

Semiconductor Industry Association in the China  
Semiconductor Industry Association in the Chinese Taipei  
Semiconductor Industry Association in the Europe  
Semiconductor Industry Association in the Japan  
Semiconductor Industry Association in the Korea  
Semiconductor Industry Association in the United States

Comments of the Associations of the World Semiconductor Council (WSC)  
On the  
Consultation Document on Proposed Amendments to the  
*Prohibition of Certain Toxic Substances Regulations, 2012*  
for PFOS, PFOA, LC-PFCAs, HBCD, PBDEs, DP and DBDPE  
(December 2018)

February 18, 2019

The associations of the World Semiconductor Council (WSC)<sup>1</sup> appreciate the opportunity to submit the following comments on the “Consultation Document on Proposed Amendments to the *Prohibition of Certain Toxic Substances Regulations, 2012* for PFOS, PFOA, LC-PFCAs, HBCD, PBDEs, DP and DBDPE” (December 2018).

The comments of the WSC associations focus on the portions of the proposal to further restrict the manufacture, use, sale, offer for sale and import of perfluorooctane sulfonate (PFOS), its salts and precursors, perfluorooctanoic acid (PFOA), and long chain perfluorocarboxylic acids (LC-PFCAs). The WSC associations support the proposal by Environment and Climate Change Canada (ECCC) to remove certain exemptions applicable to these chemicals and implement a full prohibition, but we urge ECCC to maintain certain exemptions applicable to the semiconductor industry to allow for an orderly phase out of remaining uses of these chemicals in both our operations and our manufacturing equipment.

Background on the Use of PFASs in the Semiconductor Industry

The semiconductor industry uses various Per- and Polyfluoroalkyl Substances (PFAS) in the highly complex process of manufacturing semiconductors. The industry relies on this family of chemicals because they possess unique chemical and physical attributes. These chemicals possess special performance and functional characteristics that make it useful in the complex process of manufacturing advanced semiconductors with billions of transistors on a single circuit. In most instances, there are typically no viable “drop-in” alternatives to the chemicals in use in the manufacturing process. These chemicals are carefully integrated into advanced manufacturing equipment and processes and have significant interdependence with other process steps.

Semiconductor manufacturing occurs in highly specialized equipment, called “tools,” and these tools may contain PFAS chemicals and related compounds. Tools are typically multi-million

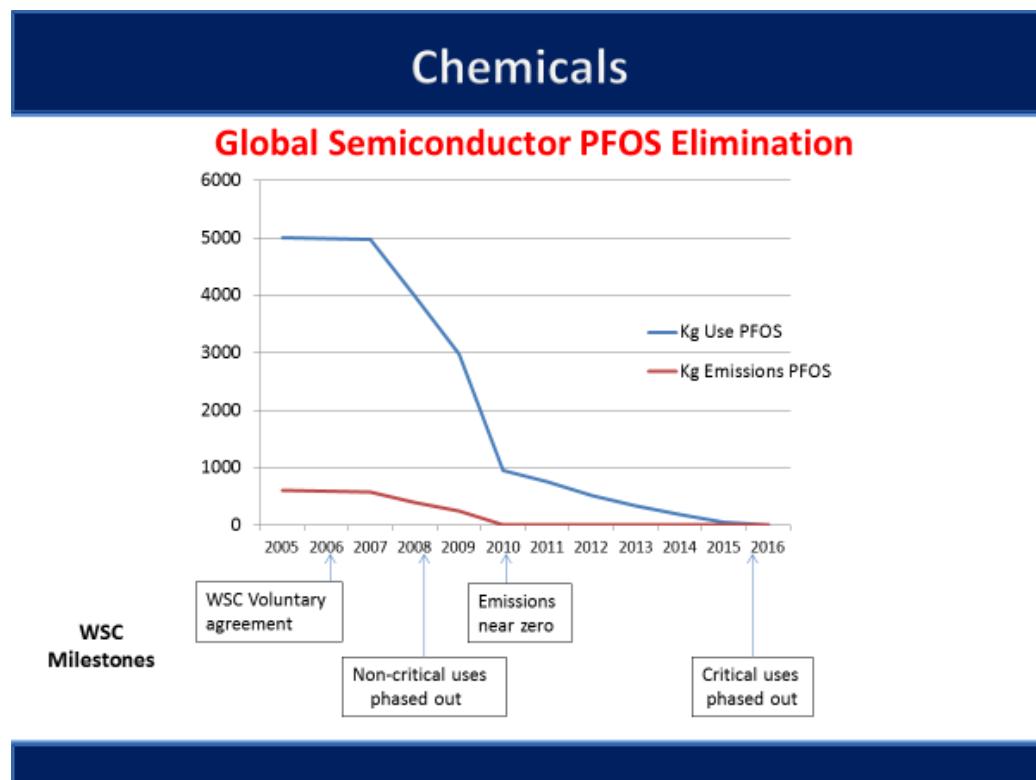
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<sup>1</sup> The World Semiconductor Council (WSC) is an international forum that brings together industry leaders to address issues of global concern to the semiconductor industry. Comprised of the semiconductor industry associations (SIAs) of the China, Chinese Taipei, Europe, Japan, Korea, and the United States, the goal of the WSC is to promote international cooperation in the semiconductor sector in order to facilitate the healthy growth of the industry from a long-term, global perspective. For more information, see <http://www.semiconductorcouncil.org/>.

