Public Submission

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Public Submission

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Uploaded to: https://www.regulations.gov/commenton/BIS-2022-0025-0002
Courtesy copy sent to: rpd2@bis.doc.gov

Ms. Eileen Albanese
Director, Office of National Security and Technology Transfer Controls
Bureau of Industry and Security (BIS)
U.S. Department of Commerce
1401 Constitution Ave. NW
Washington, DC 20230

RE: Comments on 87 Fed. Reg. 62186 (Oct. 13, 2022); RIN 0694-AI94; Docket No. 220930-0204

Note: This document contains business confidential information protected from public disclosure under 5 USC § 552(b)(4). A public version of this document, with such information redacted, is filed separately.

Dear Ms. Albanese:

Headquartered in Santa Clara, California and founded in 1967, Applied Materials, Inc. (Applied), provides manufacturing equipment, services and software to the global semiconductor, flat panel display, solar photovoltaic (PV) and related industries. Our customers include manufacturers of semiconductor wafers and chips, flat panel liquid crystal displays (LCDs), solar PV cells and modules, and other electronic devices.

Applied submits these comments in response to BIS's request for comments on the above-captioned rule. The four comments are focused on requested technical corrections to new ECCN 3B090 so that the control can effectively achieve BIS's policy objectives without unintended consequences. If the requested edits are not made, then the controls will apply to equipment now used to produce mature node semiconductors, which is an impact outside the stated goal of the rule. In addition, without the requested edits being made, the controls will describe tools that foreign companies outside the United States make and export to China and other countries that are not subject to any export controls. Thus, the unilateral controls, as worded, are ineffective because they will not prevent the export of such tools to China from countries outside the United States. The requested edits are also necessary to help level the regulatory playing field in the short term for competitors of US companies.

To be clear, Applied is not opposing the imposition of the types of controls described in ECCN 3B090 or in sections 744.6 or 744.23. To the contrary, our comments are designed to help ensure that the controls are both effective in their stated objectives without unintended consequences, such as on the production of mature node semiconductors or the creation of unlevel regulatory playing fields. The details behind each of our comments and recommended solutions are set forth below in turn.

Comment 1: ECCN 3B090.a.1 under-controls the types of equipment at issue and could be available from non-US manufacturers.

Request 1: Add the words "or electroless" after "electroplating" to ECCN 3B090.a.1.

ECCN 3B090.a.1 controls "equipment for depositing cobalt through electroplating processes." The control does not refer to "electroless" plating, which is an alternative means to enable the selective cobalt process described in ECCN 3B090.a.5. In other words, equipment for depositing an alloy of cobalt through electroless plating is also equipment that is specific to the production of semiconductors at the 14 nm nodes or smaller [redacted]

Foreign Availability: Based on publicly available information, [redacted] will soon be, able to produce equipment described in ECCN 3B090.a.1. [redacted]

Comment 2: ECCN 3B090.a.2 applies to tools available outside the US used to produce mature node semiconductors.

Request 2: Remove the words "or tungsten" in ECCN 3B090.a.2 or, in the alternative, remove ECCN 3B090.a.2 completely because ECCN 3B090.a.8 covers the same scope of equipment.

ECCN 3B090.a.2 controls "chemical vapor deposition equipment capable of deposition of cobalt or tungsten fill metal having a void/seam having a largest dimension less than or equal to 3 nm in the fill metal using a bottom-up fill process." The inclusion of the words "or tungsten" in this control appears to be a mistake because equipment capable of chemical vapor deposition of tungsten has been in use for producing semiconductors at the 90nm and larger technology nodes for more than two decades. [redacted]

[redacted]

To fix this apparent error, the words "or tungsten" could be removed. Another option would be to remove ECCN 3B090.a.2 because the equipment described in the subparagraph are all already within the scope of the tools described in ECCN 3B090.a.8, which describes the equipment for cobalt fill.

Foreign Availability: Equipment within the scope of ECCN 3B090.a.2 has been produced and sold for more than a decade by non-U.S. companies [redacted]

Comment 3: ECCN 3B090.a.6 applies to tools available outside the US used to produce mature node semiconductors.

Request 3: Remove ECCN 3B090.a.6 because it is not limited to the production of advanced node semiconductors and, in any event, ECCN 3B090.a.8 already controls the types of equipment apparently intended to be controlled by the ECCN.

ECCN 3B090.a.6. controls "physical vapor deposition equipment capable of depositing a cobalt layer with a thickness of 10 nm or less on a top surface of a copper or cobalt metal interconnect." BIS apparently inadvertently worded the control in such a way that it is not limited to equipment specific to the production of advanced node semiconductors. That is, the control text is not limited in scope to the production of cobalt interconnects on semiconductors at the 14 nm or smaller technology nodes. Rather, it applies equally to equipment that is widely used to produce mature node semiconductors (e.g., at the 65 nm technology node) that have been in production for more than a decade. [redacted]

Thus, we request that the entry be removed because it is not limited in scope as BIS apparently intended. No edits or replacements are necessary to accomplish BIS's apparent objective with the control because ECCN 3B090.a.8 already controls deposition equipment for enabling cobalt metal conductors, which is necessary for advanced node semiconductor production.

Foreign Availability: Equipment within the scope of ECCN 3B090.a.6 has been produced and sold for more than a decade [redacted]

Comment 4: ECCN 3B090.a.11 applies to tools available outside the US used to produce mature node semiconductors.

Request 4: Revise slightly ECCN 3B090.a.11 so that it is limited in scope to equipment specific to producing advanced node semiconductors.

ECCN 3B090.a.11 controls "atomic layer deposition equipment capable of producing a void/seam free fill of tungsten or cobalt in a structure having an aspect ratio greater than 5:1, with openings smaller than 40 nm, and at temperatures less than 500 °C." Although BIS apparently intended this control to only apply to equipment specific to producing advanced node semiconductors, it is worded in such a way that it also applies to tools that have been used for more than a decade to produce mature node semiconductors. [redacted]

Instead, the language would need to be slightly revised so that it is focused only on the atomic layer deposited fill process. An example of such a revised entry would be to add in the words "through atomic layer deposition processing only" after the word "producing." If accepted, the control would be over: "Atomic layer deposition equipment capable of producing through atomic layer deposition processing only a void/seam free fill of tungsten or cobalt in a structure having an aspect ratio greater than 5:1, with openings smaller than 40 nm, and at temperatures less than 500°C."

Foreign Availability: Equipment within the scope of ECCN 3B090.a.11 has been produced and sold for more than a decade [redacted]

* * *

We again would like to thank the Department of Commerce, Bureau of Industry and Security for the opportunity to provide our unique perspective following the imposition of new export controls on semiconductor manufacturing equipment.

If you have any additional questions or would like to discuss these comments further, please contact me at (202) 414-2777.

Sincerely,

John D. Kania
Managing Director, Government Affairs[1]

[1] This submission contains confidential and sensitive business and commercial information that is business proprietary and exempt from the public access provisions of the Freedom of Information Act ("FOIA"), 5 U.S.C. § 552. Further, consistent with the terms of section 4820(h)(1) of the Export Control Reform Act of 2018, this submission is prohibited from public disclosure or other disclosure under § 552 of FOIA. Such information, if disclosed, could adversely affect the financial position of Applied Materials and the normal conduct of its operations. We understand that in the event of such a demand, you will give us prompt notice and an opportunity for Applied Materials to be heard prior to taking any action to disclose.