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Subject: Advanced Computing and Semiconductor Manufacturing

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There are so many faults in the EAR revisions on this topic, effective October 7, 12 or 21, 2022, “interim final rule and request for comments,” October 13, 2022 Federal Register, that the entire rule should be completely repealed and replaced by a proposed rule requesting public comment prior to becoming effective. Part A below are Reasons for Repeal and part B below is a suggested Proposed Rule replacement.

1. Reasons for Repeal
2. Existing, unchanged, ECCN 4A003.b (Adjusted Peak Performance (APP) exceeding 29 Weighted TeraFLOPS (WT)) already covers the much higher, by an order of magnitude, 4A090.a license requirement limit1, with no guidance as to which of these inconsistent limits is to apply to license applications for export to China. The apparent intent is that the more recently adopted limit applies. If so, US computer controls on exports to China were hugely decreased in October 2022 and now grossly violate the US commitment to Wassenaar to abide by its much lower 4.A.3.b limit. However, if that is true, then the reverse would also be true, when BIS finally implements the year-old Wassenaar agreement to increase its 4.A.3.b limit from 29 to 70 WT. Such EAR revision will have a later effective date than the 4A090 October 2022 effective dates, thereby restoring the much broader Wassenaar controls to China and requiring removal of 4A090 from the EAR then.
3. Existing, unchanged, ECCN 4A003.b components already control integrated circuits with the 4A003.b characteristics 29 Weighted TeraFLOPS (WT), soon to be 4.A.3.b 70 WT. 4A090 components, per the reference to 3A090.a, control ICs exceeding 4800 TOPS, much higher, by an order of magnitude2, with no guidance as to which of these inconsistent limits is to apply to license applications for export to China. This is a classic example of COCOM Administrative Principle 4 (AP4) limitation of component controls to those which would “defeat the purpose of the embargo,” making “specially designed” redundant3.

1 4A090.a requires a license for export to China for “Computers … which exceeds the limit in 3A090.a.” Each of 3A090.a.1, a.2, a.3, and a.4 requires a license to China for:

“One or more digital processor units executing machine instructions having a bit processing performance measured in TOPS, aggregated over all processor units, of 4800 or more.”

Technical Note 3 states: “TOPS is Tera Operations Per Second or 1012 Operations per Second.”

CCL Category 4 Technical Note on APP specifies Wi architecture adjustment factor as 0.9 for non-vector processors and 0.3 for vector processors. 4800/29 = 166 or 4800/70 = 69 are rough orders of magnitude differences between 4A090 and 4A003.b or 4.A.3.b. However, 29 and 70 cover slightly less, because Wi is less than one and 4800 also covers slightly less, because 3A090.a1, a.2, a.3, and a.4 include other parameters which must be met.

2 Computer and computer component orders of magnitude and consequences are identical.

3 Reasons for deletionof specially designed also apply to many other items.

3 New 3B090 on semiconductor manufacturing equipment expands existing 3B001 by adding new parameters, but controlled only to China. Before becoming effective, Wassenaar approval of a US proposal should be obtained.

4 Points 1-3 above are mentioned in instruction numbers 2, 5, 7, 8, 11, 12, 15, 18, 23, 25, 26 in the October 13, 2022, Federal Register, pp 62195-62215, Interim Final Rule. The following numerous needed remedies to inadequacies should be accomplished by repeal and request for public comment in a proposal substitution:

a Because they are US unilateral controls, change the ECCN numbers from 3A090, 3B090, 4A090, 4D990 to 3A990, 3B990, 4A990, 4D990.

b Add new encryption ECCN 5A990, new software ECCNs 3D990 and 5D990, and new technology ECCNs 3E990, 4E990, and 5E990;

c Add revisions to following overlapping multilateral ECCNs: 3A001 (re 3A990), 3B001 (re 3B990), 4A001, 4A003, 4A004, 4A005 (re 4A990), and 5A002, 5A004 (re 5A990) and following overlapping US unilateral ECCNs: 3D991, 3E991, and 5E992;

d Delete inclusions of overlapping xx990 from: 3D001, 3E001, 3A991, 4A994, 4D994, 5A992, and 5D992;