dollar pieces of equipment comprised of many thousands of parts. The tools perform the various manufacturing processing steps necessary to produce modern semiconductors, typically in an enclosed process with significant, and often redundant, controls and safety measures. Many of the steps in the manufacturing process require total isolation of the product from the surrounding environment to prevent contamination from dust or humidity. The clean rooms in which these operations take place are 10-1,000 times cleaner than hospital operating rooms. Many of the same conditions that protect the manufacturing process also protect the workers and minimize the release of chemicals to the environment. Specialized fab infrastructure and ancillary equipment (piping, tubes, valves, etc.) may also contain PFAS chemicals and related compounds.

#### The Associations of the WSC Support the Proposed Elimination of the Exemption for PFOS

The associations of the WSC support the proposed elimination of the exemption for perfluorooctane sulfonate (PFOS). Under the auspices of the WSC, the global industry announced in May 2017 that the industry successfully achieved its voluntary goal of eliminating uses of PFOS.<sup>2</sup> The chart below summarizes this accomplishment.



The PFOS experience demonstrates that when governments around the world engage with the semiconductor industry, we can work collaboratively to achieve shared environmental goals. This success was dependent on the Stockholm Convention providing the industry with sufficient time to transition to alternative chemicals. Given that the industry has successfully phased out the use of PFOS, the associations of the WSC support the ECCC proposal to eliminate the exemptions for PFOS or a product containing it if it is designed for use in photoresists or anti-

<sup>2</sup> See <http://www.semiconductorcouncil.org/wp-content/uploads/2017/05/21st-WSC-Joint-Statement-May-2017-Kyoto-Final1.pdf>.

reflective coatings for photolithography. The ECCC correctly recognizes that the global industry has transitioned away from PFOS and identified appropriate substitutes.

The Associations of the WSC Request ECCC Maintain the Exemption for PFOA and LCPFAC to Provide Adequate Time to Complete the Transition to Alternative Chemicals

The associations of the WSC call on the ECCC to provide for exemptions for key semiconductor uses of PFOA and related compounds to allow sufficient time for an orderly phase-out of these chemicals. While PFOA may not be manufactured in Canada and there are no semiconductor fabs in the country, there are likely numerous companies in the global semiconductor supply chain in Canada that contribute components or parts for the global industry. Some semiconductor companies have transitioned from PFOA and related substances in their operations, but others continue to use these chemicals in some applications. Companies will continue to work on the process of transitioning to alternatives that consist of shorter-chain molecules, but this transition will take time and is not guaranteed in all applications. The process of identifying, qualifying, and introducing substitutes in a wide range of applications is complex and expensive, and – as demonstrated by the experience with PFOS – the industry needs sufficient time and flexibility to continue with this process. Accordingly, the associations of the WSC request that ECCC maintain the exemption for PFOA and related substances to provide adequate time for the semiconductor industry to complete the transition to alternative chemicals.

