004 vs. 4A003.

Alternatives:

1. Delete FDP sub-items 734.9.h and .i, because covered by 734.9.b;
2. Delete 3A090 and 4A090 and add their substance to 3A001 or 4A003, as follows:

(b)(1) Delete Regional Stability in both 3A090 and 4A090, for reasons in 4A below;

(b)(2) In 3A001a4 change “Reserved” to the text from 3A090a as modified in (b)(3) below;

(b)(3) In 3A090a1 before semicolon insert “and a ‘performance density’ of 5.92 or more or ‘total processing performance of 4800 or more for sparsity only computers”;

(b)(4) Delete 3A090.b, for reasons in 5A below;

(b)(5) Replace APP license requirement in 4A003 with the new Total Processing Performance (TPP) and Performance Density (PD) parameters;

(b)(6) Delete the 4A003b 64 bit or larger limitation;

(b)(7) In the 740.7 heading change “(APP)” to “(TPP, STD, NAC)”;

(b)(8) In 740.7c2, c3i, c3ii, and c3iii, change “APP” to “TPP”;

(b)(9) In 740.7d3i and d3ii, change “APP” to “(STD)”;

(b)(10) Reletter existing 740.7e to 740.7f;

(b)(11) Delete new 740.8;

(b)(12) Establish new 740.7e *(e) Computer Tier 4 destinations*

**(1) Eligible destinations** (in alphabetical order from:

CT1: Central African Republic, Congo Democratic Republic, Cyprus, Egypt, Haiti, Somalia, Venezuela, and Zimbabwe

CT3: Afghanistan, Belarus, Burma, Cambodia, China, Cyprus, Lebanon, Libya, Russia, Sudan

Not now listed in either CT1 or CT3): Cuba, Iran, North Korea, South Sudan, Syria

**(2) Eligible commodities** 3A001a4 and 4A003b are eligible for export, reexport, or transfer (in country) under License Exception Notified Advanced Computing (NAC) to Tier 4 destinations. (copy from 740.8 modified to):

e2a delete first sentence;

e2a second sentence, change “(b)” to “e2b”;

e2a last sentence, change “(b) and (c)” to “e2b and e2c”;

e2a1 change “(a)(2)” to “e2a2”;

e2a2 change “(c)” to “e2c”;

e2b change “(b)(1) or (2)” to “e2b1 or 2”;

e2b1, e2b2, e2c1, e2c2, e2c3 (No change from 740.8b1, b2, c1, c2, c3);

1. **Eligible technology and software.** None

(b)(13) In new 740.7f, 743.1b1, and 743.2b, change “APP” to “TPP”;

(b)(14) Propose above technical changes to Wassenaar 4A3 and 3A1, while omitting any mention of countries or country groups and omitting all US License Exceptions; and

(b)(15) Recognize that CCL Category 3 and Category 4 introduction Notes resolve how to determine which ECCNs apply to overlaps between:

3A001 vs 3A090 and 4A003 vs 4A090/4A004/4A005/5A002/5A004

4Q Since deemed exports and deemed reexports do not apply to Regional Stability advanced computing and semiconductor manufacturing items per 742.6a6iv, what, if any, other practices are utilized to safeguard technology and intellectual property? Do foreign person employees have a role in obtaining and maintaining U.S. technology leadership?

4A The following practices are utilized to safeguard technology and intellectual property (most of them are in order to comply with USG regulations, which are much more complicated than the simple 742.6a6iv non-applicability of controls on deemed exports and deemed reexports related to advanced computing and semiconductor manufacturing items):

1. Deemed exports of technology or source code are controlled per 734.13b;
2. Deemed reexports of technology or source code are controlled per 734.14b;
3. Activities not deemed reexports are described in 734.20a, b, c, or d, many of which are country specific, but none of which are Regional Stability specific;
4. See, in particular, 734.20c on release to other than Country Group A:5 nationals, which are subject to several restrictions, including not to a “proscribed person,” defined as:

“A person who is prohibited from receiving the items at issue or participating in a transaction that is subject to the EAR without authorization under the EAR, such as persons on the Entity List or denied persons.”;

1. A License Exception TSR pre-requisite is receipt from the importer of an assurance against specified reexports (many BIS technology or software license approvals are conditioned on a similar assurance);
2. Intellectual property is controlled pursuant to patents per WTO TRIPS regulations;
3. Regardless of regulations, companies limit release of company confidential technology, source code, or patented intellectual property to only those employees having a need for that information in order to perform their assigned duties; and
4. Also regardless of regulations, US companies hire technically qualified foreigners to assist them in obtaining and maintaining U.S. technology leadership and multinational companies headquartered in the US open branches in foreign countries largely to facilitate hiring such foreigners.

Regional Stability emerged as a reason for control in 1981, as a result of an amendment to the Export Administration Act adding sub-section 5(c)(6) to remove National Security controls maintained unilaterally by the United States. Such unilateral controls were thereafter controlled for “Regional Stability,” rather than National Security, reasons. The term “Regional Stability” was not included in legislation applicable from 1981 until the EAA expired in 2001, in IEEPA used as authority from 2001 until 2018, nor in the currently applicable ECRA of 2018.

RegionaI Stability should be removed from 3B001 and 3B002 and from 3D001 and 3E001 for 3B001 or 3B002 becoming effective November 17, 2023, leaving National Security as the only remaining reason for control after Wassenaar adopts US proposals to amend these 3B1, 3B2, 3D1, and 3E1 WDUL items.

Similarly, 3A090 and 4A090 should be deleted by moving their substance to 3A001 and 4A003, where the only reason for control should be National Security.