e Add exceptions from coverage of overlapping xx990 to 3D001, 3E001, 3A991, 4A994, 4D994, 5A992, and 5D992 and to newly added 3A001, 3B001, 3D002, 3D991, 3E991, 4A001, 4A003, 4A004, 4A005, 4D001, 4E001, 4E992, 5A002, 5A004, 5D002, 5E002, and 5E992;

f Based on COCOM 1951 Administrative Principle 4 limiting controlled components to those which would “defeat the purpose of the embargo,” delete “specially designed” and “therefor” and replace “therefor” with “having the characteristics of” in “specially designed” “components” therefor in the following: 3A001.c, 3B001, 3B090, 3B991, 4A001, 4A004, 4A990 (delete and replace only “therefor”), 4A994 heading, 4A994.a, 4A994.k;

g Because of adequate technical parameters, delete “specially designed” from the following: 3A001.d, 3A001.e.3 Note, 3A991.k, l, 3B001.f.3, j.1, 3B991.a twice, 3B991.b, 3B991.b.1 Note twice, 3B991.b.1.b, b.1.f, b.1.g, 3B991.b.2.e Note, 3B991.b.3.c, 4A001.a, a.1 Note, a.2 Note, 4A003.c (or modified), 4A003.g, 4A005 (or modified), 4A994.c (or modified), 4A994.c Note 2, 4A994.j, 5A002.a (designed or modified), 5A002 Note 2.j, 5A002.c or d (designed or modified), 5A004.a (designed or modified), 5A004.a Note (designed or modified), 5A004.b Note 1, 5A004.b Note 2.d (specially designed and limited to);

h Because of a COCOM decision, long ago, to use “required,” rather than “specially designed,” for software or technology without adequate technical parameters, change “specially designed” or “specially designed or modified” to “required” in: 3D001 (both entries), 4D994, 5D992 Related Controls, 3D002, 3D991, 4D001.a, b, b.2;

i Given that “capable of” should not be controlled unless actually used, delete “capable of” in the following: 3B090 (11 times), 3B991.b.1.c three times, b.1.d twice, b.1.f, b.1.g.4, b.2.d four times, b.2.f, b.2.h, b.3 Note;

j In October 2022, the following two sub-items were added to US unilateral ECCNs xx99x:

“3A991.p Integrated circuits, n.e.s., having any of the following:

p.1 A processing performance of 8 TOPS or more; or

p.2 An aggregate bidirectional transfer rate over all inputs and outputs of 150 Gbyte/s or more to or from integrated circuits other than volatile memories.”

“4A994.l Computers, “electronic assemblies,” and “components,” n.e.s., containing integrated circuits, any of which exceeds the limit of ECCN 3A991.p.”

“TOPS” is defined in 3A090 Technical Note 3 as “Tera Operations Per Second or 1012 operations per second.”

Therefore, 8 TOPS, in 3A991.p.1, is slower than 4A003.b 29 WTOPS or 4.A.3.b 70 WTOPS; but much faster than 4A994.b 0.0128 Weighted Teraflops. The origin of ECCNs xx99x is what COCOM (Wassenaar’s predecessor from 1951 to 1989) agreed to remove from control about 50 years ago, because of being obsolete. 8 WTOPS was a former 4.A.3.b limit. This updates the 4A994 removal from 4A003.b control. But retention of 4A994.b is inconsistent with new 4A994.p. If 4A994.b were deleted, even slower computers than that would still be controlled in EAR99 to the same AT1 countries applicable to 3A991 and 4A994. But both 3A991 and 4A994 are also included in 744 Supplement 2 as requiring licenses for military end-use or military end-user in Burma, China, Russia, and Venezuela. This order of magnitude decrease in controls to China was certainly not intended. The impact of omission of “W” for “Weighted” from 3A991.p requires study of Technical Note on “Adjusted Peak Performance” (“APP”) at the end of CCL Category 4.