Under the auspices of the WSC, the companies in the global semiconductor industry announced a commitment to phase out the use of PFOA in its manufacturing processes by 2025.<sup>3</sup> The global industry is now working to track our progress toward achieving this goal. Accordingly, we request that ECCC maintain the exemption for PFOA and related substances until 2025 to enable the industry to complete the process of identifying, qualifying, and introducing alternative chemicals into their operations and complete the transition to substitute chemistries.

Specifically, the associations of the WSC request an exemption for each of the following:

- (a) The semiconductor industry's uses of PFOA and related compounds in its manufacturing processes, and
- (b) The semiconductor industry's uses of PFOA and related compounds in advanced semiconductor manufacturing equipment, parts, and related fab infrastructure.

Additional time will be needed beyond 2025 to address the presence of PFOA and related substances in spare parts used in semiconductor manufacturing equipment. Semiconductor tools include thousands of components, some of which may contain PFOA and related substances. It will likely take additional time for the global supply chain, including suppliers in Canada, to complete the transition from PFOA and related substances, and the industry will require the continued production of spare parts to maintain fab equipment. We note that the ECCC proposal includes a time-limited exemption for the import and use of decaBDE in automotive replacement parts until 2036. The same reasoning applicable to this exemption applies to the need for an exemption for spare parts in semiconductor manufacturing equipment

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<sup>3</sup> See Joint Statement of the 22<sup>nd</sup> Meeting of the World Semiconductor Council (May 2018 San Diego, USA), available at <http://www.semiconductorcouncil.org/wp-content/uploads/2018/05/22nd-WSC-Joint-Statement-San-Diego-CA-FINAL-1.pdf>

This approach would be consistent with other regulatory actions taken around the world regarding the use of PFOA and related substances in the semiconductor industry. In 2017, the European Commission published the final regulation on PFOA in the EU's Official Journal. Annex XVII to Regulation (EC) No 1907/2006 provides for the following exemptions for the semiconductor industry:

- Photolithography – exemption with no time limitation for “photo-lithography processes for semiconductors or in etching processes for compound semiconductors”
- Equipment – exemption for “equipment used to manufacture semi-conductors” for 5 years (effective date of 04 July 2022) in a concentration equal to or above 25 ppb of PFOA including its salts or 1 000 ppb of one or a combination of PFOA-related substances”
- Articles – exemption from the concentration limits otherwise applicable to articles for “semiconductors or compound semiconductors”

The associations of the WSC support the European regulation, and we call on the ECCC to adopt similar exemptions. This approach would also be consistent with the approach adopted by the Stockholm Convention with regard to PFOA and related substances.

The Associations of the WSC Requests Any Phase-Out Include Measurable and Feasible Thresholds

The ECCC proposal lacks the inclusion of threshold levels. The absence of thresholds is problematic because companies need measurable and feasible thresholds to ensure compliance with regulations governing the presence of chemicals. It is possible that minute quantities of a banned chemical may be present in a chemical formulation or article, even if unintentionally present. In the absence of threshold quantities set forth in the regulation, companies will lack the ability to assure compliance. The associations of the WSC request that ECCC include measurable and feasible thresholds in any phase-out of these chemicals.

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The associations of the WSC appreciate the opportunity to provide comments, and we look forward to working with the Canada ECCC on appropriate regulation of PFAS chemicals in the semiconductor industry.