Alternatives, to modifying or deleting 742.6a6iv:

1. Delete Regional Stability (RS) controls for 3B001, 3B002, 3D001 for 3B001 or 3B002, 3D002, and 3E001 for 3B001 or 3B002, since identical NS controls are adequate;
2. Delete 3A090 and 4A090 and substitute their content into 3A001 with no RS controls.

5Q How should references to “not for use in data centers,” removed from 3A090 if also not TPP 4800 or more, by Note 2, but subject to NAC License Exception if TPP 4800 or more, be refined to cover, more granularly, only ICs for use in training large-scale AI systems? Should ICs not for use in data centers be defined more specifically?

5A Data centers are buildings where computers and related telecommunications and other equipment are located. The term has been used since 1940. Recent terminology refers to:

1. transformation of data centers in a step-by-step approach through integrated projects, including virtualization and automation, which differ from traditional data center upgrades that took a serial and siloed approach;
2. Lights out or dark rooms reducing the need for direct access by personnel, with all of the devices accessed and managed by remote systems, with automatic programs used to perform unattended operations; and
3. Granularly, meaning a grainy appearance.

References to data centers should be removed altogether from 3A090, because location in, or not in, a data center does not affect performance relevant to a license requirement or License Exception; and AI automation may be present both in, or not in, a data center.

No purpose is seen for adding granularly to 3A090, as implied by 5Q.

No purpose is seen for adding subitem .b to 3A090, because its presence in a computer is not relevant to the license requirement for the computer or for eligibility to License Exception NAC. Moreover, b.2 is identical to a.2 except for a different performance density; and, since performance density is omitted from a.1 in order to control TPP 4800 or more in the event of sparsity only, there is no apparent reason not to add TPP 1600 or more in b.2 and a.2, or 2400 or more in b.1, without performance density, to cover sparsity only at 1600 or 2400 TPP levels, if needed for some reason other than to control the computer containing them.

6Q How should “headquartered companies” be defined for destinations in D:5 countries to which License Exception Notified Advance Computing (NAC) authorizes exports and reexports, with a policy goal of limiting advanced computing capability by D:5 parties, provided that NAC may not be used for military end-use or military end user exports or to the hundreds of other government or non-government entities in China, Russia, or 21 other D:5 countries listed in 744 Supplement 4, to which a license is required for any transaction subject to the EAR, with a presumption of denial licensing policy?

6A There is a precedent in 740.17(b)(2)(iv)(A), which requires a classification request to make technology for “non-standard cryptography” eligible for License Exception for encrypted items (ENC) to any end user located or headquartered in any of the 36 allied countries listed in 740 Supplement 3. This ENC requirement for a prior classification request parallels the NAC requirement for a prior notification. However, NAC limitation to 23 countries to which ITAR 126.1 prohibits exports, which EAR duplicates in D:5, differs markedly from the ENC limitation to 36 allied countries; and the NAC goal of limiting computing capability by D:5 parties is the exact opposite of the ENC expectation of no license required or license approval if BIS approves a classification request.

The stated NAC purpose is to limit capability of headquartered companies. This was the purpose of US licensing policy two years ago towards Hua Wei headquarters in China. That policy was at least partially offset by Hua Wei moving sales to subsidiaries in countries other than D:5.

It seems that the only definition of “headquartered companies” in D:5 which would further the NAC policy goal would be to list as many as possible in the 744 Supplement 4 entity list, so as require them to do business in countries not listed in D:5. This turns the usual purpose of a License Exception on its head and would probably be counterproductive. Hua Wei is still in business, despite many Hua Wei named entities being listed in 744 Supplement 4. Subsidiaries are not required to identify themselves by using the name of the headquarters company.

7Q Supercomputers

Q7a How does the 772.1 definition of “supercomputer” relate to the 744.23a1 end use control?

Q7b Will the definition of “supercomputer" result in commercial datacenters falling increasingly into that definition and the end use control under 744.23a1?

Q7c What additional criteria could be added to 744.23a1 to ensure that supercomputers used to support foreign government agencies would be caught under the end use control, but other datacenters strictly involved in the commercial sector would not be covered?

7A A7a Supercomputer is mentioned in 744.23a1iiA and a1iiB if located in or destined to D:5 countries. However, there is confusion with respect to relationships of supercomputer to 744.23a1iii, iv, or v. The October 2023 amendment did not delete iii, iv, or v; but the citations therein to a2iiiA, a2iv, and a2v do not exist in the October 2023 amendment. Therefore, one must assume that a1iii, iv, or v no longer exist.

A more serious confusion is the lack of relationship between supercomputer and 4A090 or 4A003b. 744.23a states:

“In addition to the license requirements for items specified on the CCL …”

But supercomputers are not mentioned in any item on the CCL. The 772.1 definition of supercomputer includes:

“collective maximum theoretical computing capacity of 100 or more double precision (64 bit) petaflops or 200 or more single precision (32 bit) petaflops within 41,600 ft3”

The term “collective maximum theoretical computing capacity” is not defined; but it apparently differs from both APP in 4A003b and TPP in 3A090/4A090.

It is recommended that the definition of “supercomputer” use terminology from 3A090a and 4A090 which would be moved to 4A003b per Alternative (b) in 3A above.

A7b and A7c See recommendation above in 5A above to delete datacenter from export control parameters.

A7c It is recommended that the distinction between Government and non-Government destinations used in 740.17 License Exception ENC be considered for applicability to the supercomputer portion of new License Exception TPP replacing License exception APP for computers.