1. 2, 16, and 19 – “License requirement” for each of the 28 footnote 4 entries in 744 Supplement 4 is “For all items subject to the EAR (See 734.9(e) and 744.11 of the EAR).” However, the product scope for Entity List FDP rule in 734.9(e)(2)(i)(A) or (B) is limited to “foreign-produced item is the “direct product” of “technology” or “software” subject to the EAR and specified in (18 software or technology ECCNs in Categories 3, 4, and 5)”; and 744.11(a)(2)(ii) specifies license requirements for items designated footnote 4 as “any foreign-produced item subject to the EAR pursuant to 734.9(e)(2)” or “that will be used in the “development” or “production” of any “part,” “component,” or “equipment” produced, purchased, or ordered by any such entity.” These inconsistencies could be remedied by inserting “for additional license requirements for Foreign-Direct Product)” after “(See 734.9(e) and 744.11 of the EAR.”
2. 2 – New 734.9(h) Advanced computing FDP rule is already covered by old 734.9(b) National Security FDP rule.
3. 5 - Temporary General License 736 Supplement 1 (d) General Order No. 4 refers to “specified elsewhere” which “meets or exceeds 3A090 or 4A090 performance parameters.” There are no such items specified elsewhere; but the following ECCNs overlap 3A090 or 4A090: 3A001, 3A991, 3D001, 3D991, 3E001, 3E991, 4A001, 4A003, 4A004, 4A005, 4A994, 4D990, 4D994, 4E001, 4E992.
4. 7, 8 - In Restrictions on License Exceptions 740.2(a)(9), eligible portions of RPL are described as “(excluding 3B990, 3D001 (for 3B990), and 3E001 (for 3B990)), under 740.10, including 740.10(a)(3)(v), which prohibits exports and reexports of replacement parts to E:1 countries.” The “excluding” portion of RPL is identical to the items addressed in this paragraph. This is another way of saying the following obvious total inconsistency, namely, that, if the item is ineligible for all license exceptions except RPL, GOV, and TSU, it is also ineligible for RPL.

The “including” portion 740.10(a)(3)(v) states that 2A983 and 2D983 explosives detection equipment is ineligible for RPL replacement parts to Iran, North Korea, or Syria. This is another way of saying another obvious inconsistency, namely, if the item is not addressed in 740.2(a)(9), it is included in the previous exclusion from RPL.

1. 11, 12 - 742.6(a)(6) Per instruction 11, RS applies to “items … exported, reexported, or transferred (in-country) to or within the (sic) China.” Instruction 12 adds “from the (sic) China to any destinations worldwide of 3E001 (for 3A090) technology developed by an entity headquartered in the (sic) China that is the direct product of software subject to the EAR and is for the “production” of commodities identified in ECCNS 3A090, 4A090, or identified elsewhere on the CCL that meet or exceed the performance parameters of ECCNs 3A090 or 4A090, consistent with 734.9(h)(1)(i)(B)(*1*) and (h)(2(ii) of the EAR.” 3E001 controls include “RS applies (worldwide) technology for commodities controlled in 3A090, when exported from China.” But 3E001 omits the instruction 12 reference to direct product. The apparent basis for US jurisdiction for such controls from China is Foreign Direct Product of US-origin technology, which is 734.9, rather than 774 CCL RS. Instruction 12 inclusion of direct product as RS is incorrect. Instruction 12 “3A090, 4A090, or identified elsewhere on the CCL that meet or exceed the performance parameters of ECCNs 3A090 or 4A090” is also incorrect. There are no such items elsewhere on the CCL. “Supercomputer” exceeds the performance of ECCNs 3A090 or 4A090; but “supercomputer” is not “on the CCL” and its definition uses parameters differing from those in 3A090 or 4A090.
2. 15 – revising 744.1(a)(1) and 744.6(c, d) and adding 744.6(e)(3): Controls on activities of U.S. Persons in 744.6(c)(2)(i, ii, iii, iv, v, vi, vii, viii, ix) located in, or to, the PRC, and references thereto in 744.6(d)(1, 2) and (e)(3), are already largely covered by the long-standing 744.6(b) general prohibition (China is not included in the list of countries in 744 Supplement 3 or A:3 and is included in D:4). But new 744.6(c)(2) would expand (b) in a way adverse to US interests. Old 744.6(b)(6)(ii) becomes operative if “you (U.S. person) know will be used in or by any of the end-uses or end-users described in paragraphs (b)(1) through (5)”; whereas, in new 744.6(c)(2), “BIS is hereby informing “U.S. persons” that a license is required for the following activities (located in (or to or within) the PRC), which could involve ‘support’ for the weapons of mass destruction-related end uses set forth in paragraph (b).”

Why should a U.S. person with no knowledge of a proscribed activity, but with knowledge of a non-proscribed activity for a dual use computer or IC, be required to seek a license involving a non-US-origin item, simply because of a BIS theory, based on no knowledge, that the activity “could involve” WMD use? There is no way, short of USG force against Chinese Government intent to proceed, that denial of such an application could be enforced. Even if USG action stopped the transaction, Chinese retaliation (*e.g*., rare earth export controls) would almost certainly follow.

1. 14, 16, 17, 18 – new 744.23 “Supercomputer” and semiconductor manufacturing end-use:

It is triply orders of magnitude difference to relate to “supercomputer” what US agreed 50 years ago to remove from COCOM controls, namely, 3A991, 4A994, 5A992, 3B991, and 3B992.

It is doubly orders of magnitude difference to relate to “supercomputer” current Wassenaar-based US controls, namely, 3A001, 4A003, 4A004, 5A002, 5A004, 3B001, and 3B002.

It is at least single order of magnitude difference to relate to “supercomputer” 3B611 and 3B090.

It is beyond my competence to comment on the relevance, or lack of relevance, to “supercomputer” of 744.23(a)(2)(iii)(A,B,C) IC parameters and limits.

It is not beyond my competence to label as unjustified 744.23(a)(2)(iv) inclusion, in the supercomputer end-use scope of “supercomputer,” a semiconductor fabrication facility in the PRC that “you do not know whether such semiconductor fabrication “facility” fabricates integrated circuits that meet any of the criteria in paragraphs (a)(2)(iii)(A) through (C).”

US “supercomputer” end-use controls should not be limited to those “located in or destined to China.” License requirements for end-uses per 744.23 should not be limited to supercomputers “located in or destined to the PRC.” In order to achieve multilateral controls on supercomputer end-use, numerous other member countries of one or more of the following would have to concur: Wassenaar (China not member but Russia is), IAEA Trigger List (China 1984), Nuclear Suppliers Group (China 2004), Missile Technology Control Regime (China non-member but pledging to adhere).

B Proposed Rule request public comment prior to effective dates:

1. Send to Wassenaar the following proposal:

a In 3A1, add ICs that meet or exceed 8 WTOPS;

b In 3B1, add 3B090 parameters and limits:

c Add supercomputer, and components, software, and technology having supercomputer characteristics, to Very Sensitive List (VSL) (denial licensing policy to all destinations, no license exceptions);

d Add the following, and components, software, and technology having those characteristics, to Sensitive List (denial licensing policy except case-by-case review to A:5):

4A3b per 4A090, 3A1 per 3A090, and 3B1 per 3B090;

f Based on COCOM 1951 Administrative Principle 4 limiting controlled components to those which would “defeat the purpose of the embargo,” delete “specially designed” and “therefor” and replace “therefor” with “having the characteristics of” in 3A1c, 3B1 heading, 4A1 heading, 4A3b heading, and 4A4 heading;

g Because of adequate technical parameters, delete “specially designed” from the following: 3A1d, 3A1e3 Note, 3B1f3, 3B1j1, 4A1a, a1 Note , a2 Note, 4A3c (or modified), 4A3g, 4A5 (or modified), 4E1b2 (or modified), 5A2a (designed or modified), 5A2 Note 2j, 5A2c(designed or modified), 5A2d (designed or modified), 5A3 (or modified), 5A4a (designed or modified), 5A4a Note (designed or modified), 5A4b Note 1, 5A4b Note 2d (specially designed and limited to);

h In 5E1b2, delete “with the capability of” and, in 5E1b3, delete “capabilities”;

i Long ago, COCOM decided to use “required,” rather than “specially designed,” for software or technology without adequate technical parameters. Therefore, change “specially designed” to “required” in: 3D1 (heading), 3D2 (heading), 3D3 (heading), 3D4 (heading), 4D1a (or modified), 4D1b (or modified), 4D1b2 (or modified), 5D1a (or modified), 5D1c (or modified), 5D1d (or modified), 5D1d2b Note (or modified), 5D1e (or modified), 5D1e (Technical Note 1 (designed)), 5D2 definition (or modified), 5D2a (or modified).

1. Propose following EAR revision not relevant to Wassenaar: Add 28 entities to 744 Supp 4 annotated by Note 4, including “(See 734.9(e) and 744.11 of the EAR for additional license requirements for Foreign-Direct Product.)”